# MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES

'G' Scheme

# **COURSE NAME : CIVIL ENGINEERING GROUP**

# **COURSE CODE : CE/CS/CR/CV**

tÛJ

# DURATION OF COURSE : 6 SEMESTERS for CE/CS/CR (8 SEMESTERS for CV)

#### **SEMESTER : FOURTH**

#### **PATTERN : FULL TIME - SEMESTER**

# WITH EFFECT FROM 2012-13 DURATION : 16 WEEKS

# SCHEME : G

| ~~        |                                                                                                   |                  | TEACHING    |                                                        | EXAMINATION SCHEME |              |         |        |    |     |        |   | a <b></b> - |     |    |    |
|-----------|---------------------------------------------------------------------------------------------------|------------------|-------------|--------------------------------------------------------|--------------------|--------------|---------|--------|----|-----|--------|---|-------------|-----|----|----|
| SR.<br>NO | SUBJECT TITLE                                                                                     | Abbrevi<br>ation | SUB<br>CODE | $\begin{array}{c c c c c c c c c c c c c c c c c c c $ |                    | PAPER TH (1) |         | PR (4) |    | OR  | OR (8) |   | TW (9)      |     |    |    |
| 110       |                                                                                                   | ution            | CODE        |                                                        |                    | Min          | (17100) |        |    |     |        |   |             |     |    |    |
| 1         | Environmental Studies \$                                                                          | EST              | 17401       | 01                                                     |                    | 02           | 01      | 50#*   | 20 |     |        |   |             | 25@ | 10 |    |
| 2         | Transportation Engineering                                                                        | TEN              | 17418       | 03                                                     |                    |              | 03      | 100    | 40 |     |        |   |             |     |    |    |
| 3         | Advanced Surveying                                                                                | ASU              | 17419       | 03                                                     |                    | 04           | 03      | 100    | 40 | 50# | 20     |   |             | 50@ | 20 |    |
| 4         | Geo Technical Engineering                                                                         | GTE              | 17420       | 03                                                     |                    | 02           | 03      | 100    | 40 |     |        |   |             | 25@ | 10 | 50 |
| 5         | Hydraulics                                                                                        | HYD              | 17421       | 03                                                     |                    | 02           | 03      | 100    | 40 | 25# | 10     |   |             | 25@ | 10 | 50 |
| 6         | Theory of Structures                                                                              | TOS              | 17422       | 03                                                     | 01                 |              | 04      | 100    | 40 |     |        |   |             |     |    |    |
| 7         | Computer Aided Drawing                                                                            | CAD              | 17036       |                                                        |                    | 04           |         |        |    | 25# | 10     | - |             | 25@ | 10 |    |
| 8         | Professional Practices-II                                                                         | PPT              | 17037       |                                                        |                    | 03           |         |        |    |     |        |   |             | 50@ | 20 |    |
|           |                                                                                                   |                  | Total       | 16                                                     | 01                 | 17           |         | 550    |    | 100 |        |   |             | 200 |    | 50 |
| **        | Industrial Training (Ontional) Evamination in 5 <sup>th</sup> Semester Professional Practices-III |                  |             |                                                        |                    |              |         |        |    |     |        |   |             |     |    |    |

Student Contact Hours Per Week: 34 Hrs.

# THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.

#### Total Marks : 900

@ - Internal Assessment, # - External Assessment, No Theory Examination, \$ - Common to all branches, #\* - Online Theory Examination. Note: In plant training of 04 weeks after IV<sup>th</sup> semester & before V<sup>th</sup> semester. Optional for the students & to be assesses in the V<sup>th</sup> semester in PPT. Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work.

\*\* Industrial Training (Optional) - Student can undergo Industrial Training of four weeks after fourth semester examination during summer vacation.

Assessment will be done in Fifth semester under Professional Practices-III. They will be exempted from activities of Professional Practices-III of 5<sup>th</sup> Semester.

- Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subjects is to be converted out of 50 marks as sessional work (SW).
- > Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.
- > Code number for TH, PR, OR and TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.

MSBTE - Final Copy Dt. 30/08/2013

**Course Name : All Branches of Diploma in Engineering & Technology** 

# Course Code : AE/CE/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG/AU

Semester : Fourth

Subject Title : Environmental Studies

Subject Code : 17401

**Teaching and Examination Scheme:** 

| Teaching Scheme |    |    | Examination Scheme |      |    |    |     |       |  |
|-----------------|----|----|--------------------|------|----|----|-----|-------|--|
| TH              | TU | PR | PAPER<br>HRS       | TH   | PR | OR | TW  | TOTAL |  |
| 01              |    | 02 | 01                 | 50#* |    |    | 25@ | 75    |  |

#### **#\* Online Theory Examination**

NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Environment essentially comprises of our living ambience, which gives us the zest and verve in all our activities. The turn of the twentieth century saw the gradual onset of its degradation by our callous deeds without any concern for the well being of our surrounding we are today facing a grave environmental crisis. The unceasing industrial growth and economic development of the last 300 years or so have resulted in huge ecological problems such as overexploitation of natural resources, degraded land, disappearing forests, endangered species, dangerous toxins, global warming etc.

It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

The curriculum covers the aspects about environment such as Environment and Ecology, Environmental impacts on human activities, Water resources and water quality, Mineral resources and mining, Forests, etc.

General Objectives: The student will be able to,

- 1. Understand importance of environment
- 2. Know key issues about environment
- 3. Understands the reasons for environment degradation
- 4. Know aspects about improvement methods
- 5. Know initiatives taken by the world bodies to restrict and reduce degradation



# Theory:

| Topic and Contents                                                     | Hours | Marks    |
|------------------------------------------------------------------------|-------|----------|
| Topic 1: Nature of Environmental Studies                               |       |          |
| Specific Objectives:                                                   |       |          |
| Define the terms related to Environmental Studies                      |       |          |
| State importance of awareness about environment in general public      | 01    | 04       |
| Contents:                                                              | 01    | 04       |
| • Definition, Scope and Importance of the environmental studies        |       |          |
| Importance of the studies irrespective of course                       |       |          |
| Need for creating public awareness about environmental issues          |       |          |
| Topic 2: Natural Resources and Associated Problems                     |       |          |
| Specific Objectives:                                                   |       |          |
| Define natural resources and identify problems associated with<br>them |       |          |
| Identify uses and their overexploitation                               |       |          |
| Identify alternate resources and their importance for environment      |       |          |
| Contents:                                                              |       |          |
| 2.1 Renewable and Non renewable resources                              |       |          |
| • Definition                                                           |       |          |
| Associated problems                                                    |       |          |
| 2.2 Forest Resources                                                   |       |          |
| General description of forest resources                                |       |          |
| Functions and benefits of forest resources                             |       |          |
| • Effects on environment due to deforestation, Timber                  |       |          |
| extraction, Building of dams, waterways etc.                           | 04    | 10       |
| 2.3 Water Resources                                                    | 04    | 10       |
| Hydrosphere: Different sources of water                                |       |          |
| • Use and overexploitation of surface and ground water                 |       |          |
| • Effect of floods, draught, dams etc. on water resources and          |       |          |
| community                                                              |       |          |
| 2.4 Mineral Resources:                                                 |       |          |
| Categories of mineral resources                                        |       |          |
| Basics of mining activities                                            |       |          |
| Mine safety                                                            |       |          |
| • Effect of mining on environment                                      |       |          |
| 2.5 Food Resources:                                                    |       |          |
| Ered for all                                                           |       |          |
| • Food for all $\mathbf{F}(\mathbf{G})$ is the                         |       |          |
| • Effects of modern agriculture                                        |       |          |
| World food problem                                                     |       |          |
| Topic 3. Ecosystems                                                    |       |          |
| • Concept of Ecosystem                                                 | 0.1   | <u>.</u> |
| • Structure and functions of ecosystem                                 | 01    | 04       |
| • Energy flow in ecosystem                                             |       |          |
| Major ecosystems in the world                                          |       |          |
| Topic 4. Biodiversity and Its Conservation                             | 0.5   | 0.5      |
| Definition of Biodiversity                                             | 02    | 06       |
| Levels of biodiversity                                                 |       |          |

| <ul> <li>Human Health and Human Rights</li> </ul>                                                                     |    |
|-----------------------------------------------------------------------------------------------------------------------|----|
| environment                                                                                                           |    |
| i opulation ofowni. Aspects, importance and chect on                                                                  |    |
| Population Growth: Aspects importance and effect on                                                                   |    |
| Forest Conservation Act                                                                                               |    |
| • Wildlife Protection Act                                                                                             | 08 |
| • Water (Prevention and Control of Pollution) Act                                                                     |    |
| • Air (Prevention and Control of Pollution) Act                                                                       |    |
| Environmental Protection Act                                                                                          |    |
| Brief description of the following acts and their provisions:                                                         |    |
| Tonic 7 Environmental Protection                                                                                      |    |
| <ul> <li>Concept of Carbon Credits and its advantages</li> </ul>                                                      |    |
| and their effect on climate                                                                                           |    |
| Chimale Change, Global Warning, Acid rain, Ozone Layer     Depletion, Nuclear Accidents and Holocaust: Basic concepts |    |
| Climate Change, Clobal warming, Acid min, Ozona Lawer 03                                                              | 10 |
| • Water conservation, watershed management, Rain water                                                                |    |
| • Concept of development, sustainable development                                                                     |    |
| 1 opic o. Social Issues and Environment                                                                               |    |
| Noise Pollution: Definition, sources, effects, prevention                                                             |    |
| • Soil Pollution: Definition, sources, effects, prevention                                                            |    |
| prevention                                                                                                            |    |
| • Water Pollution: Definition, Classification, sources, effects,                                                      |    |
| prevention 03                                                                                                         | 08 |
| • Air pollution: Definition, Classification, sources, effects,                                                        |    |
| • Definition                                                                                                          |    |
| Topic 5. Environmental Pollution                                                                                      |    |
| Conservation of biodiversity                                                                                          |    |
| Threats to biodiversity                                                                                               |    |
| Value of biodiversity                                                                                                 |    |

#### Practical: Skills to be developed:

#### **Intellectual Skills**:

- 1. Collection of information, data
- 2. Analysis of data
- 3. Report writing

# **Motor Skills:**

- 1. Presentation Skills
- 2. Use of multi media

# List of Projects:

Note: Any one project of the following:

- 1. Visit to a local area to document environmental assets such as river / forest / grassland / hill / mountain
- 2. Visit to a local polluted site: Urban/Rural/Industrial/Agricultural
- 3. Study of common plants, insects, birds

4. Study of simple ecosystems of ponds, river, hill slopes etc

# Prepare a project report on the findings of the visit illustrating environment related facts, analysis and conclusion. Also suggest remedies to improve environment.

#### Learning Resources: Books:

| Sr.<br>No. | Author                                                | Title                                        | Publisher               |
|------------|-------------------------------------------------------|----------------------------------------------|-------------------------|
| 01         | Anindita Basak                                        | Environmental Studies                        | Pearson Education       |
| 02         | R. Rajgopalan                                         | Environmental Studies<br>from Crises to Cure | Oxford University Press |
| 03         | Dr. R. J. Ranjit Daniels, Dr.<br>Jagdish Krishnaswamy | Environmental Studies                        | Wiley India             |

**Course Name : Civil Engineering Group** 

Course Code : CE/CS/CR/CV

Semester : Fourth

Subject Title : Transportation Engineering

Subject Code : 17418

**Teaching and Examination Scheme:** 

| Teac | hing Scl | heme |              |     | Examinati | on Scheme |    |       |
|------|----------|------|--------------|-----|-----------|-----------|----|-------|
| TH   | TU       | PR   | PAPER<br>HRS | TH  | PR        | OR        | TW | TOTAL |
| 03   |          |      | 03           | 100 |           |           |    | 100   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

This subject caters to the need of technician engaged in the investigation, planning, construction and maintenance of railway, bridges, tunnels, airways and waterways. In Practical field, each component of transportation is a specialized branch of engineering.

This subject aims at basic knowledge about railway, bridges, tunnels, airport engineering and docks and harbour engineering in respect of their various types, materials used, functions of component parts, methods of construction, planning principles, aspects of supervision and maintenance.

Topic of railway engineering will be useful to understand the components of permanent way with their function, different types of rails and rail gauges. The topic of track geometry and yards will be useful to plan for station and yard layout. The topic on maintenance will be useful in the supervision of railway track.

Content on bridge engineering will be useful to understand different types and components of bridges with their functions. The content in topic site investigation will be useful while taking decision about site selection for a bridge.

Topic on tunnel engineering will be useful to understand different cross-sections of tunnel and methods of tunnellining. Contents on investigation will be useful for transferring the centre line of tunnel during construction.

Topic on Airport engineering and Docks and harbour engineering will be useful to understand different terms and used in these fields.

Thus all modes of transportation are useful in the development of a nation and improving over all standards in Agricultural, medical, industrial, educational and social fields.

#### **General Objectives:**

Student will be able to-

- 1. Know component parts of railway, bridges, tunnels, airport and dock and harbour engineering
- 2. Understand methods of survey and investigation of alignment of railway, bridges and tunnels.

3. Organize, supervise and coordinate the construction activities related to railway, bridges and tunnels





# Theory:

| Topic and Contents                                                        | Hours | Marks |
|---------------------------------------------------------------------------|-------|-------|
| Topic 1. Overview of Transportation Engineering                           |       |       |
| Specific objectives:                                                      |       |       |
| $\succ$ List various modes of transportation system with their merits and |       |       |
| demerits                                                                  |       |       |
| State importance of cross drainage works                                  |       |       |
|                                                                           | 02    | 04    |
| Contents:                                                                 | 02    | 04    |
| Role of transportation in the development of nation                       |       |       |
| • Modes of transportation system - roads, railway, airways,               |       |       |
| waterways, Importance of each mode, comparison and their relative         |       |       |
| merits and demerits.                                                      |       |       |
| • Necessity of Cross drainage works for railways.                         |       |       |
| Topic 2. Railway Engineering                                              |       |       |
|                                                                           |       |       |
| Specific objectives:                                                      |       |       |
| List zones of Indian Railway and rail gauges.                             |       |       |
| > State component parts of permanent way with their functions types,      |       |       |
| merits and demerits.                                                      |       |       |
| Calculate the superelevation and cant deficiency.                         |       |       |
| > Draw different track junctions and station yards                        |       |       |
| Contents:                                                                 |       |       |
| 2.1 Alignment and Gauges and Permanent ways                               |       |       |
| Classification of Indian Railways, zones of Indian Railway.               |       |       |
| Alignment- Factors governing rail alignment.                              |       |       |
| Rail Gauges – types, factors affecting selection of gauge. Rail track     |       |       |
| cross sections – standard cross section of BG and M.G Single and          |       |       |
| double line in cutting and embankment.                                    |       |       |
|                                                                           |       |       |
| Permanent ways                                                            |       |       |
| Ideal requirement, component parts.                                       |       |       |
| Rails - function and its types. Rail Joints - requirements, types, Creep  | 18    | 32    |
| of rail, causes and prevention of creep. Sleepers - functions and         |       |       |
| Requirement, types - wooden, metal, concrete sleepers and their           |       |       |
| suitability, sleeper density Ballast - function and different types with  |       |       |
| their properties, relative merits and demerits. Rail fixtures and         |       |       |
| fastenings – fish plate, bearing plates, spikes, bolts, keys, anchors and |       |       |
| anti creepers.                                                            |       |       |
|                                                                           |       |       |
| 2.2 Railway Track Geometrics and Branching of Tracks14                    |       |       |
| • Coning of wheels, tilting of rails, Gradient and its types, Super       |       |       |
| elevation limits of Super elevation on curves, cant deficiency negative   |       |       |
| cant, grade compensation on curves                                        |       |       |
| Branching of Tracks                                                       |       |       |
| Definition of point and crossing, a simple split switch turnout           |       |       |
| consisting of points and crossing lines. Sketch showing different         |       |       |
| components, their functions and working. Line sketches of track           |       |       |
| junctions-crossovers, scissor cross over, diamond crossing, triangle.     |       |       |
| Inspection of points and crossings.                                       |       |       |
| 2.3 Station and Yards and Track Maintenance06                             |       |       |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | r  | 1  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|
| • Site selection for railway stations, Requirements of railway                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |    |    |
| station. Types of stations (way side, crossing, junction and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |    |    |
| terminal)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |    |
| Chatian manda, taman af atatian manda Daaran ana ata ata                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |    |    |
| Station yards, types of station yard, Passenger yards, good                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |    |    |
| yard Locomotive yard – its requirements, water column,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |    |    |
| Marshalling yard – its types.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |    |    |
| Track Maintenance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |    |    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |    |
| Necessity, types, Tools required and their function,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |    |    |
| orgnisation, duties of permanent way inspector, gang mate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |    |
| key man.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |    |    |
| Tonic 3. Bridge Engineering                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |    |    |
| Specific objectives:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |    |    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |    |
| Define different terminologies related to bridge engineering                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |    |    |
| State functions of component parts of bridge                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |    |    |
| Draw sketches of temporary and permanent bridges                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |    |    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |    |
| Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |    |    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |    |
| 3.1 Site selection and investigation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |    |    |
| Factors affecting selection of site of a bridge. Bridge alignment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |    |    |
| Collection of design data, Classification of bridges according to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |    |    |
| function material span size alignment position of HFI                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |    |    |
| 2.2 Component parts of bridge                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |    |    |
| 5.2 Component parts of officiency of the second sec |    |    |
| Plan and sectional elevation of bridge showing component parts of,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |    |    |
| substructure and super structure.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |    |    |
| Different terminology such as effective span, clear span, economical                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |    |    |
| span waterway afflux scour HFL freeboard etc                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 16 | 32 |
| Equilation function types Diego function requirements types                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |    |    |
| Foundation – function, types. Plets-function, requirements, types.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |    |    |
| Abutment – function, types. Wing walls – functions and types.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |    |    |
| Bearing – functions, types of bearing for RCC and steel bridges.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |    |    |
| Approaches – in cutting and embankment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |    |    |
| Bridge flooring- open and solid floors                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |    |    |
| 2.2 Demonstrand Temporary Dridges and Maintenance of Dridge 09                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |    |    |
| 5.5 Fermanent and Temporary Druges and Maintenance of Druge08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |    |    |
| • Permanent Bridges - Sketches and description in brief of culverts,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |    |    |
| causeways, masonry, arch, steel, movable steel bridges, RCC girder                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |    |    |
| bridge, prestressed girder bridge, cantilever, suspension bridge.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |    |    |
| Temporary Bridges- timber flying floating bridges                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |    |    |
| Temporary Druges- timber, rrying, noting bruges                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |    |
| • Inspection and Maintenance Of Bridge                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |    |    |
| Inspection of bridges-General points to be observed. Pre and post                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |    |    |
| mansoon inspection-Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |    |    |
| Maintenance of bridges: types – routine and special Maintenance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |    |    |
| Tonic 4 Tunnel Engineering                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |    |    |
| Specific objectives                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |    |    |
| specific objectives.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |    |    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |    |
| Draw tunnel cross sections for highways and railways.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |    |    |
| List data for tunnel investigation and survey.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |    |    |
| State precautions in constructions of tunnel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |    |    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 12 | 32 |
| Contonto                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |    |    |
| Contents:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |    |
| 4.116                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |    |    |
| • Definition, necessity, advantages, disadvantages, Classification of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |    |    |
| tunnels Shape and Size of tunnels Tunnel Cross sections for highway                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |    |    |
| and railwaye                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |    |    |
| and ranways                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1  |    |

|     | Total                                                                      | 48 | 100 |
|-----|----------------------------------------------------------------------------|----|-----|
|     | Tunnel lining and ventilation-Purpose and methods                          |    |     |
|     | drills carrying equipments, Types of explosives used in tunneling.         |    |     |
| •   | Precautions in construction of tunnels Drilling equipments-drills and      |    |     |
| -   | Descontions in construction of turnels Drilling equipments drills and      |    |     |
|     | method                                                                     |    |     |
|     | Hard rock-Full-face heading method Heading and bench method drift          |    |     |
|     | method. Line plate method, shield method. Methods of tunneling in          |    |     |
| •   | Methods of tunneling in Soft rock-needle beam method, fore-poling          |    |     |
| 4.2 | 16                                                                         |    |     |
|     | its purpose and construction.                                              |    |     |
|     | center line on ground, transferring center line inside the tunnel. Shaft - |    |     |
| ٠   | Tunnel investigations and surveying –Tunnel surveying locating             |    |     |
|     |                                                                            |    |     |

# Learning Resources: 1. Books:

| Sr.<br>No. | Title                                            | Author                       | Publisher                           |
|------------|--------------------------------------------------|------------------------------|-------------------------------------|
| 01         | Railway Engineering                              | S.C. Saxena                  | Dhanpatrai & sons                   |
| 02         | Railway Track                                    | K.R. Antia                   | The New Book Co. Pvt.<br>Ltd Mumbai |
| 03         | Principles of Railway Engineering                | S.C. Rangwala                | Charotar Publication                |
| 04         | Principles and Practice of Bridge<br>Engineering | S.P. Bindra                  | Dhanpatrai & sons                   |
| 05         | A Text book Transportation Book of Engineering   | N.L.Arora and S.P.<br>Luthra | IPH New Delhi                       |
| 06         | Elements of Bridge Engineering                   | J.S. Alagia                  | Charotar Publication                |
| 07         | Road railway and bridges                         | Birdi and Ahuja              | Std.Book house                      |

# 2. IS, BIS and International Codes:

| Sr.<br>No. | Title                        |
|------------|------------------------------|
| 01         | IS 4880,I.S.5878,Part-I to X |

Course Name : Civil Engineering GroupCourse Code : CE/CR/CS/CVSemester : FourthSubject Title : Advanced Surveying

Subject Code : 17419

# **Teaching and Examination Scheme:**

| Teac | hing Scl | neme |              |     | Examinati | on Scheme |     |       |
|------|----------|------|--------------|-----|-----------|-----------|-----|-------|
| TH   | TU       | PR   | PAPER<br>HRS | TH  | PR        | OR        | TW  | TOTAL |
| 03   |          | 04   | 03           | 100 | 50#       |           | 50@ | 200   |

# NOTE:

> Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.

# > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

In search of precision and accuracy surveyor has to use more precise instruments like transit theodolite, micro optic theodolite, digital theodolite, total station and digital planimeter. Being a versatile instrument theodolite can be used more precisely for all civil engineering survey works. After studying theodolite survey student will able to precisely measure horizontal and vertical angles and calculate coordinates of various stations. After studying components of curve students will able to set the curve.

After studying Tacheometry student will able to find horizontal distances and elevations of various stations. After studying contouring student will able to prepare and interpret contour map.

With the use of planimeter student will able to calculate area of contour and volume occupied. It is intended to abreast with new technology for which study and use of Total station becomes inevitable.

Geographical Information System (GIS) is rapidly used in technological field which intend to assess real-world problems. GIS backed by modern computers allow us to benefit from visual power of maps. It is the time demand to nurture civil engineers with latest surveying technology.

#### **General objectives**

#### Students will be able to:

- Understand handling and use of various survey instruments for field observations.
- Understand linear and angular measurements
- Select suitable instruments and appropriate method of survey.
- Understand the preparation of maps from the field observations.
- Interprete survey maps.



# Theory:

| Topic and Contents                                                                                             | Hours | Marks |
|----------------------------------------------------------------------------------------------------------------|-------|-------|
| Topic 1. Contouring                                                                                            |       |       |
| Specific objectives :                                                                                          |       |       |
| State the meaning of contour, contour interval and horizontal equivalent.                                      |       |       |
| Carry out contouring by direct and indirect method                                                             |       |       |
| > Interpret features of ground from contour map                                                                |       |       |
| Contents:                                                                                                      |       |       |
| • Concept of contour contour interval and horizontal equivalent                                                |       |       |
| Factors affecting contour interval Characteristics of contours                                                 | 06    | 14    |
| Interpretation of ground features from contour man. Uses of contour                                            | 00    | 14    |
| map                                                                                                            |       |       |
| Mathada of contouring Direct method and Indirect method (block                                                 |       |       |
| • Methods of contourning, Direct method and multect method (block                                              |       |       |
| contouring, Longitudinal and cross sectioning) interpolation of                                                |       |       |
| contour and its methods,                                                                                       |       |       |
| • Concept of grade contour, Establishing grade contour on ground,                                              |       |       |
| Locating grade contour on contour map.                                                                         |       |       |
| Topic 2. Area and Volume Measurement                                                                           |       |       |
| Specific objectives :                                                                                          |       |       |
| Measure the area of plans/maps.                                                                                |       |       |
| Compute the volume                                                                                             |       |       |
| Contents:                                                                                                      |       |       |
| • Instruments used for measuring the area- Polar Planimeter and Digital                                        | 04    | 10    |
| Planimeter, Polar Planimeter- Component parts and procedure of                                                 |       |       |
| measurement of area. Simple numerical problems.                                                                |       |       |
| <ul> <li>Digital planimeter- Component parts and procedure of measurement</li> </ul>                           |       |       |
| Computation of volume from contour mans by Transzoidal and                                                     |       |       |
| Computation of volume noni contour maps by Trapezoidal and     Driszmoidal formulae. Simple numerical problems |       |       |
| Topio 3. Theodolite Survey                                                                                     |       |       |
| Specific chiestives                                                                                            |       |       |
| Specific objectives :                                                                                          |       |       |
| Use the theodonite for measurement of norizontal angle, deflection angle,                                      |       |       |
| magnetic bearing and vertical angle                                                                            |       |       |
| > Carry out theodolite traversing                                                                              |       |       |
| Carry out calculations for Gale's traverse table.                                                              |       |       |
|                                                                                                                |       |       |
| 3.1(06)                                                                                                        |       |       |
| Types of theodolite, uses of theodolite, Component parts of transit                                            |       |       |
| theodolite and their functions, Reading the vernier of transit thedolite,                                      |       |       |
| Technical terms- Swinging, Transiting, Face left, Face right, Fundamental                                      |       |       |
| axes of transit theodolite and their relationship                                                              | 12    | 24    |
| 3.2(08)                                                                                                        |       |       |
| Temporary adjustment of transit theodolite, Measurement of horizontal                                          |       |       |
| angle- Direct and Repetition method, Errors eleminated by method of                                            |       |       |
| repetition, Measurement of magnetic bearing of a line, Prolonging and                                          |       |       |
| ranging a line, Measurement of deflection angle, Measurement of vertical                                       |       |       |
| Angle. Permanent adjustment of transit theodolite (only relationship of                                        |       |       |
| different axes of theodolite)                                                                                  |       |       |
| 3.3(10)                                                                                                        |       |       |
| • The dolite traversing by included angle method and deflection angle                                          |       |       |
| method. Check in open and closed traverse. Calculations of bearing                                             |       |       |
| from angles Traverse computation-I atitude Departure Consecutive                                               |       |       |
| nom angles, mayerse compatition-Latitude, Departure, Consecutive                                               |       |       |

| cordinates, Independent cordinates, Balancing traverse by Bowditch's                                                          |    |    |
|-------------------------------------------------------------------------------------------------------------------------------|----|----|
| rule and Transit rule, Gale's table calculations, Simple numerical                                                            |    |    |
| problems                                                                                                                      |    |    |
| Specific chiestives                                                                                                           |    |    |
| Specific objectives :                                                                                                         |    |    |
| <ul> <li>Ose tacheometer to find nonzontal and vertical distances</li> <li>Carry out contour survey by techoometer</li> </ul> |    |    |
| Carry out contour survey by tacheometer                                                                                       |    |    |
| Magning of tachaometer and tachaometry. Principle of tachaometry                                                              |    |    |
| • Weaking of tacheometer and tacheometer, Tacheometric formula for                                                            | 06 | 12 |
| horizontal distance with telescope horizontal and staff vertical Field                                                        | 00 | 12 |
| method for determining constants of tacheometer. Determining                                                                  |    |    |
| horizontal and vertical distances with tacheometer by fixed hair method                                                       |    |    |
| and staff held vertical. Limitation of tacheometry Simple numerical                                                           |    |    |
| problems.                                                                                                                     |    |    |
| • Contouring by tacheometer-Method and specific use.                                                                          |    |    |
| Topic 5. Modern Survey Instrument                                                                                             |    |    |
| Specific objectives :                                                                                                         |    |    |
| Use the microoptic theodolite for measurement of horizontal and vertical                                                      |    |    |
| angle                                                                                                                         |    |    |
| Use the digital theodolite for measurement of horizontal and vertical                                                         |    |    |
| angle                                                                                                                         |    |    |
| Use the digital level for finding and recording reduced level.                                                                |    |    |
| Solution Use the total station for surveying work                                                                             |    |    |
| Contents:                                                                                                                     |    |    |
| Component parts and procedure to set and use microoptic theodolite for                                                        |    |    |
| measurement of horizontal and vertical angle. Component parts and                                                             | 10 | 20 |
| procedure to set and use digital theodolite for measurement of horizontal                                                     |    |    |
| and vertical angle. Component parts and procedure to set and use digital                                                      |    |    |
| level or finding and recording reduced level.                                                                                 |    |    |
| 5.2(10)                                                                                                                       |    |    |
| Component parts of total station, Minimum inventory required, Set up of                                                       |    |    |
| total station, Setting a back sight, Azimuth mark, Measurement with                                                           |    |    |
| total station, General setting required for all stations, Field book                                                          |    |    |
| recording, Radial shooting, Survey station description by codes,                                                              |    |    |
| Instrument station entry, Data retrieval, Field generated graphics, Lay                                                       |    |    |
| out using Total station.                                                                                                      |    |    |
| Specific chiestiyes                                                                                                           |    |    |
| > List components of simple circular curve                                                                                    |    |    |
| <ul> <li>Set simple circular curve by offsets from long chord and Rankine's</li> </ul>                                        |    |    |
| deflection angle method                                                                                                       |    |    |
| Contents:                                                                                                                     | 06 | 12 |
| Necessity of curve. Classification of curve. Notation of simple circular                                                      |    |    |
| curve, Designation of curve                                                                                                   |    |    |
| • Setting simple circular curve by offsets from long chord and Rankine's                                                      |    |    |
| deflection angle method, Simple numerical problems.                                                                           |    |    |
| Topic 7. Remote sensing and GIS                                                                                               |    |    |
| Specific objectives:                                                                                                          | 04 | 08 |
| Descibe remote sensing process                                                                                                | 04 | 00 |
| Identify the components of GIS                                                                                                |    |    |

| Total                                                                  | 48 | 100 |
|------------------------------------------------------------------------|----|-----|
| • Introduction to GPS. Application of GPS in civil engineering.        |    |     |
| information, Environmental field.                                      |    |     |
| • Definition of GIS, Key components of GIS, Application of GIS in Land |    |     |
| Limitations of remote sensing                                          |    |     |
| Application of remote sensing, Advantages of remote sensing,           |    |     |
| remote sensing, Remote sensing data, Remote sensing processs,          |    |     |
| remote sensing System-1 assive system, Active system, Distance of      |    |     |
| remote sensing system-Passive system Active system Distance of         |    |     |
| • Definition of remote sensing, Concept of remote sensing, Types of    |    |     |
| Contents:                                                              |    |     |
| State applications of GPS                                              |    |     |
|                                                                        |    |     |

#### **Practicals:**

Skills to be developed:

# Instructions: Intellectual Skills:

- Understand different instruments for linear measurement and leveling.
- Understand the method of taking observations with the survey instruments.
- Understand specific use of various types of survey instruments.
- Identify the errors of the survey instruments.

# Motor Skills:

- Measure distances, Bearings and finding Reduced Levels with various survey instruments.
- Recording of survey field data collected in Field Book and Leveling Book.
- Prepare drawing (plans/maps) using survey data.
- Reading and Interpretation of drawing (plans/maps).

# **List of Practicals:**

- Group size for survey practical shall be about five students.
- Each teaching staff shall handle maximum two groups.
- Students shall record the observations in Field Book at field itself.
- One full day per project is required for project survey work.
- Drawing and plotting should be considered as a part of practical.
- Term work shall consists of record of all practicals and projects in field book and drawing sheets for the given projects.
  - 1. Carry out Block contouring of plot 30 m x 30 m with each block 5mx5m
  - 2. Locate a contour on a field by direct contouring method.
  - 3. To find area of given contour map with polar planimeter and digital planimeter
  - 4. Understanding different components of transit theodolite, Temporary adjustment and reading the vernier and recording it.
  - 5. Measurement of horizontal angle by transit theodolite (direct method)
  - 6. Measurement of horizontal angle by transit theodolite (repetition method)
  - 7. Measurement of magnetic bearing by transit theodolite
  - 8. Measurement of deflection angle by transit theodolite
  - 9. Measurement of vertical angle by transit theodolite
  - 10. Find constants of tacheometer
  - 11. To find horizontal distance and elevation of given object with tacheometer

- 12. Measure horizontal and vertical angle with micro-optic theodolite
- 13. Measure horizontal and vertical angle with digital theodolite
- 14. Use total station for measuring horizontal angle, vertical angle, horizontal distance, sloping distance, vertical distance.
- 15. Layout with total station
- 16. Setting curve by offset from long chord method
- 17. Setting curve by Rankine's deflection angle method

# **Mini Projects:**

- 1. Carry out Block contouring project for a plot 100mx120m with a block size 10mx10m plot the contours on imperial drawing sheet.
- 2. Theodolite survey for a closed traverse (5-6) sides and locating the details of buildings. Plotting the Gale's table and traverse on A1 size imperial drawing sheet.
- 3. Carry out block contouring using total station for a plot of 100x120 meter with block size of 5 m x5m on sloping ground and locate the building layout up to 100 square meter on site. Prepare the contour map and centre line plan on A-1 size imperial sheet.

# Learning Resources:

1. Books :

| Sr.<br>No. | Title                                  | Author                     | Publisher                         |  |
|------------|----------------------------------------|----------------------------|-----------------------------------|--|
| 1          | Surveying and Leveling- 38 th edition. | N.N. Basak                 | Tata McGraw Hill                  |  |
| 2          | Surveying- Volume-I, II Third Edition  | S.K. Duggal                | Tata McGraw Hill                  |  |
| 3          | Surveying and Leveling-1,II            | T.P. Kanetkar and Kulkarni | Pune Vidyarthi Grigh<br>Prakashan |  |
| 4          | Surveying and Leveling-1               | Dr. B.C. Punmia            | Laxmi Publication                 |  |
| 5          | Surveying and Leveling                 | R. Subramanian             | Oxford university press           |  |
| 6          | Advance Surveying                      | Satheesh Gopi, N. Madhu    | Pearson                           |  |
| 7          | Remote sensing and GIS                 | Basudeo Bhatta             | Oxford university press           |  |
| 8          | Surveying,( seventh edition)           | Arthur Bannister           | Pearson                           |  |

Course Name : Civil Engineering Group Course Code : CE/CS/CR/CV Semester : Forth Subject Title : Geo Technical Engineering Subject Code : 17420

# **Teaching and Examination Scheme**

| Tea | ching Sch | neme | Examination Scheme |     |    |    |     |       |
|-----|-----------|------|--------------------|-----|----|----|-----|-------|
| TH  | TU        | PR   | PAPER<br>HRS       | TH  | PR | OR | TW  | TOTAL |
| 03  |           | 02   | 03                 | 100 |    |    | 25@ | 125   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Geotechnical engineering is the important for every structure, since all structures rest on soil. The stability of these structures depends upon behavior of soil and bearing capacity of soil to carry loads under different loading conditions. Formation of soil and rocks, defects in rocks, soil behavior, and soil as an engineering material are essential parameter to an engineer. The design of foundation of buildings, dams, towers, embankments, roads, railways, retaining walls, bridges is mainly governed by these above stated parameters.

The content of this subject are also useful in designing basement, underground tank and underwater structures. Knowledge of geology, soil characteristics, and stress distribution under loading on soil, bearing capacity of soil is also useful to every engineer in the design, execution and stability analysis of structures.

# **General Objectives:**

#### Students will be able to

- 1) Know types of rocks and their formation, ground water table, detail investigation, mineralogy, earthquake forces and their effects.
- 2) Understand the structure and sub soil strata of earth.
- 3) Understand the causes and effects of earth quake
- 4) Understand soil properties and interpretation of results of test on soil.
- 5) Understand the suitability of foundation based on soil condition at site.
- 6) Know importance of shear strength, bearing capacity, stability of slopes and techniques of stabilization of soil.



#### **Theory:**

| Торіс                                                                                                           | Hours | Marks |
|-----------------------------------------------------------------------------------------------------------------|-------|-------|
| Topic 1: General geology, mineralogy and petrology.                                                             |       |       |
| Specific Objectives:                                                                                            |       |       |
| <ul> <li>State purpose of geology in civil engineering.</li> </ul>                                              |       |       |
| Describe different structure and composition of earth.                                                          |       |       |
|                                                                                                                 |       |       |
| • Introduction of geology, different branches of geology, importance of                                         | 04    | 06    |
| Introduction to mineralogy, physical properties of minerals depending                                           |       |       |
| on light and state of aggregation                                                                               |       |       |
| <ul> <li>Introduction of petrology definition of a rock classification based on</li> </ul>                      |       |       |
| their genesis (mode of origin) formation classification and                                                     |       |       |
| engineering uses of igneous, sedimentary and metamorphic rocks.                                                 |       |       |
| Topic 2: Structural Geology                                                                                     |       |       |
| Specific Objectives:                                                                                            |       |       |
| > State the meaning of different terms related to structural geology.                                           |       |       |
| State causes and condition of formation of fold, fault and joints.                                              | 02    | 06    |
| Contents:                                                                                                       | 02    | 00    |
| • StructuralGeology: Definition, importance, Outcrop, dip, strike, folds-                                       |       |       |
| Definition, parts and types, Joints- Definition and classification, Faults-                                     |       |       |
| Definition, parts and Types                                                                                     |       |       |
| Topic 3: Physical Geology.                                                                                      |       |       |
| Specific Objectives:                                                                                            |       |       |
| <ul> <li>State the effect of weathering on rocks.</li> <li>Describe the Forth movement and Velconism</li> </ul> |       |       |
| Contents:                                                                                                       |       |       |
| Introduction of Physical geology weathering Definition Types Soil-                                              |       |       |
| Definition formation of soil classification of soils                                                            | 06    | 12    |
| Earthquakes-Definition Terminology-focus Epicenter Intensity                                                    |       |       |
| Seismograph. Isoseismic lines. Classification of Earthquakes based on                                           |       |       |
| focus, origin, Richter's scale. Causes and effect of earthquakes. Record                                        |       |       |
| of earthquake, seismic waves Indian earthquakes, earthquake resistant                                           |       |       |
| structures                                                                                                      |       |       |
| Topic 4: Overview Geotechnical Engineering                                                                      |       |       |
| Specific Objectives:                                                                                            |       |       |
| State purpose of Soil as construction and Engineering material.                                                 |       |       |
| Describe field application of Geo-technical Engineering.                                                        |       |       |
|                                                                                                                 | 00    | 0.6   |
| • IS definition of soil, Importance of soil in Civil Engineering as                                             | 02    | 06    |
| bed for structures                                                                                              |       |       |
| <ul> <li>Field application of geotechnical angineering for foundation design</li> </ul>                         |       |       |
| • Field application of geotechnical engineering for foundation design,                                          |       |       |
| dams salient features of earthen dam in Maharashtra and India                                                   |       |       |
| Topics 5: Physical Properties of Soil                                                                           |       |       |
| Specific Objectives:                                                                                            |       |       |
| State the different physical properties of Soil.                                                                | 12    | 26    |
| Classify the soil as per IS classification.                                                                     |       |       |
| Contents:                                                                                                       |       |       |

| 5.1 Soil Properties (10 Marks)                                                            |    |    |
|-------------------------------------------------------------------------------------------|----|----|
| • Soil as a three phase system, water content, determination of water                     |    |    |
| content by oven drying method as per IS code, void ratio, porosity and                    |    |    |
| degree of saturation, density index, unit weight of soil mass – bulk unit                 |    |    |
| weight, dry unit weight, unit weight of solids, saturated unit weight,                    |    |    |
| submerged unit weight, determination of bulk unit weight and dry unit                     |    |    |
| weight by core cutter method and sand replacement method as per IS                        |    |    |
| code, specific gravity, determination of specific gravity by pycnometer.                  |    |    |
| 5.2 Consistency Limits of Soil                                                            |    |    |
| • Consistency of soil, stages of consistency, Atterberg's limits of                       |    |    |
| consistency viz. Liquid limit, plastic limit and shrinkage limit,                         |    |    |
| shrinkage limit as per IS code                                                            |    |    |
| 5.3 Grading of Soils                                                                      |    |    |
| Particle size distribution mechanical sieve analysis as per IS code                       |    |    |
| particle size distribution, meenanced sieve dianysis as per is code                       |    |    |
| coefficient and coefficient of curvature, well graded and uniformly                       |    |    |
| graded soils, particle size. classification of soils, I.S. classification of              |    |    |
| soil.                                                                                     |    |    |
| Topics 6: Permeability and Shear Strength of Soil.                                        |    |    |
| Specific Objectives:                                                                      |    |    |
| State the factors affecting the permeability of soil.                                     |    |    |
| Describe the shear failure of cohesive and Non-cohesive soil.                             |    |    |
| Contents:                                                                                 |    |    |
| • Definition of permeability, Darcy's law of permeability, coefficient of                 |    |    |
| permeability, factors affecting permeability, determination of                            |    |    |
| coefficient of permeability by constant head and falling head                             | 06 | 16 |
| permeability tests, simple problems to determine coefficient of                           | 00 | 10 |
| permeability. Seepage through earthen structures, seepage velocity,                       |    |    |
| seepage pressure, phreatic line, flow lines, application of flow net, (No                 |    |    |
| Shoer foilure of soil field situation of sheer foilure, concert of sheer                  |    |    |
| • Shear failure of soil, field situation of shearing resistance of soil – cohesion        |    |    |
| internal friction Mohr-coulomb failure theory Strength envelope                           |    |    |
| strength Equation for purely cohesive and cohesion less soils. Direct                     |    |    |
| shear test and vane shear test –laboratory methods.                                       |    |    |
| Topics 7: Bearing Capacity, Compaction and Stabilization of Soil                          |    |    |
| Specific Objectives:                                                                      |    |    |
| Describe the procedure of test for Bearing Capacity of soil.                              |    |    |
| State the necessity of compaction and stabilization of soil.                              |    |    |
| Contents:                                                                                 |    |    |
| 7.1 Bearing capacity and theory of earth pressure (14 Marks)                              |    |    |
| • Concept of bearing capacity, ultimate bearing capacity, safe bearing                    | 16 | 28 |
| capacity and allowable bearing pressure, introduction to Terzaghi's                       |    |    |
| analysis and assumptions made effect of water table on dearing<br>capacity                |    |    |
| <ul> <li>Field methods for determination of hearing capacity – Plate load test</li> </ul> |    |    |
| and standard penetration test. Test procedures as Per IS: 1888 & IS:                      |    |    |
| 2131.                                                                                     |    |    |
| Definition of earth pressure, active earth pressure and passive earth                     |    |    |

| <ul> <li>7.2 Compaction and consolidation</li></ul>                                                   |     | Total                                                                                                                                                                                                                                                                                | 48 | 100 |
|-------------------------------------------------------------------------------------------------------|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
| <ul> <li>assumptions made for non-cohesive Soils.</li> <li>7.2 Compaction and consolidation</li></ul> | •   | value.<br>Necessity of site investigation and sub-soil exploration, types of<br>exploration, criteria for deciding the location and number of test pits<br>and bores.Field identification of soil – dry strength test, dilatancy test<br>and toughness test.                         |    |     |
| <ul> <li>assumptions made for non-cohesive Soils.</li> <li>7.2 Compaction and consolidation</li></ul> | •   | Concept of soil stabilization, necessity of soil stabilization, different methods of soil stabilization – Mechanical soil stabilization, lime stabilization, cement stabilization, bitumen stabilization, fly-ash stabilization California bearing ratio C B R test meaning of C B R |    |     |
|                                                                                                       | 7.2 | assumptions made for non-cohesive Soils.<br>Compaction and consolidation                                                                                                                                                                                                             |    |     |

# Practicals: Skills to be developed:

# **Intellectual Skills**:

- 1. Identify type of rocks and mineral.
- 2. Identify properties of soil.
- 3. Interpret test results.
- 4. Understand IS procedure of testing.

# **Motor Skills:**

- 1. Measure the quantities accurately.
- 2. Handle the instruments carefully.

# List of Practicals:-

- 1. Identity different rocks specimen.
- 2. Prepare chart of different mineral families with physical properties.
- 3. (A) Determine water content of given soil sample by oven drying method as per I.S. 2720 part- II

# And

- 3. (B) Determine specific gravity of soil by pycnometer method as per I.S. 2720 part- III.
- 4. (A) Determine dry unit weight of soil in field by core cutter method as per I.S. 2720 part-XXIX.

# <u>OR</u>

- 4. (B) Determine dry unit weight of soil in field by sand replacement method as per I.S. 2720 part- XXVIII.
- 5. Determine Liquid Limit and Plastic Limit of given soil sample as per I.S. 2720 part- V.

- 6. Determine grain size distribution of given soil sample by mechanical sieve analysis as per I.S. 2720 part- IV.
- 7. (A) Determine co efficient of permeability by constant head test as per I.S. 2720 past- XVII

#### <u>OR</u>

- 7. (B) Determine co efficient of permeability by falling head test as per I.S.
- 8. (A) Determine shear strength of soil by direct shear test as per I.S. 2720 part- XIII

#### <u>OR</u>

- 8. (B) Determine shear strength of soil by vane shear test as per I.S. 2720 part- XXX
- 9. Determine MDD and OMC by standard proctor test of given soil sample as per I.S. 2720 part- VII.
- 10. Identify and classify soil by conducting field tests-Visual inspection, Dry strength test, Dilatancy test and Toughness test. (Organize visit to construction site)

**Note:** For experiments 4, 7 and 8, divide batch in two sub groups and allot experiment 'A' to one sub group and 'B' to other sub group .

#### Learning Resources:

1. Books:

| Sr.<br>No. | Author              | Title                              | Publisher             |
|------------|---------------------|------------------------------------|-----------------------|
| 1          | M.T. Maruthesha     | A text book of applied Engineering | New age International |
| 1          | reddy.              | Geology.                           | Publishers            |
| 2          | Dr P P Cupto        | A text book of Engineering         | Pune Vidyarthi Griha  |
|            | DI.R.B.Gupte        | Geology.                           | Prakashan.            |
| 2          | Prof.T.N.Ramamurthy | Geotechnical Engineering (Soil     | S Chand and Company   |
| 5.         | & Prof.T.G.Sitharam | Mechanics)                         | LTD.                  |
| 4          | Dr D C Dunmio       | Soil Mechanics and Foundation      | Standard Book House,  |
| 4          | DI.D.C.PuiiIIIa     | Engineering                        | New Delhi.            |

#### 2. IS, BIS and International Codes:

- 1. Is 2809-1972-Glossary of Terms and Symbols Relating To Soil Engineering?
- 2. Is 4410-Part Vii-1968-Engineering Geology
- 3. Is 1892-1979-Code oOf Practice For Sub Surface Investigation of Foundation
- 4. Is 2132-1986-Code of Practice For Thin Walled Tube Sampling
- 5. Is 2720-Test For Soil Part 1-1983 To Part 29

# 3. Websites:

www.totalgte.com, www.igs.org.in, www.gsi.gov.in, www.igsjournal.org, www.geology.com

Course Name : Civil Engineering Group Course Code : CE/CS/CR/CV Semester : Fourth Subject Title : Hydraulics

Subject Code : 17421

# **Teaching and Examination Scheme:**

| Teaching Scheme |    |    | Examination Scheme |     |     |    |     |       |
|-----------------|----|----|--------------------|-----|-----|----|-----|-------|
| TH              | TU | PR | PAPER<br>HRS       | TH  | PR  | OR | TW  | TOTAL |
| 03              |    | 02 | 03                 | 100 | 25# |    | 25@ | 150   |

# NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

# **Rationale:**

Hydraulics is a branch of engineering science which deals with behavior of liquids at rest as well as in motion. It forms the basis of core engineering subjects like Irrigation Engineering, Bridge Engineering and Inland water transport.

Problems in the field of water supply, irrigation, navigation can be solved by applying principles of Hydraulics.

Physical properties of water will be useful in the analysis of the flow of water through pipes, open channels.

The measurement of flow through pipe and open channel will be useful in the design of water supply system, design of irrigation channels and assessment of water charges for water supply and filed of irrigation.

The measurement of flow in open streams, flow over the spillways will be useful for regulation of flood discharge.

The empirical formulae developed in hydraulics are useful in solving engineering problems.

Thus this subject will help students in the hydraulic design of various civil engineering structures.

# General Objectives:

The students will able to:

- 1. Understand principles of pressure measuring devices and computation of hydrostatic pressure and center of pressure
- 2. Identify the types of fluid flow.
- 3. Estimate the loss of head for flow through pipes.
- 4. Estimate the diameter of pipes for different arrangements of pipes.

- 5. Design most economical channel section.
- 6. Estimate the discharge over weirs and notches.
- 7. Understand the velocity of flow in open streams as well as in pipes.
- 8. Decide horse power of pump and selection of pump.



# Theory:

| Topic and Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Hours | Marks |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
| Topic 1: Properties of fluid                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |       |
| Specific Objectives:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |       |
| Differentiate between fluids with solids                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |       |
| List properties of fluids                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |       |
| Contents :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |       |
| <ul> <li>Definition of fluid, Fluid mechanics and Hydraulics, Hydrostatics, Hydrodynamics. Difference in behavior of liquid with solids,</li> <li>Application of hydraulics with respect to irrigation and environmental engineering.</li> <li>Physical properties of fluid and standard values of Mass density, Weight density, Specific volume, Specific gravity, Surface tension and Capillarity, Compressibility, Viscosity, Ideal and Real fluids. Neuton's law of viscosity simple numerical methods.</li> </ul>                                                                                                                                                                 | 04    | 08    |
| Tonic 2: Hydrostatic Pressure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |       |
| Specific Objectives:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |       |
| Specific Objectives.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |       |
| <ul> <li>State principles, laws of hydrostatic pressure</li> <li>Compute total hydrostatic pressure and centre of pressure on</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |       |
| different surfaces                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |       |
| Contents :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |       |
| <ul> <li>Contents :</li> <li>Definition of pressure and its SI Unit. Hydrostatic pressure at a point in fluid, Pascal's law of fluid pressure. Variation of pressure in static liquid, Pressure diagram –concept and use.</li> <li>Total hydrostatic pressure and center of pressure-Determination of total pressure and center of pressure on vertical, inclined and horizontal plane surfaces in contact with liquid and horizontal plane surfaces in contact with liquid faces of dams, sides and bottom of water tanks sides and bottom of tanks containing two liquids. Vertical surface in contact with liquid on either side. Numerical Problems on all cases above.</li> </ul> | 08    | 12    |
| Topic 3: Measurement of Liquid Pressure In Pipes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |       |
| <ul> <li>Specific Objectives:</li> <li>State meaning of liquid pressure, pressure head</li> <li>State principles and uses of different pressure measuring devices</li> <li>Contents : <ul> <li>Concept of pressure, pressure head and its unit, conversion of pressure head of one liquid into pressure head of other liquid.</li> <li>Devices for pressure measurements in pipe, principles and working of Piezometer, U-tube simple manometers, U-tube differential manometers, Inverted manometers. Numerical problems. on manometers</li> <li>Bourdon's pressure gauge – construction and principle of working.</li> </ul> </li> </ul>                                             | 04    | 12    |
| Topic 4: Fundamentals of Fluid Flow                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |       |
| Specific Objectives:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |       |
| Identify type of flow                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0.5   | 10    |
| State the use of Reynolds number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 06    | 12    |
| <ul> <li>List the components of energy of liquid flow</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |       |
| Write the statement of Bernoulli's theorem as applied to flow of liquid.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |       |

| Contents:                                                                                                                                 |    |    |
|-------------------------------------------------------------------------------------------------------------------------------------------|----|----|
| • Types of flow- Gravity flow, pressure flow.steady and unsteady flow, uniform and non- uniform flow, laminar and turbulent flow. Various |    |    |
| combinations of above flows with practical examples.                                                                                      |    |    |
| • Reynolds number and its application. Stream line and equi-potential                                                                     |    |    |
| line. Flow net and its use.                                                                                                               |    |    |
| • Discharge and its unit, continuity equation for liquid flow.                                                                            |    |    |
| • Energy of flowing liquid – datum head, velocity head, pressure head.                                                                    |    |    |
| Bernoulli's theorem- statement, assumptions, equation. Loss of                                                                            |    |    |
| Numerical Problems on all above tonics                                                                                                    |    |    |
| Tonic 5: Flow of Liquid Through Pines                                                                                                     |    |    |
| Specific Objectives:                                                                                                                      |    |    |
| List various losses in flow through pipes                                                                                                 |    |    |
| Estimate loss of head for flow through pipes                                                                                              |    |    |
| List various pipe arrangements and calculate diameter of pipe                                                                             |    |    |
| Contents :                                                                                                                                |    |    |
| 5.1 Loss of energy or loss of head in flow through pipe06                                                                                 |    |    |
| • Loss of head due to friction- Darcy-Weisbach Equation.                                                                                  |    |    |
| <ul> <li>Moody's diagram and its use, common range of friction factor for<br/>different types of pipe materials.</li> </ul>               |    |    |
| • Minor loss of head in flow through pipe- loss of head due to sudden                                                                     | 08 | 16 |
| contraction, sudden expansion, entrance and exit losses. Losses in                                                                        | 00 | 10 |
| various pipe fittings.                                                                                                                    |    |    |
| 5.2 Different Pipes arrangements and hydraulic gradient                                                                                   |    |    |
| Flow through pipes in series and parallel pipes                                                                                           |    |    |
| <ul> <li>Frow through pipes in series and parallel pipes.</li> <li>Synhon pipe</li> </ul>                                                 |    |    |
| <ul> <li>Syphon pipe.</li> <li>Equivalent pipe. Dupit's equition</li> </ul>                                                               |    |    |
| <ul> <li>Equivalent pipe- Dupit's equilion.</li> <li>Hydraulic Gradient Line and Energy Gradient Line</li> </ul>                          |    |    |
| <ul> <li>Water Hammer- concept causes effects and remedial measures</li> </ul>                                                            |    |    |
| <ul> <li>Use of Nomograms for design of nine</li> </ul>                                                                                   |    |    |
| Numerical Problems on above tonics                                                                                                        |    |    |
| Topic 6: Flow Through Open Channel                                                                                                        |    |    |
| Specific Objectives:                                                                                                                      |    |    |
| Work out discharge through open channel                                                                                                   |    |    |
| Design most economical section of channel                                                                                                 |    |    |
|                                                                                                                                           |    |    |
| Contents :                                                                                                                                |    |    |
| 6.1 Open channel flow                                                                                                                     |    |    |
| • Definitions of open channel flow.                                                                                                       |    |    |
| • Types of channels- artificial and natural. Different snapes of artificial abannels Geometrical properties of abannel sections watted    | 07 | 16 |
| area wetted perimeter, hydraulic radius, hydraulic mean depth                                                                             |    |    |
| <ul> <li>Types of flow in open channel, steady unsteady and uniform non-</li> </ul>                                                       |    |    |
| uniform flow                                                                                                                              |    |    |
| 6.2 Determination of discharge through open channel                                                                                       |    |    |
| • Chezy's equation and Manning's equation.                                                                                                |    |    |
| • Most economical channel sections- conditions for most economical                                                                        |    |    |
| rectangular and trapezoidal channel sections.                                                                                             |    |    |
| 6.3 Hydraulic Jump04                                                                                                                      |    |    |

| • Froud's number and its significance.                                             |           |     |
|------------------------------------------------------------------------------------|-----------|-----|
| • Hydraulic Jump, its occurrence in field, use .                                   |           |     |
| Numerical Problems.on above all topics                                             |           |     |
| Topic 7: Flow Measurement Techniques                                               |           |     |
| Specific Objectives:                                                               |           |     |
| Understand principles and working of flow measuring devices                        |           |     |
| Determine discharge through pipes and open streams                                 |           |     |
| Contents :                                                                         |           |     |
| 7.1 Discharge measuring devices for pipes                                          |           |     |
| • Venturimeter- component parts, its working, determination of                     |           |     |
| discharge through venturimeter.                                                    |           |     |
| • Flow through orifice-Definition, use, types. Hydraulic Coefficients of           |           |     |
| orifice $(C_{d}, C_{c}, C_{v})$ , relation between them and their determination,   | 07        | 16  |
| Discharge through small sharp edged circular orifice.                              |           |     |
| 7.2 Discharge measuring devices for open channel08                                 |           |     |
| <ul> <li>Notches – Types- Rectangular, 'V', Trapezoidal notches.</li> </ul>        |           |     |
| Expression for discharge.                                                          |           |     |
| • Weirs- Types, discharge over rectangular sharp crested weir.                     |           |     |
| Velocity area method of discharge measurement                                      |           |     |
| • Velocity measuring devices-floats, pitot tube, Current meter.                    |           |     |
| • Study and use of water meter.                                                    |           |     |
| Numerical Problemson all above topics                                              |           |     |
| Topic 8: Pumps and Turbines                                                        |           |     |
| Specific Objectives:                                                               |           |     |
| Identify various types of pumps and their uses in different                        |           |     |
| situations                                                                         |           |     |
| Calculate power for pump                                                           |           |     |
| Contents :                                                                         |           |     |
| <ul> <li>Pumps- Definition and types.</li> </ul>                                   |           |     |
| • Suction head, delivery head, static head and manometric head of                  | 04        | 08  |
| Pump. Computation of power required for pump. numerical                            |           |     |
| problems.                                                                          |           |     |
| <ul> <li>Centrifugal pump, Reciprocating pump, Submersible pump and Jet</li> </ul> |           |     |
| pump- component parts and their function, principle of working.                    |           |     |
| • Selection and choice of pump.                                                    |           |     |
| • Turbine- Types-impulse and reaction, components and their                        |           |     |
| functions, working, selection.                                                     |           |     |
| Total                                                                              | <b>48</b> | 100 |

# **Practicals:**

Skills to be developed

**Intellectual Skills:** 1) Interpret test results

- 2) Calculate parameters
- 3) Interpret graphs

Motor Skills: 1) Observe and measure different parameters and record accurately

- 2) Operate the equipments
- 3) Handle various apparatus
- 4) Draw graphs

# **List of Practicals:**

- 1. Measure pressure head and pressure intensity by using piezometer and simple U-tube manometer and demonstrate Bourdon's tube pressure gauge for measurement of positive and negative gauge pressure.
- 2. Measure pressure difference by using differential U-tube manometer and inverted U tube differential manometer.
- 3. Calculate total head at different cross sections of a given pipe to verify Bernoulli's theorem.
- 4. Identity type of flow through a pipe using Reynolds's apparatus.
- 5. Determine friction factor for given pipes of different diameters using Darcy weisbach equation.
- 6. Determine minor losses of head due to sudden enlargement, sudden contraction, bend and elbow in pipe.
- 7. Calculate chezy's and Manning's constant for a given rectangular tilting flume and demonstrate Hydraulic jump.
- 8. Determine coefficient of discharge for a given Venturimeter.
- 9. Determine coefficient of discharge for a given rectangular and triangular notch.
- 10. Determine Hydraulic coefficients for small circular sharp edged orifice.
- 11. Determine Hydraulic coefficients for small circular sharp edged orifice.
- 12. Understand construction and working of centrifugal and reciprocating pumps with the help of model of charts and collect catalogues of pumps and use it for selection of pump for design discharge and head.

# **Learning Resources:**

# 1. Books:

| Sr.<br>No. | Author                           | Title                                                             | Publisher                                 |
|------------|----------------------------------|-------------------------------------------------------------------|-------------------------------------------|
| 01         | Dr. P. N. Modi<br>Dr. S. M. Seth | Hydraulics & Fluid Mechanics                                      | Standard Book House, Dehli                |
| 02         | Dr. R. K.Bansal                  | Fluid Mechanics & Hydraulic<br>Mechanics                          | Laxmi Publication New Delhi               |
| 03         | R. S. Khurmi                     | A Text Book of Hydraulics, Fluid<br>Mechanics, Hydraulic Machines | S.Chand & Company Ltd.<br>New Delhi       |
| 04         | S. Ramamurtam                    | Hydraulics & Fluid Mechanics                                      | Dhanpat Rai & Sons, Delhi                 |
| 05         | S. K. Likhi                      | Hydraulic Laboratory Manual                                       | T.T.T.I.Chandhigrah                       |
| 06         | Dr. S. K. Ukarande               | Fluid Mechanics and Hydraulics                                    | Ane Books Pvt. Ltd.<br>ISBN 9789381162538 |

# 2. Models and Charts etc.:

Model of pumps, hydraulic jump and pipe fittings.

3. Websites: 1) www.howstuffworks.com

Course Name : Civil Engineering Group Course Code : CE/CS/CR/ CV Semester : Fourth Subject Title : Theory of Structures Subject Code : 17422

# **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |     | Examinati | on Scheme |    |       |
|-----------------|----|----|--------------|-----|-----------|-----------|----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH  | PR        | OR        | TW | TOTAL |
| 03              | 01 |    | 04           | 100 |           |           |    | 100   |

NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Civil engineering structures are mainly made-up of column, Beam and Slabs and these structures are subjected to axial as well as eccentric loading. These structures may be determinant or indeterminate in nature. The members like fixed beam, continuous beam, portal frame are indeterminate structures.

The content on calculations of actual shear stresses, bending moments and deflections which are developed in various structural members will be useful in analyzing the forces in these members which is further useful in design of these members. Analysis of member for deflection, combined direct and bending stresses will be useful in safe design of various structural members.

Thus the total contents of this subject forms the basic for the efficient and safe design of steel and RCC structures.

#### **General Objectives:**

The students will be able to-

- 1. Understand the stresses in the members due to eccentric load and wind pressure
- 2. Understand shear force and bending moment diagram for Fixed and continuous beams for various external loading on them.
- 3. Understand the shear force and bending moment diagrams for beams subjected to point load and uniformly distributed load.
- 4. Understand analysis of forces in various members of steel roof trusses for different spans.



# **Theory Content:**

| Topic and Contents                                                                                                                             | Hours | Marks |
|------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
| Topic 1: Direct and Bending Stresses                                                                                                           |       |       |
| Specific Objectives:                                                                                                                           |       |       |
| <ul> <li>List direct and eccentric loads on columns.</li> </ul>                                                                                |       |       |
| Write conditions of no tension for beams, columns and pillars.                                                                                 |       |       |
| Draw stress distribution diagram at bases of column, pillars and                                                                               |       |       |
| chimneys subjected to wind pressure.                                                                                                           |       |       |
| Contents: (12 Marter)                                                                                                                          |       |       |
| 1.1                                                                                                                                            |       |       |
| • Introduction of direct and eccentric loads,                                                                                                  |       |       |
| • Eccentricity about one principal axis, nature of stresses                                                                                    |       |       |
| • Maximum and minimum stresses, resultant stress distribution                                                                                  | 10    | 20    |
| diagram.                                                                                                                                       | 10    | 20    |
| • Condition for no tension or zero stress at extreme fiber                                                                                     |       |       |
| • Limit of eccentricity, core of section for rectangular and circular                                                                          |       |       |
| cross sections                                                                                                                                 |       |       |
| • Middle third rule.                                                                                                                           |       |       |
| 1.2(08 Marks)                                                                                                                                  |       |       |
| • Chimneys subjected to wind, rectangular and circular cross section,                                                                          |       |       |
| wind pressure, coefficient of wind pressure, stress distribution                                                                               |       |       |
| diagram at base.                                                                                                                               |       |       |
| • Walls subjected to horizontal pressure & stress distribution at base.                                                                        |       |       |
| Topics 2: Slope and Deflection                                                                                                                 |       |       |
| Specific Objectives:                                                                                                                           |       |       |
|                                                                                                                                                |       |       |
| State meaning of slope and deflection and stiffness of simply supported                                                                        |       |       |
| beams and cantilevers.                                                                                                                         |       |       |
| Calculate slope and deflection of simply supported and cantilever beam                                                                         |       |       |
| Subjected to point load and UDL by Macauley method.                                                                                            |       |       |
| Contents:                                                                                                                                      |       |       |
| 2 1 (O8 Marks)                                                                                                                                 |       |       |
| • Concept of slope and deflection stiffness of beams                                                                                           | 10    | 20    |
| <ul> <li>Concept of slope and deflection, stiffness of beams.</li> <li>Delation among handing moment slope deflection and radius of</li> </ul> | 10    | 20    |
| • Relation among bending moment, slope deflection and fadius of<br>surveture, differential equation (no derivation), double integration        |       |       |
| method to find slope and defection of simply supported and                                                                                     |       |       |
| cantilever beam                                                                                                                                |       |       |
| 2 2 (12 Marks)                                                                                                                                 |       |       |
| <ul> <li>Macaulay's method for slope and deflection application to simply</li> </ul>                                                           |       |       |
| supported and cantilever beam subjected to concentrated and                                                                                    |       |       |
| uniformly distributed load on entire span                                                                                                      |       |       |
| Tonics 3: Fixed Beam                                                                                                                           |       |       |
| Specific Objectives:                                                                                                                           |       |       |
| State meaning of fixity effects and list advantages of fixed beam                                                                              |       |       |
| <ul> <li>Write the principle of superposition</li> </ul>                                                                                       |       |       |
| <ul> <li>Draw BMD and SFD for fixed beams with point load and UDL</li> </ul>                                                                   | 06    | 12    |
| 2 - 214. 21.12 and 51 2 for fixed bounds with point foud and 0.21.                                                                             |       |       |
| Contents:                                                                                                                                      |       |       |
| Fixed Beam                                                                                                                                     |       |       |

| • Concept of fixity, effect of fixity, advantages and disadvantages of                                                               |     |    |
|--------------------------------------------------------------------------------------------------------------------------------------|-----|----|
| fixed beam.                                                                                                                          |     |    |
| • Principle of superposition.                                                                                                        |     |    |
| • Fixed end moments from first principle for beam subjected to UDL                                                                   |     |    |
| Application of standard formulae in finding moments and drawing                                                                      |     |    |
| • Application of standard formulae in finding moments and drawing<br>S.E. and B.M. diagrams for a fixed beam (Derivation need not be |     |    |
| asked in the examination)                                                                                                            |     |    |
| Topics 4: Continuous Beam                                                                                                            |     |    |
| Specific Objectives:                                                                                                                 |     |    |
| State the effects of continuity of beams and nature of moments induced.                                                              |     |    |
| ➢ Write Calpeyron's theorem of three moments (No derivation)                                                                         |     |    |
| Draw sketches of BMD and SFD for continuous beams.                                                                                   |     |    |
| Contents:                                                                                                                            |     |    |
| Continuous Beam                                                                                                                      |     |    |
| • Definition, effect of continuity practical example, nature of moments                                                              | 08  | 16 |
| induced due to continuity, concept of deflected shape                                                                                |     |    |
| • Clapeyron's theorem of three moment (no derivation).                                                                               |     |    |
| • Application of theorem maximum up to three spans and two                                                                           |     |    |
| unknown support moment only, Support at same level, spans having                                                                     |     |    |
| same and different moment of inertia subjected to concentrated loads                                                                 |     |    |
| and uniformly distributed loads over entire span.                                                                                    |     |    |
| • Drawing SF and BM diagrams for continuous beams.                                                                                   |     |    |
| 1 opics 5: Moment Distribution Method<br>Specific Objectives:                                                                        |     |    |
| > List introduction and sign convention for fixed and moments                                                                        |     |    |
| <ul> <li>State meaning of carry over factor, stiffness factor and distribution</li> </ul>                                            |     |    |
| factor.                                                                                                                              |     |    |
| <ul> <li>Draw BMD, SFD with support at same level.</li> </ul>                                                                        |     |    |
| Contents:                                                                                                                            |     |    |
| Moment Distribution Method.                                                                                                          |     |    |
|                                                                                                                                      | 08  | 16 |
| Introduction, sign convention                                                                                                        | 00  | 10 |
| • Carry over factor, stiffness factor, distribution factor.                                                                          |     |    |
| • Application of moment distribution method for various types of                                                                     |     |    |
| continuous beams subjected to concentrated loads and uniformly                                                                       |     |    |
| distributed load over entire span having same or different moment of                                                                 |     |    |
| inertia up to three spans and two unknown support moment only, SF                                                                    |     |    |
| and BM diagrams (Supports at same level)                                                                                             |     |    |
| <ul> <li>Introduction to portal frames – Types of portal frames (No problems<br/>shall be asked on portal frames)</li> </ul>         |     |    |
| Tonia 6: Simple Frames                                                                                                               |     |    |
| Topic 0. Simple Frames                                                                                                               |     |    |
| Specific Objectives:                                                                                                                 |     |    |
| List different types of roof trusses.                                                                                                |     |    |
| State conditions for redundant and non- redundant frames.                                                                            | 0.6 | 16 |
| List types of forces in different members.                                                                                           | 06  | 10 |
| Contents:                                                                                                                            |     |    |
|                                                                                                                                      |     |    |
| Simple Frames                                                                                                                        |     |    |
| • Types of trusses (Simple, Fink, compound fink, French roof truss,                                                                  | 1   |    |

| examination)                                                                                                   | 48 | 100 |
|----------------------------------------------------------------------------------------------------------------|----|-----|
| <ul><li>Method of sections.</li><li>Graphical method of analysis of truss. (No problem in the theory</li></ul> |    |     |
| • Calculate forces in different members by using method of joints and                                          |    |     |
| • Calculate support reactions for point loads at nodal points.                                                 |    |     |
| and Queen post roof truss)                                                                                     |    |     |
|                                                                                                                |    |     |

# **Tutorial:**

Questions from any two old QP shall be given for tutorial on each topic. Students shall solve these problems in a separate note book. The staff member shall assess these work batchwise.

#### Learning Resources: Books:

| Sr.<br>No. | Author                  | Title                                  | Publisher                           |
|------------|-------------------------|----------------------------------------|-------------------------------------|
| 01         | S. B. Junnarkar         | Mechanics of structures<br>Volume-I,II | Charotar Publishing House,<br>Anand |
| 02         | S. Ramanrutham          | Theory of Structures                   | Dhanpatrai & Sons, Delhi            |
| 03         | R. S. Khurmi            | Theory of Structures                   | S.Chand Publications,<br>Delhi      |
| 04         | G.S. Pandit & S.P.Gupta | Theory of Structures                   | Tata Mcgraw Hill                    |
| 05         | West                    | Fundamentals of Structural Analysis    | Wiley India                         |

Course Name : Civil Engineering Group Course Code : CE/CS/CR/CV Semester : Fourth Subject Title : Computer Aided Drawing Subject Code : **17036** 

**Teaching and Examination Scheme:** 

| Teaching Scheme |    |    |              |    | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH | PR        | OR        | TW  | TOTAL |
|                 |    | 04 |              |    | 25#       |           | 25@ | 50    |

#### **Rationale:**

Drawing is a language of engineers and in the era computers, engineers prepare most accurate and descent presentation of plans to satisfy the clients. It has become the practice to prepare the drawing with the help of computer. This not only saves time, but also provides scope for immediate improvements, changes in the drawings. From the aesthetic point of view also the drawings give better presentations. Therefore, use of computer software's (Auto Cad, Felix Cad, Auto Civil) will enable Civil Engineers to prepare quality drawing in shortest possible time. Hence, it becomes mandatory for the students of Diploma in Civil Engineering to possess drafting skills with the help of software.

#### **General Objectives:**

The students will be able to -

- 1) Use different CAD commands for drawing
- 2) Prepare line plans with CAD Software
- 3) Prepare Submission drawing/ working drawing of buildings.

#### To develop following skills: Intellectual Skills:

- Read and interpret building drawing
- Plan residential and public building as per requirement

#### **Motor Skills:**

- Prepare line plan for residential and public building
- Draw developed plan, elevation, section, site plan, foundation plan,
- Prepare schedule of openings, area statement

#### MSBTE - Final Copy Dt. 30/08/2013


#### **Theory:**

| Topic and Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Hours |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| Topic 1. FUNDAMENTAL OF CAD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |
| <ul> <li>CAD Software – Meaning, various CAD software's available in market,<br/>Advantages of CAD</li> <li>Starting up of Cad, CAD Window, Toolbar, Drop down menu, Drop down<br/>menu, Introduction of starting Auto Cad Screen.</li> <li>CAD fundamental, coordinate system in CAD. Absolute, Relative, Polar,<br/>Spherical, Cylindrical coordinate system, filters, Use of function key in<br/>AUTOCAD.</li> </ul>                                                                                                   | 08    |
| Topic 2. CAD COMMANDS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |
| <ul> <li>WCS icon, UCS icon, coordinates, drawing limits , grid, snap, ortho features</li> <li>Drawing commands- line circle, arc, polyline, multiline, construction line, sp line, ellipse, polygon, rectangle, table, block, text.</li> <li>Editing commands – copy, move, offset, fillet, chamfer, trim, stretch, lengthen, extend, rotate, mirror, array etc.</li> <li>Working with hatches, fills, dimensioning, text etc.</li> <li>Important commands in insert menu, format menu, tools and dimensions.</li> </ul> | 16    |
| Topic3. SUBMISSION AND WORKING DRAWING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |
| <ul> <li>Preparation of line plan, detailed plan, developed plan, section, site plan, area statement</li> <li>Procedure for printing drawings.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                 | 36    |
| Topic 4. INTRODUCTION TO 3D DRAWING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 04    |
| Preliminary commands required for 3D.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |
| Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 64    |

# LIST OF PRACTICALS (TERM WORK) / ASSIGNMENTS:

Submission print on A 4 size paper

- 1. Draw a line plan of given residential building ......08 Hrs.
- 2. Draw line plan of given public building ......12 Hrs.

# (Print on A 4 size paper: Developed Plan, Elevation and Section on one page and remaining drawing on other page)

# (Print on A 4 size paper: Developed Plan, Elevation and Section on one page and remaining drawing on other page)

7. Submission of soft copy of above drawing files on CD and Hard copy on A4 size paper...... 4 Hrs.

### List of Equipment

| S.No | Name of Equipments                                                                                               | Quantity        |
|------|------------------------------------------------------------------------------------------------------------------|-----------------|
| 1    | Personal Computer's with latest version, TFT monitor 17 inches and Window based operating system with networking | 20              |
| 2    | Printer                                                                                                          | 02              |
| 3    | Software's : AUTOCAD                                                                                             | 01 for 20 users |

### **Learning Resources:**

### 1. Books:

| Sr.<br>No. | Title                                         | Author                                                    | Publisher                                  |
|------------|-----------------------------------------------|-----------------------------------------------------------|--------------------------------------------|
| 1          | AUTOCAD                                       | David Frey                                                | BPB Publication New Delhi                  |
| 2          | Introduction To Auto Cad 2012                 | Nighat Yasmin                                             | SDC Publication.                           |
| 3          | AUTOCAD                                       | Shyam & Titkoo                                            |                                            |
| 4          | Auto Cad 2010 Instructor                      | James Leach                                               | Tata McGraw Hill                           |
| 5          | Auto CAD and its Applications-<br>Basics 2010 | Terence M. Shumaker<br>David A. Madsen<br>David P. Madsen | Goodheart- Willcox<br>(Duplicate of GOODW) |

# 2. CDs, PPTs Etc.:

SOFTWARE REQUIRED: Latest version of Auto-CAD, Build master, interior Designer, 3D- Max Studio.

### **3. Websites:** www.zwsoft.com/cad

Course Name : Civil Engineering Group Course Code : CE/CS/CR/CV Semester : Fourth Subject Title : Professional Practices-II Subject Code : 17037

#### **Teaching and Examination Scheme:**

| Teac | hing Scl | heme |              |    |    |    |     |       |
|------|----------|------|--------------|----|----|----|-----|-------|
| TH   | TU       | PR   | PAPER<br>HRS | TH | PR | OR | TW  | TOTAL |
|      |          | 03   |              |    |    |    | 50@ | 50    |

#### **Rationale:-**

Most of the diploma holders join industries. Due to globalization and competition in the industrial and service sectors the selection for the job is based on campus interviews or competitive tests.

While selecting candidates a normal practice adopted is to see general confidence, attitude and ability to communicate and attitude, in addition to basic technological concepts.

The purpose of introducing professional practices is to provide opportunity to student to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

### **Objective:**

### To develop the following Skills:

#### **Intellectual Skills**

- 1. Understand construction of different Civil Engineering works through visits.
- 2. Understand the techniques of collecting different data.
- 3. Understand the Presentation for giving the seminar.

#### **Motor Skills**

- 1. Write report on various field visits to the construction sites.
- 2. Present the seminar.

#### **Learning Structure:**



#### Activities

| Activity<br>No. | Content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |    |  |  |  |  |  |  |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|--|--|--|--|--|--|
| 1               | <ul> <li>Field Visits:</li> <li>Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form a part of the term work. The industrial visits may be arranged in the following areas / industries (Any Three) <ol> <li>Bridges under construction</li> <li>Tunnel site visit</li> <li>Railway Station</li> <li>Construction of basement / retaining wall /pile foundation</li> <li>Public building under construction</li> <li>Airport / Docks and Harbour</li> </ol> </li> </ul>                                                                                                                                                                                                                                                            | 12 |  |  |  |  |  |  |
| 2               | <ul> <li>vii) Visit to different construction Exhibitions</li> <li>Expert Lectures:</li> <li>Lectures by Professional persons / Industrial Expert / Entrepreneur Seminars based on information search, expert lectures to be organized from <u>any two</u> of the following areas : <ul> <li>i) Construction of Flyovers : Special Features</li> <li>ii) Ready Mix Concrete</li> <li>iii) Safety in Construction</li> <li>iv) Latest Trends in Construction activities like Water Proofing, Centering, Cladding, Plumbing</li> <li>v) Software for Drafting</li> <li>vi) Any other subject related to Civil Engineering</li> <li>vii) Introduction to Apprenticeship Training Scheme</li> </ul> </li> </ul>                                                                                          | 06 |  |  |  |  |  |  |
| 3               | <ul> <li>Data Collection:</li> <li>Information search can be done through manufacturers, catalogue, internet, magazines, books etc. and a submit a report (any three) <ol> <li>Collection and reading of drawings of buildings from architect / Practicing engineers and listing of various features from the drawings.</li> <li>Market survey for pumps, pipes and peripherals required for multi storied buildings.</li> <li>Non conventional energy sources with focus on solar energy</li> <li>Elevators - Installation and Maintenance</li> <li>Market survey for Advanced Construction material with respect to Quality, Rate and application</li> <li>Modern products of Non-Conventional Energy like solar cooker, solar lamp, solar water heater, solar distillation</li> </ol> </li> </ul> | 08 |  |  |  |  |  |  |
| 4               | Seminar :<br>Seminar topic should be related to the subject of fourth semester. Each<br>student shall submit a report of at least 10 pages and deliver a seminar<br>(Presentation time - 10 minutes) (Any one topic)<br>Seminar topics may be from areas:<br>i) Geology<br>ii) Soil Mechanics<br>iii) Transportation Engineering<br>iv) Surveying and Advance Surveying<br>v) Environmental Science.                                                                                                                                                                                                                                                                                                                                                                                                 | 10 |  |  |  |  |  |  |

| Activity<br>No. |      | Content                                                            | Hours |
|-----------------|------|--------------------------------------------------------------------|-------|
|                 | vi)  | Building Construction                                              |       |
|                 | vii) | Materials for construction                                         |       |
|                 | Mini | Project / Activities: (any one)                                    |       |
|                 | i)   | Mix design of concrete.                                            |       |
|                 | ii)  | Preparing two dimensional submissions drawing of residential       |       |
|                 |      | building using CAD.                                                |       |
|                 | iii) | Soil Investigation at a site to find out the Bearing capacity      |       |
|                 | iv)  | A week program on Construction site and prepare a detail           |       |
|                 |      | report                                                             |       |
| 5               | v)   | Student shall collect the information by visiting Electrical /     | 12    |
|                 |      | Electronics Engineering dept. about the material required for      |       |
|                 |      | wiring and switches - lamps, fans, boards their materials and      |       |
|                 |      | capacities, systems of wiring and material used, control switches, |       |
|                 |      | fuse, etc.                                                         |       |
|                 | vi)  | Student shall collect the information by visiting Mechanical       |       |
|                 |      | Engineering department and study the mechanical devices like       |       |
|                 |      | pumps                                                              |       |
|                 |      | Total                                                              | /18   |

List of assignments to be done by each student as term work (Group of 5-6 students shall be prepared and each group shall be given different activity.

# 1. Field Visit:

Industrial visit to be arranged for class / batch. Students are expected to observe and collect data. Finally prepare a visit report. Report of three industrial visits,

# 2. Expert Lectures:

Expert lecture to be arranged at institute for the class. Student should attend and prepare the keynote of it as a part of term work. Report of two expert Lecture

# 3. Data Collection:

Students are expected to collect data from various sources under the guidance of faculty member and submit the report for the term work. Data collection report on two topics.

# 4. Seminar:

Each student should select the topic of his own interest from the list and prepare and present the seminar on it and submit the hard copy as a term work.

# 5. Mini Project:

Form a group of 4 to 5 students. Each group shall select a topic from the given list. Submit a report of 8-10 pages with sketches, photographs, diagrams, statements etc. as a part of term work.

# Learning Resources:

Reference Book, Journal, Exhibitions, Seminar Papers.

| Sr.<br>No. | Title                                                                                                     |
|------------|-----------------------------------------------------------------------------------------------------------|
| 1.         | Fourth semester subjects reference books                                                                  |
| 2.         | Journals and magazines – IEEE Journals, IT technologies.                                                  |
| 3.         | Local news papers and events                                                                              |
| 4.         | Apprenticeship Training Scheme: Compiled By – BOAT (Western Region), Mumbai, Available on MSBTE Web Site. |

42

Web sites: On Google search refer various sites on

- 1. How to write a report
- 2. How to prepare seminar
- 3. Effective Listening.

# Course Name : All Branches of Diploma in Engineering & Technology Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG Industrial Training (Optional) after 4<sup>th</sup> semester examination.

Note:- Examination in Professional Practices of 5<sup>th</sup> Semester.

#### INDUSTRIAL TRAINING (OPTIONAL)

#### Rational:-

There was a common suggestion from the industry as well as other stakeholders that curriculum of Engineering and Technology courses should have Industrial training as part of the curriculum. When this issue of industrial training was discussed it was found that it will be difficult to make industrial training compulsory for all students of all courses as it will be difficult to find placement for all the students. It is therefore now proposed that this training can be included in the curriculum as optional training for student who is willing to undertake such training on their own. The institutes will help them in getting placement or also providing them requisite documents which the student may need to get the placement.

Details:- Student can undergo training in related industries as guided by subject teachers / HOD.

- The training will be for four weeks duration in the summer vacation after the fourth semester examination is over.
- The student undergoing such training will have to submit a report of the training duly certified by the competent authority from the industry clearly indicating the achievements of the student during training. This submission is to be made after joining the institute for Fifth semester.
- The student completing this training will have to deliver a seminar on the training activities based on the report in the subject Professional Practices at Fifth Semester.
- The student undergoing this training will be exempted from attending activities under Professional Practices at Fifth semester except the seminar.
- The students who will not undergo such training will have to attend Professional Practices Classes/activities of fifth semester and will have to complete the tasks given during the semester under this head.
- There work will be evaluated on their submissions as per requirement and will be given marks out of 50. Or student may have to give seminar on training in Industry he attended.
- Institute shall encourage and guide students for Industry training.
- Evaluation:- Report of Training attended and delivery of seminar and actual experience in Industry will be evaluated in fifth semester under Profession Practices-III and marks will be given accordingly out of 50.

'G' Scheme

| MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI              |                                                                                                                 |                  |       |        |       |       |            |      |        |        |        |       |               |     |                |         |
|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|------------------|-------|--------|-------|-------|------------|------|--------|--------|--------|-------|---------------|-----|----------------|---------|
|                                                                     | The second se |                  | TEA   | ACHI   | NG Al | ND EX | KAMINA     | TION | SCHEN  | ЛЕ     |        |       |               |     |                |         |
| COURSE NAME : DIPLOMA IN TEXTILE TECHNOLOGY                         |                                                                                                                 |                  |       |        |       |       |            |      |        |        |        |       |               |     |                |         |
| COU                                                                 | COURSE CODE : TC                                                                                                |                  |       |        |       |       |            |      |        |        |        |       |               |     |                |         |
| DURATION OF COURSE : SIX SEMESTERS       WITH EFFECT FROM : 2012-13 |                                                                                                                 |                  |       |        |       |       |            |      |        |        |        |       |               |     |                |         |
| SEMESTER : FOURTH DURATION : 16 WEEKS                               |                                                                                                                 |                  |       |        |       |       |            |      |        |        |        |       |               |     |                |         |
| PATTERN : FULL TIME - SEMESTER SCHEME : G                           |                                                                                                                 |                  |       |        |       |       |            |      |        |        |        |       |               |     |                |         |
| CD                                                                  |                                                                                                                 | A 1. 1           | CUD   | TE     | ACHI  | NG    |            |      | E      | XAMINA | TION S | CHEME |               |     |                | CW      |
| SK.<br>NO                                                           | SUBJECT TITLE                                                                                                   | Abbrevi<br>ation | SUB   | SCHEME |       | PAPER | PER TH (1) |      | PR (4) |        | OR (8) |       | <b>TW (9)</b> |     | 5 W<br>(17400) |         |
| 110.                                                                |                                                                                                                 | ution            | CODE  | TH     | TU    | PR    | HRS.       | Max  | Min    | Max    | Min    | Max   | Min           | Max | Min            | (17400) |
| 1                                                                   | Environmental Studies \$                                                                                        | EST              | 17401 | 01     |       | 02    | 01         | 50#* | 20     |        |        |       |               | 25@ | 10             |         |
| 2                                                                   | Technology of Dyeing-I                                                                                          | TOD              | 17467 | 04     |       | 03    | 03         | 100  | 40     | 50#    | 20     |       |               | 25@ | 10             |         |
| 3                                                                   | Technology of Printing-I                                                                                        | TOP              | 17468 | 04     |       | 03    | 03         | 100  | 40     | 50#    | 20     |       |               | 25@ | 10             |         |
| 4                                                                   | Technology of Finishing-I                                                                                       | TOF              | 17469 | 03     |       | 03    | 03         | 100  | 40     |        |        | 25#   | 10            | 25@ | 10             |         |
| 5                                                                   | Elements of Chemical<br>Engg. Operation                                                                         | ECH              | 17470 | 03     |       |       | 03         | 100  | 40     |        |        |       |               |     |                | 50      |
| 6                                                                   | Textile Testing                                                                                                 | TTE              | 17471 | 03     |       | 02    | 03         | 100  | 40     |        |        |       |               | 25@ | 10             |         |
| 7                                                                   | Professional Practices-II                                                                                       | PPS              | 17052 |        |       | 03    |            |      |        |        |        |       |               | 50@ | 20             | 1       |
| 8                                                                   | Industrial Training                                                                                             | ITR              | 17053 |        |       | **    |            |      |        |        |        |       |               |     |                |         |
|                                                                     | TOTAL 18 16 550 100 25 175 50                                                                                   |                  |       |        |       |       |            |      |        |        |        |       |               |     |                |         |

Student Contact Hours Per Week: 34 Hrs.

# THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.

#### Total Marks: 900

@ Internal Assessment, # External Assessment, \$ Common to All Conventional Diploma, \_\_\_\_\_\_ No Theory Examination, \*\* Industrial Training for six weeks to be completed during summer break after Fourth semester. Assessment to be done in Fifth Semester.

Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Termwork, SW- Sessional Work.

- Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subject are to be converted out of 100 marks as sessional work (SW).
- > Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.
- Code number for TH, PR, OR and TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.

**Course Name : All Branches of Diploma in Engineering & Technology** 

# Course Code : AE/CE/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/AU/FG

Semester : Fourth

Subject Title : Environmental Studies

Subject Code : 17401

**Teaching and Examination Scheme:** 

| Teac | ching Scl | neme |              |      |    |    |     |       |
|------|-----------|------|--------------|------|----|----|-----|-------|
| TH   | TU        | PR   | PAPER<br>HRS | TH   | PR | OR | TW  | TOTAL |
| 01   |           | 02   | 01           | 50#* |    |    | 25@ | 75    |

#### **#\* Online Theory Examination**

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Environment essentially comprises of our living ambience, which gives us the zest and verve in all our activities. The turn of the twentieth century saw the gradual onset of its degradation by our callous deeds without any concern for the well being of our surrounding. We are today facing a grave environmental crisis. The unceasing industrial growth and economic development of the last 300 years or so have resulted in huge ecological problems such as

overexploitation of natural resources, degraded land, disappearing forests, endangered species, dangerous toxins, global warming etc.

It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

The curriculum covers the aspects about environment such as Environment and Ecology, Environmental impacts on human activities, Water resources and water quality, Mineral resources and mining, Forests, etc.

General Objectives: The student will be able to,

- 1. Understand importance of environment
- 2. Know key issues about environment
- 3. Understands the reasons for environment degradation
- 4. Know aspects about improvement methods
- 5. Know initiatives taken by the world bodies to restrict and reduce degradation

#### **Learning Structure:**



# Theory:

| Topic 1: Nature of Environmental Studies00Specific Objectives:> Define the terms related to Environmental Studies0104• Definition, Scope and Importance of the environmental studies0104• Definition, Scope and Importance of the environmental studies0104• Importance of the studies irrespective of course• Need for creating public awareness about environmental issues0104Topic 2: Natural Resources and Associated ProblemsSpecific Objectives:> Define natural resources and identify problems associated with them<br>> Identify alternate resources and their importance for environmentContents:2.1 Renewable and Non renewable resources• Definition<br>• Associated problems04102.1 Renewable and Non renewable resources• Definition<br>• Associated problems04102.2 Water Resources• Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.04102.3 Water Resources• Effect of floods, draught, dams etc. on water resources and community04102.4 Mineral Resources:• Categories of mineral resources<br>• Basics of mining activities<br>• Mine safety0410                                                                                                                                                                                                                                                                                                                         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Specific Objectives:       > Define the terms related to Environmental Studies       01       04         Contents:       01       04       04         Contents:       01       04       04         • Definition, Scope and Importance of the environmental studies       01       04         • Importance of the studies irrespective of course       01       04         • Need for creating public awareness about environmental issues       01       04         Topic 2: Natural Resources and Associated Problems       Specific Objectives:       01       04         > Define natural resources and identify problems associated with them       10       10       10         > Identify uses and their overexploitation       10       10       10         2.1 Renewable and Non renewable resources       0       04       10         2.2 Forest Resources       0       General description of forest resources       04       10         2.3 Water Resources       0       10       10       10         4. Hydrosphere: Different sources of water       04       10         • Hydrosphere: Different sources of water       04       10         • Use and overexploitation of surface and ground water       04       10         • Effect of floods, draught, dams etc. on water resources a                                                                                                                                    |
| <ul> <li>Define the terms related to Environmental Studies</li> <li>State importance of awareness about environment in general public Contents: <ul> <li>Definition, Scope and Importance of the environmental studies</li> <li>Importance of the studies irrespective of course</li> <li>Need for creating public awareness about environmental issues</li> </ul> </li> <li>Topic 2: Natural Resources and Associated Problems <ul> <li>Specific Objectives:</li> <li>Define natural resources and identify problems associated with them</li> <li>Identify uses and their overexploitation</li> <li>Identify uaternate resources and their importance for environment</li> </ul> </li> <li>Contents: <ul> <li>Of 04</li> </ul> </li> <li>2.1 Renewable and Non renewable resources <ul> <li>Definition</li> <li>Associated problems</li> </ul> </li> <li>2.2 Forest Resources</li> <li>General description of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> </ul> <li>2.3 Water Resources <ul> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> </ul> </li> <li>2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> </ul> </li> |
| <ul> <li>State importance of awareness about environment in general public<br/>Contents:</li> <li>Definition, Scope and Importance of the environmental studies</li> <li>Importance of the studies irrespective of course</li> <li>Need for creating public awareness about environmental issues</li> </ul> Topic 2: Natural Resources and Associated Problems Specific Objectives: <ul> <li>Define natural resources and identify problems associated with them</li> <li>Identify uses and their overexploitation</li> <li>Identify alternate resources and their importance for environment</li> <li>Contents:</li> <li>2.1 Renewable and Non renewable resources</li> <li>Definition</li> <li>Associated problems</li> </ul> 2.2 Forest Resources <ul> <li>General description of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> </ul> 2.3 Water Resources <ul> <li>04</li> </ul> 10 41 10 10 10 10 2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> </ul>                                                                                                                                                                                                                                                                                                                |
| Contents:       01       04         • Definition, Scope and Importance of the environmental studies       •       01       04         • Importance of the studies irrespective of course       •       01       04         • Need for creating public awareness about environmental issues       •       01       04         Topic 2: Natural Resources and Associated Problems       Specific Objectives:       •       •         > Define natural resources and identify problems associated with them       •       •       10         • Identify uses and their overexploitation       •       •       Identify uses and their overexploitation         • Identify alternate resources and their importance for environment       Contents:       •       11         2.1 Renewable and Non renewable resources       •       Definition       •       Associated problems         2.2 Forest Resources       •       General description of forest resources       •       04       10         • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.       04       10         • Hydrosphere: Different sources of water       •       04       10         • Hydrosphere: Different sources of water       •       04       10         • Effect of floods, draught, dams etc. on water resources and community                                                                             |
| <ul> <li>Definition, Scope and Importance of the environmental studies         <ul> <li>Importance of the studies irrespective of course</li> <li>Need for creating public awareness about environmental issues</li> </ul> </li> <li>Topic 2: Natural Resources and Associated Problems         <ul> <li>Specific Objectives:</li> <li>Define natural resources and identify problems associated with them</li> <li>Identify uses and their overexploitation</li> <li>Identify alternate resources and their importance for environment</li> </ul> </li> <li>Contents:         <ul> <li>Perfine the and Non renewable resources</li> <li>Definition</li> <li>Associated problems</li> </ul> </li> <li>2.1 Renewable and Non renewable resources         <ul> <li>Definition</li> <li>Associated problems</li> </ul> </li> <li>2.2 Forest Resources         <ul> <li>Effects on environment due to deforestration, Timber extraction, Building of dams, waterways etc.</li> <li>2.3 Water Resources             <ul> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> </ul> </li> <li>2.4 Mineral Resources:         <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> </ul> </li> </ul></li></ul>                                        |
| <ul> <li>Importance of the studies irrespective of course         <ul> <li>Need for creating public awareness about environmental issues</li> </ul> </li> <li>Topic 2: Natural Resources and Associated Problems Specific Objectives:         <ul> <li>Define natural resources and identify problems associated with them</li> <li>Identify uses and their overexploitation</li> <li>Identify alternate resources and their importance for environment</li> </ul> </li> <li>Contents:         <ul> <li>Definition</li> <li>Associated problems</li> <li>Definition</li> <li>Associated problems</li> </ul> </li> <li>2.1 Renewable and Non renewable resources         <ul> <li>Definition</li> <li>Associated problems</li> </ul> </li> <li>2.2 Forest Resources         <ul> <li>General description of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> </ul> </li> <li>2.3 Water Resources         <ul> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> </ul> </li> <li>2.4 Mineral Resources:         <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> </ul> </li> </ul>                                                                          |
| <ul> <li>Need for creating public awareness about environmental issues</li> <li>Topic 2: Natural Resources and Associated Problems</li> <li>Specific Objectives:         <ul> <li>Define natural resources and identify problems associated with them</li> <li>Identify uses and their overexploitation</li> <li>Identify alternate resources and their importance for environment</li> </ul> </li> <li>Contents:         <ul> <li>1 Renewable and Non renewable resources</li> <li>Definition</li> <li>Associated problems</li> </ul> </li> <li>2.2 Forest Resources         <ul> <li>General description of forest resources</li> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> </ul> </li> <li>2.3 Water Resources         <ul> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> </ul> </li> <li>2.4 Mineral Resources:         <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> </ul> </li> </ul>                                                                                                                                                                                                                   |
| Topic 2: Natural Resources and Associated Problems         Specific Objectives:         > Define natural resources and identify problems associated with them         > Identify uses and their overexploitation         > Identify alternate resources and their importance for environment         Contents:         2.1 Renewable and Non renewable resources         • Definition         • Associated problems         2.2 Forest Resources         • General description of forest resources         • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.         2.3 Water Resources         • Hydrosphere: Different sources of water         • Leffect of floods, draught, dams etc. on water resources and community         2.4 Mineral Resources:         • Categories of mineral resources         • Basics of mining activities         • Mine safety                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Specific Objectives:       > Define natural resources and identify problems associated with them         > Identify uses and their overexploitation         > Identify alternate resources and their importance for environment         Contents:         2.1 Renewable and Non renewable resources         • Definition         • Associated problems         2.2 Forest Resources         • General description of forest resources         • Functions and benefits of forest resources         • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.         2.3 Water Resources         • Use and overexploitation of surface and ground water         • Effect of floods, draught, dams etc. on water resources and community         2.4 Mineral Resources:         • Categories of mineral resources         • Basics of mining activities         • Mine safety                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <ul> <li>Define natural resources and identify problems associated with them</li> <li>Identify uses and their overexploitation</li> <li>Identify alternate resources and their importance for environment</li> <li>Contents:</li> <li>2.1 Renewable and Non renewable resources <ul> <li>Definition</li> <li>Associated problems</li> </ul> </li> <li>2.2 Forest Resources <ul> <li>General description of forest resources</li> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> </ul> </li> <li>2.3 Water Resources <ul> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> </ul> </li> <li>2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <ul> <li>Identify uses and their overexploitation</li> <li>Identify alternate resources and their importance for environment</li> <li>Contents:</li> <li>2.1 Renewable and Non renewable resources <ul> <li>Definition</li> <li>Associated problems</li> </ul> </li> <li>2.2 Forest Resources <ul> <li>General description of forest resources</li> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> </ul> </li> <li>2.3 Water Resources <ul> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> </ul> </li> <li>2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <ul> <li>Identify alternate resources and their importance for environment</li> <li>Contents:</li> <li>2.1 Renewable and Non renewable resources <ul> <li>Definition</li> <li>Associated problems</li> </ul> </li> <li>2.2 Forest Resources <ul> <li>General description of forest resources</li> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> </ul> </li> <li>2.3 Water Resources <ul> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> </ul> </li> <li>2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Contents:         2.1 Renewable and Non renewable resources         • Definition         • Associated problems         2.2 Forest Resources         • General description of forest resources         • Functions and benefits of forest resources         • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.         2.3 Water Resources         • Hydrosphere: Different sources of water         • Use and overexploitation of surface and ground water         • Effect of floods, draught, dams etc. on water resources and community         2.4 Mineral Resources:         • Categories of mineral resources         • Basics of mining activities         • Mine safety                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <ul> <li>2.1 Renewable and Non renewable resources <ul> <li>Definition</li> <li>Associated problems</li> </ul> </li> <li>2.2 Forest Resources <ul> <li>General description of forest resources</li> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> </ul> </li> <li>2.3 Water Resources <ul> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> </ul> </li> <li>2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <ul> <li>Definition <ul> <li>Associated problems</li> </ul> </li> <li>2.2 Forest Resources <ul> <li>General description of forest resources</li> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> </ul> </li> <li>2.3 Water Resources <ul> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> </ul> </li> <li>2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <ul> <li>Associated problems</li> <li>2.2 Forest Resources <ul> <li>General description of forest resources</li> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> </ul> </li> <li>2.3 Water Resources <ul> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> </ul> </li> <li>2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <ul> <li>2.2 Forest Resources <ul> <li>General description of forest resources</li> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> </ul> </li> <li>2.3 Water Resources <ul> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> </ul> </li> <li>2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <ul> <li>General description of forest resources</li> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction,<br/>Building of dams, waterways etc.</li> <li>2.3 Water Resources</li> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and<br/>community</li> <li>2.4 Mineral Resources:</li> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <ul> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> <li>2.3 Water Resources</li> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> <li>2.4 Mineral Resources:</li> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <ul> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> <li>2.3 Water Resources</li> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> <li>2.4 Mineral Resources:</li> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <ul> <li>2.3 Water Resources</li> <li>2.3 Water Resources</li> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> <li>2.4 Mineral Resources:</li> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <ul> <li>2.3 Water Resources</li> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> <li>2.4 Mineral Resources:</li> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <ul> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> <li>2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <ul> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> <li>2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <ul> <li>Effect of floods, draught, dams etc. on water resources and community</li> <li>2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <ul> <li>2.4 Mineral Resources:</li> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 2.4 Mineral Resources:<br>• Categories of mineral resources<br>• Basics of mining activities<br>• Mine safety                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <ul> <li>Basics of mining activities</li> <li>Mine safety</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Mine safety                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| nine salety                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Effect of mining on environment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 2.5 Food Resources:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| • Food for all                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Fffects of modern agriculture                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| World food problem                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Tonic 3. Ecosystems                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Concept of Ecosystem                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| • Structure and functions of ecosystem 01 04                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Energy flow in ecosystem                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <ul> <li>Major ecosystems in the world</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Topic 4. Biodiversity and Its Conservation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Definition of Biodiversity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| • Levels of biodiversity 02 06                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Value of biodiversity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Threats to biodiversity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

| Conservation of biodiversity                                     |    |    |
|------------------------------------------------------------------|----|----|
| Topic 5. Environmental Pollution                                 |    |    |
| Definition                                                       |    |    |
| • Air pollution: Definition, Classification, sources, effects,   |    |    |
| prevention                                                       | 02 | 00 |
| • Water Pollution: Definition, Classification, sources, effects, | 03 | 08 |
| prevention                                                       |    |    |
| • Soil Pollution: Definition, sources, effects, prevention       |    |    |
| • Noise Pollution: Definition, sources, effects, prevention      |    |    |
| Topic 6. Social Issues and Environment                           |    |    |
| Concept of development, sustainable development                  |    |    |
| • Water conservation, Watershed management, Rain water           |    |    |
| harvesting: Definition, Methods and Benefits                     | 02 | 10 |
| Climate Change, Global warming, Acid rain, Ozone Layer           | 05 |    |
| Depletion, Nuclear Accidents and Holocaust: Basic concepts and   |    |    |
| their effect on climate                                          |    |    |
| Concept of Carbon Credits and its advantages                     |    |    |
| <b>Topic 7. Environmental Protection</b>                         |    |    |
| Brief description of the following acts and their provisions:    |    |    |
| Environmental Protection Act                                     |    |    |
| • Air (Prevention and Control of Pollution) Act                  |    |    |
| • Water (Prevention and Control of Pollution) Act                | 02 | 08 |
| Wildlife Protection Act                                          | 02 | 08 |
| Forest Conservation Act                                          |    |    |
| Population Growth: Aspects, importance and effect on             |    |    |
| environment                                                      |    |    |
| Human Health and Human Rights                                    |    |    |
| Total                                                            | 16 | 50 |

### **Practical:** Skills to be developed:

### **Intellectual Skills**:

- 1. Collection of information, data
- 2. Analysis of data
- 3. Report writing

#### **Motor Skills:**

- 1. Presentation Skills
- 2. Use of multi media

### List of Projects:

Note: Any one project of the following:

- 1. Visit to a local area to document environmental assets such as river / forest / grassland / hill / mountain
- 2. Visit to a local polluted site: Urban/Rural/Industrial/Agricultural
- 3. Study of common plants, insects, birds
- 4. Study of simple ecosystems of ponds, river, hill slopes etc

Prepare a project report on the findings of the visit illustrating environment related facts, analysis and conclusion. Also suggest remedies to improve environment.

# Learning Resources: Books:

| Sr.<br>No. | Author                                                | Author Title                                 |                         |  |  |  |  |
|------------|-------------------------------------------------------|----------------------------------------------|-------------------------|--|--|--|--|
| 01         | Anindita Basak                                        | Environmental Studies                        | Pearson Education       |  |  |  |  |
| 02         | R. Rajgopalan                                         | Environmental Studies<br>from Crises to Cure | Oxford University Press |  |  |  |  |
| 03         | Dr. R. J. Ranjit Daniels, Dr.<br>Jagdish Krishnaswamy | Environmental Studies                        | Wiley India             |  |  |  |  |

Course Name : Diploma in Textile Technology Course Code : TC Semester : Fourth Subject Title : Technology of Dyeing-I Subject Code : 17467

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |     | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|-----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH  | PR        | OR        | TW  | TOTAL |
| 04              |    | 03 | 03           | 100 | 50#       |           | 25@ | 175   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

The chemical processing of textiles is a value addition process by way of enhancing the aesthetic properties through dyeing and printing. In the second year of this course, the students are taught about the dyeing and printing of textiles with various types of dyes and pigments along with different methods, and styles. The students are also made acquainted with the operations of the machines involved in these processes. In general this subject is devised to impart the knowledge and skills in the areas of dyeing and printing of the textiles.

#### **General Objectives:**

The students will be able to: -

- Get the basic concepts in dyeing of cellulosic material
- Know the technology of dyeing of cellulosic material with various classes of dyes. Differentiate the various dyeing techniques and their advantages and disadvantages.
- Understand construction and working of various dyeing machines used for cellulosic dyeing.

#### **Learning Structure:**



# **Contents: Theory**

| Chapter | Details                                                           | Hours | Marks |
|---------|-------------------------------------------------------------------|-------|-------|
|         | Introduction to Dyeing                                            |       |       |
|         | Specific Objectives:                                              |       |       |
|         | <ul> <li>To understand basic concept of dyeing</li> </ul>         |       |       |
|         | • Learn terminologies used in dyeing                              |       |       |
|         | • To understand effect of pretreatments on dyeing                 |       |       |
| 01      | Contents:                                                         | 07    | 12    |
|         | Definition of - Affinity, Substantivity, Exhaustion, Material to  |       |       |
|         | Liquor Ratio (MLR), Percentage shade, Percentage expression.      |       |       |
|         | Dyeing Agents – Sequestering agents, Exhausting agents,           |       |       |
|         | Dispersing agents, Levelling agents, Retarding agents             |       |       |
|         | Mechanism of Dyeing – Adsorption, Absorption, Fixation            |       |       |
|         | Direct Dyeing                                                     |       |       |
|         | Specific Objectives:                                              |       |       |
|         | • To understand chemical properties and classification of         |       |       |
|         | direct dyes                                                       |       |       |
|         | • To study dyeing procedure                                       |       |       |
|         | • To analyze faults and remedies                                  | 05    |       |
|         | Contents:                                                         |       |       |
| 02      | Direct Dyes: Properties, Classification, Mechanism, Effect of -   |       | 08    |
|         | electrolytes, temperature, liquor ratio                           |       |       |
|         | Application on –cellulose and protein fibres                      |       |       |
|         | After-treatments with – Metallic salts, chromium compounds,       |       |       |
|         | formaldehyde, cationic dye fixing agents, basic dyes (topping),   |       |       |
|         | diazotization and development                                     |       |       |
|         | Fastness properties                                               |       |       |
|         | Faults and remedies                                               |       |       |
|         | Reactive Dyeing                                                   |       |       |
|         | Specific Objectives:                                              |       |       |
|         | • To learn chemical properties and classification of reactive     |       |       |
|         | dyes                                                              |       |       |
|         | • To understand dyeing procedure                                  |       |       |
|         | • To analyze faults and remedies                                  |       |       |
|         | Contents:                                                         |       |       |
| 03      | Reactive Dyes - Properties, Classification                        | 08    | 12    |
|         | Chemical reaction, Effect of dyeing parameters                    |       |       |
|         | Methods of dyeing with cold brand, hot brand, high-exhaust brand, |       |       |
|         | ME brand, VS brand dyes                                           |       |       |
|         | Dyeing techniques – Exhaust, Pad-batch, Continuous                |       |       |
|         | After treatments, Faults and remedies                             |       |       |
|         | Reactive dyes on silk, wool                                       |       |       |
| 1       | rastness properties                                               | 1     | 1     |

|    | Vat Dveing                                                                                                             |    |    |
|----|------------------------------------------------------------------------------------------------------------------------|----|----|
|    | Specific Objectives:                                                                                                   |    |    |
|    | • To learn chemical properties and classification of vat dyes                                                          |    |    |
|    | <ul> <li>To reall chemical properties and enastineation of var ayes</li> <li>To understand dueing procedure</li> </ul> |    |    |
|    | To analyze faults and remedies                                                                                         |    |    |
|    | • To analyze faults and femedies                                                                                       |    |    |
| 04 | Vat Dues Properties Classification                                                                                     | 08 | 12 |
|    | Application steps – vatting dueing oxidation after treatment                                                           |    |    |
|    | Methods – Leuco-vat dveing (exhaust nadding) Pigmentation vat                                                          |    |    |
|    | acid                                                                                                                   |    |    |
|    | Eastness properties                                                                                                    |    |    |
|    | Faults and remedies                                                                                                    |    |    |
|    | Solubalised Vat Dveing                                                                                                 |    |    |
|    | Specific Objectives:                                                                                                   |    |    |
|    | • To learn chemical properties and classification of                                                                   |    |    |
|    | Solubilised vat dves                                                                                                   |    |    |
|    | • To understand dveing procedure                                                                                       |    |    |
|    | <ul> <li>To analyze faults and remedies</li> </ul>                                                                     |    |    |
| 05 | Contents                                                                                                               | 04 | 06 |
|    | Properties                                                                                                             |    |    |
|    | Steps involved in dveing                                                                                               |    |    |
|    | Dveing method                                                                                                          |    |    |
|    | Fastness properties                                                                                                    |    |    |
|    | Faults and remedies                                                                                                    |    |    |
|    | Sulphur Dyeing                                                                                                         |    |    |
|    | Specific Objectives:                                                                                                   |    |    |
|    | • To learn chemical properties and classification of sulphur                                                           |    |    |
|    | dyes                                                                                                                   |    |    |
|    | • To understand dyeing procedure                                                                                       |    |    |
| 06 | • To analyze faults and remedies                                                                                       | 07 | 10 |
|    | Contents:                                                                                                              |    |    |
|    | Sulphur Dyes - Properties, Classification                                                                              |    |    |
|    | Application steps – Reduction, dyeing, oxidation, after treatment                                                      |    |    |
|    | Fastness properties                                                                                                    |    |    |
|    | Faults and remedies                                                                                                    |    |    |
|    | Azoic Dyeing                                                                                                           |    |    |
|    | Specific Objectives:                                                                                                   |    |    |
|    | • To learn chemical properties and mechanism of azoic colour                                                           |    |    |
|    | formation                                                                                                              |    |    |
|    | • To understand dyeing procedure                                                                                       |    |    |
|    | • To analyze faults and remedies                                                                                       |    |    |
| 07 | Contents:                                                                                                              | 05 | 08 |
|    | Properties                                                                                                             |    |    |
|    | Naptholation, Diazotisation, Coupling                                                                                  |    |    |
|    | Shop floor method of application on cotton                                                                             |    |    |
|    | After treatments                                                                                                       |    |    |
|    | Fastness properties                                                                                                    |    |    |
|    | Faults and remedies                                                                                                    |    |    |

|    | Dyeing with Basic Dyes                                         |    |    |
|----|----------------------------------------------------------------|----|----|
|    | Specific Objectives:                                           |    |    |
|    | • To learn chemical properties and classification of Basic     |    |    |
|    | dyes                                                           |    |    |
|    | • To understand dyeing procedure                               |    |    |
|    | • To analyze faults and remedies                               |    |    |
| 08 | Contents:                                                      | 04 | 06 |
| 08 | Properties                                                     | 04 | 00 |
|    | Mechanism of dyeing on – cellulosic fibres, protein fibres     |    |    |
|    | Dyeing of silk fibre                                           |    |    |
|    | Dyeing of wool fibre                                           |    |    |
|    | Dyeing of cellulosic fibres                                    |    |    |
|    | After treatments                                               |    |    |
|    | Fastness properties                                            |    |    |
|    | Dyeing With Acid Dyes                                          |    |    |
|    | Specific Objectives:                                           |    |    |
|    | • To learn chemical properties and classification of Acid dyes |    |    |
|    | • To understand dyeing procedure                               |    |    |
|    | • To analyze faults and remedies                               |    |    |
|    | Contents:                                                      |    |    |
|    | Acid dyes – Properties, Classification                         |    |    |
|    | Dyeing mechanism of protein fibres                             |    |    |
| 00 | Dyeing of silk fibre                                           | 04 | 00 |
| 09 | Dyeing of wool fibre                                           | 04 | 08 |
|    | After treatments                                               |    |    |
|    | Fastness properties                                            |    |    |
|    | Dyeing With Metal Complex Dyes                                 |    |    |
|    | Metal Complex dyes - Properties, Classification                |    |    |
|    | Dyeing mechanism of protein fibres                             |    |    |
|    | Dyeing of wool fibre                                           |    |    |
|    | After treatments                                               |    |    |
|    | Fastness properties                                            |    |    |
|    | Dyeing With Natural Dyes                                       |    |    |
|    | Specific Objectives:                                           |    |    |
|    | • To learn sources of natural dyes                             |    |    |
|    | • To understand dyeing procedure                               |    |    |
| 10 | • To analyze faults and remedies                               | 04 | 06 |
| 10 | Contents:                                                      | 04 | 00 |
|    | Classification of natural dyes                                 |    |    |
|    | Properties                                                     |    |    |
|    | Application on cellulosic material                             |    |    |
|    | Faults and remedies                                            |    |    |

|    | Dyeing Machines                                           |    |     |
|----|-----------------------------------------------------------|----|-----|
|    | Specific Objectives:                                      |    |     |
|    | • To understand types of dyeing machines                  |    |     |
| 11 | • To learn construction and working of m/cs               |    |     |
|    | • To compare advantages and limitations of different m/cs |    |     |
|    | Contents:                                                 | 08 | 12  |
| 11 | Construction, working, advantages and disadvantages of:   |    |     |
|    | • Fibre/Yarn Dyeing Machine - Hank Dyeing, Package        |    |     |
|    | Dyeing                                                    |    |     |
|    | Jigger Dyeing Machine                                     |    |     |
|    | Winch Dyeing Machine                                      |    |     |
|    | Semi continuous and Continuous Dyeing Machines            |    |     |
|    | Total                                                     | 64 | 100 |

# **Practicals:**

Skills to be developed Intellectual Skills: The student will learn

- 1) Understand dying process.
- 2) Learn after treatments.
- 3) Learn dyeing machine.

#### Motor Skill:

The student will learn

- 1) Dyeing if cellulosic & protein fibre with different dyes.
- 2) To operate dyeing machine.

### List of Experiments:

- 1. Dyeing of cotton with direct dye
- 2. After treatment with direct dyed goods
- 3. Dyeing of cotton with hot brand & HE brand reactive dyes
- 4. Dyeing of cotton with ME & ramazol reactive dyes
- 5. Dyeing of cotton with vat dyes
- 6. Dyeing of cotton with sulphur dye
- 7. After treatments of sulphur dyed goods
- 8. Dyeing of cotton with azoic colours
- 9. Dyeing of wool & silk with basic dye
- 10. Dyeing of wool & silk with acid dye
- 11. Dyeing of wool & with metal complex dye
- 12. Dyeing of cotton fabric with reactive dyes by semi-continuous dyeing method.
- 13. Dyeing of cotton fabric with reactive dyes by continuous dyeing method.

#### **Implementation Strategies:**

The teaching learning will involve many methods such as: Class room lectures with questions and answers, mill visits, discussions, exercises, practices assignments etc. The classroom & practice sessions will be enriched by industry-based materials in the form of photographs, slides, transparencies, video programs and computer based programs.

#### **References:**

| Sr.<br>No. | Author                                              | Title                                         | Edition         | Year<br>of<br>Publication | Publisher & Address                                                                 |
|------------|-----------------------------------------------------|-----------------------------------------------|-----------------|---------------------------|-------------------------------------------------------------------------------------|
| 1          | Dr. C. V.<br>Koushik & Mr.<br>Antao Irwin<br>Josico | Chemical<br>Processing of<br>Textiles         | 1 <sup>st</sup> | 2003                      | NCUTE, 8 <sup>th</sup> Floor, Main<br>Building, IIT, Hauz<br>Khas, New Delhi-110016 |
| 2          | V. A. Shenai                                        | Technology of<br>Dyeing                       | $2^{nd}$        | 2000                      | Sevak Publications<br>Mumbai - 400031                                               |
| 3          | T. L. Vigo                                          | Textile<br>processing &<br>properties         | 2 <sup>nd</sup> | 1994                      | Elsevier Science<br>B.V. Amsterdam                                                  |
| 4          | Clifford<br>Pireston                                | The dyeing of cellulose fibres                | $1^{st}$        |                           | Dyers co. Publication<br>Trust. England.                                            |
| 5          | F. Sadav                                            | Chemical<br>technology of<br>fibres materials | $1^{st}$        | 1973                      | Mir Publication Miscrow                                                             |
| 6          | M. L.<br>Gulrajani                                  | Silk dyeing<br>printing &<br>finishing        | 3 <sup>rd</sup> | 1988                      | I.I.T. Delhi Dept.                                                                  |

Course Name : Diploma in Textile Technology Course Code : TC Semester : Fourth Subject Title : Technology of Printing-I Subject Code : 17468

#### **Teaching & Examination Scheme:**

| Teaching Scheme |    |    |               |     | Examinati | on Scheme |     |       |
|-----------------|----|----|---------------|-----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS. | TH  | PR        | OR        | TW  | TOTAL |
| 04              |    | 03 | 03            | 100 | 50#       |           | 25@ | 175   |

NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

The chemical processing of textile is a value addition process by way of exhausting the aesthetic properties through printing and other processes. The students will be acquainted with the operation of printing. In general this subject will impact knowledge and skills in the areas of printing of textile fabrics.

### **Objectives:**

The students will be able to:

- Get the basic concepts in printing of fabrics.
- Know the technology of printing, different techniques of printing, their advantages and disadvantages.
- Understand construction and working of various printing machines.

#### **Learning Structure:**



# **CONTENTS:** Theory

| Chapter | Name of the Topic                                                       | Hours | Marks |
|---------|-------------------------------------------------------------------------|-------|-------|
|         | Introduction to Textile Printing                                        |       |       |
|         | Specific Objectives: Student will be able to understand                 |       |       |
|         | Importance of pretreatments for fabric printing                         |       |       |
|         | Various ingredients and their role in printing                          |       |       |
|         |                                                                         |       |       |
| 1       | Contents:                                                               | 10    | 16    |
|         | • Preparation of cotton fabric for printing                             |       |       |
|         | <ul> <li>Print paste ingredients and their functions</li> </ul>         |       |       |
|         | • Classification of thickeners, chemistry of thickeners                 |       |       |
|         | • Advantages and limitations of thickeners.                             |       |       |
|         | Selection criteria of thickeners for various dyes                       |       |       |
|         | Methods of printing and styles of printing:                             |       |       |
|         | Specific Objectives: Student will be able to understand                 |       |       |
|         | <ul><li>Various methods of printing</li></ul>                           |       |       |
|         | Various styles of printing                                              |       |       |
|         |                                                                         |       |       |
| 2       | Contents:                                                               | 10    | 12    |
|         | <ul> <li>General classification of methods of printing</li> </ul>       |       |       |
|         | • Tie and dye method, batik printing, stencil printing and              |       |       |
|         | block printing.                                                         |       |       |
|         | Classification of styles of printing                                    |       |       |
|         | • Principles of direct ,discharge, resist styles of printing            |       |       |
|         | Printing machinery                                                      |       |       |
|         | Specific Objectives: Student will be able to understand                 |       |       |
|         | Working of machineries for printing                                     |       |       |
|         | Advantages and limitations of every machinery                           |       |       |
|         |                                                                         |       |       |
|         | Contents:                                                               |       |       |
| 3       | • Table printing – Technical features, faults, causes and               | 14    | 24    |
| 5       | remedies.                                                               | 14    | 24    |
|         | • Flat-bed printing- technical features, types of squeezes,             |       |       |
|         | advantages and limitations.                                             |       |       |
|         | • Screen preparation for flat bed printing machine.                     |       |       |
|         | • Rotary screen printing-technical features, types of                   |       |       |
|         | squeezes, advantages and limitations                                    |       |       |
|         | <ul> <li>Screen exposing for rotary printing machine.</li> </ul>        |       |       |
|         | Printing of Cotton:                                                     |       |       |
|         | Specific Objectives: Student will be able to understand                 |       |       |
|         | Fixation mechanism of prints                                            |       |       |
|         | Print paste formulation for direct, reactive and azoic                  |       |       |
|         | colours.                                                                |       |       |
| 4       | Contonta                                                                | 20    | 30    |
|         | 4.1 Drint fixation methods                                              | 20    |       |
|         | 4.1 FILL IXAUOII INCUIOUS     8 MarKs       • Methods of print fivetion |       |       |
|         | Internous of print fixation                                             |       |       |
|         | • Internation of print fixation during steaming                         |       |       |
|         | • Steaming machineries- Star ager and rapid ager                        |       |       |
|         | 4.2 Formulation of print paste 16 Marks                                 |       |       |

|   | Total                                                                                                                                                                                                  | 61 | 100 |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
| 6 | <ul> <li>Print paste formulation for direct style of printing on<br/>wool and silk fabric using acid, metal complex and basic<br/>dves with process sequence</li> </ul>                                | 06 | 08  |
|   | <ul><li>Printing of Wool and Silk:</li><li>Preparation of fabrics for printing,</li></ul>                                                                                                              |    |     |
|   | • Print paste formulation for pigment printing and process sequence.                                                                                                                                   |    |     |
| 5 | <ul> <li>Printing with pigment on Cotton:</li> <li>Principle of pigment printing,</li> <li>Print paste ingredients,</li> </ul>                                                                         | 04 | 10  |
|   | Magic and Crimp styles of printing on cotton                                                                                                                                                           |    |     |
|   | Khadi printing                                                                                                                                                                                         |    |     |
|   | 4.3 Special print effects 6 Marks                                                                                                                                                                      |    |     |
|   | Printing with azoic colours: Print paste formulation for<br>direct style of printing                                                                                                                   |    |     |
|   |                                                                                                                                                                                                        |    |     |
|   | <ul> <li>Printing with direct dye – Print paste formulation for direct style of printing and discharge style of printing.</li> <li>Printing with reactive dye - Print paste formulation for</li> </ul> |    |     |

#### **Practical:**

#### Skills to be developed:

#### **Intellectual Skills:**

- 1) Understand screen preparation.
- 2) Understand printing process.
- 3) Learn different styles of printing.

#### **Motor Skill:**

- 1) Drawing a design & prepare screen of same.
- 2) Direct, discharge & resist style of printing.

#### **List of Practicals:**

- 1) Preparation of screen for printing.
- 2) Develop Tie & dye effect on cotton fabric.
- 3) Develop batik effect on cotton fabric.
- 4) Application of direct dye on cotton by direct style of printing.
- 5) Application of reactive dye on cotton by direct style of printing.
- 6) Application of azoic colour on cotton by direct style of printing.
- 7) Develop magic style of printing, crimp style of printing effects on cotton.
- 8) Obtain White & colour discharge effects on cotton using direct and reactive dyes.

- 9) Obtain azoic colour discharge effect on direct dyed ground.
- 10) Obtain White & colour resist effect on reactive dyed ground.
- 11) Printing of Silk using acid dyes.

#### Learning Resources: Books:

| Sr.<br>No. | Author                             | Title                                                 | Edition         | Year of<br>Publication | Publisher                                    |
|------------|------------------------------------|-------------------------------------------------------|-----------------|------------------------|----------------------------------------------|
| 1          | Prof. N.L.<br>Gulrajani            | Silk Dyeing,<br>Printing & Finishing                  | $2^{nd}$        | 1988                   | Dept. Of Textile<br>Technology, IIT<br>Delhi |
| 2          | Dr. K.V.<br>Datye & A.A.<br>Vaidya | Chemical Processing<br>Of Synthetic And Its<br>Blends | 2 <sup>nd</sup> | 1984                   | A Wiley Inter Science<br>Publication         |
| 3          | L.W. C. Miles                      | Textile Printing                                      | 2nd             | 1981                   | The Dyer Company<br>Publication Trust        |
| 4          | Dr. V. A.<br>Shenai                | Technology. Of<br>Printing, Vol. IV                   | 3rd             | 1990                   | Sevak Publication                            |

Course Name : Diploma in Textile Technology Course Code : TC Semester : Fourth Subject Title : Technology of Finishing-I Subject Code : 17469

#### **Teaching & Examination Scheme:**

| Teaching Scheme |    |    |               |     | Examinati | on Scheme |     |       |
|-----------------|----|----|---------------|-----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS. | TH  | PR        | OR        | TW  | TOTAL |
| 03              |    | 03 | 03            | 100 |           | 25#       | 25@ | 150   |

NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

The word textile finishing defines a series of processing operations applied to grey fabrics to enhance their appearance and hand, properties and possible applications. The term functional finishing with reference to all the mechanical or chemical finishing operations carried out on fabrics already bleached, dyed or printed to further enhance their properties and possibly add some new ones.

The terms finishing and functional finishing are therefore similar and both play a fundamental role for the commercial excellency of the results of textiles, strictly depending on market requirements that are becoming increasingly stringent and unpredictable and permit very short response times.

#### **Objectives:**

The students will be able to: -

- Know the basic concepts and types of finishing
- Have the knowledge of various formulations of different functional finishes.
- Study the functional finishes.

#### **Learning Structure:**



# **Contents: Theory**

| Chapter | Name of Topic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Hours    | Marks |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------|
|         | Introduction to Finishing and application techniques                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |          |       |
|         | Objects of finishing, classification of finishing,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |          |       |
|         | Application techniques-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |          |       |
| 01      | <ul> <li>Review of exhaust method of application</li> <li>Dadding Concert of negotiation system which the second second</li></ul> | 08       | 20    |
|         | • Padding - Concept of percentage expression, weight pick-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |          |       |
|         | Working principle of machinery like Calendaring Sueding                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |          |       |
|         | Sanforising, Stenter.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |          |       |
|         | Softeners & Stiffeners                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |          |       |
|         | Classification of softener, Properties, mode of action and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |          |       |
| 02      | application of Cationic, Anionic, Non-ionic, Reactive and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 08       | 16    |
|         | Emulsion softeners. Softeners for cotton, wool, silk, polyester.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |       |
|         | Classification of sufferers, examples and their application.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |          |       |
|         | Kesin Finishing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          |       |
|         | Object of resin finishing, Mechanism of creasing and resin                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |          |       |
|         | nnisning, General recipe for Resin finisning, Role of catalyst in                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |          |       |
| 03      | Press, Classification and properties of resin and catalysts, Concept                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 10       | 20    |
|         | of pre- cure and post cure method. Durable press finishing for                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |          |       |
|         | denim garments, Limitations of resin finishing. Concept of eco-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          |       |
|         | friendly cross linking agents. Evaluation methods like crease                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |          |       |
|         | recovery angle and DP rating.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |          |       |
| 0.4     | Optical Brightening Agent Finishing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <u> </u> |       |
| 04      | Chemistry, mechanism and application methods of OBA for                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 04       | 08    |
|         | cotton, wool, silk, polyester. Stripping of OBA.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |       |
|         | Flame Retardancy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |       |
|         | flame proof and flame retardancy. Limiting oxygen Index and its                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          |       |
|         | importance. Classification of flame retardants. Mechanism of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |          |       |
| 05      | Solid Phase and Gas Phase flame retardant. Factors affecting                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 06       | 16    |
|         | flame retardancy. Essential requirements of a good flame                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |          |       |
|         | retardant. Various flame retardants for Cotton, Wool, Silk,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |       |
|         | Polyester and Nylon. Evaluation of flame retardancy by angular                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |          |       |
|         | Antimicrohial Finishing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |          |       |
|         | Objects requirements types and mechanism of antimicrobial                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |          |       |
| 06      | finishing Desirable properties of a good antimicrobial finish                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 06       | 10    |
| 00      | Various antimicrobial finishes for Cotton Wool and Silk Moth                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 00       | 10    |
|         | proofing of wool. Evaluation of antimicrobial finishes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |          |       |
|         | Introduction to Special Finishes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |       |
| 07      | Waterproof and water repellent finishing, Biopolishing, Scroopy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 06       | 10    |
|         | finish for silk, Concept of Nano-finishes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | -        | -     |
|         | Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 48       | 100   |

#### List of Experiments:

- 1. Preparation and application of Blue Tone and Red Tone on cellulosic.
- 2. Application & evaluation of various types of softeners on cotton.
- 3. Finishing of cotton for imparting soft, medium and stiff handle.
- 4. Resin finishing of cotton.
- 5. Application of OBA on Cotton by continuous & exhaust method.
- 6. Finishing of wool to impart moth proofing.
- 7. Finishing of Silk to improve softness and crease recovery property.
- 8. Application & evaluation of anti microbial finish on cotton.
- 9. Application & evaluation of flame retardant finishing on cotton.
- 10. Application & evaluation of waterproof / Water repellent Finishing on cotton.

#### Learning Resources: Books:

| Sr.<br>No. | Author                          | Title                                                      | Edition         | Year of<br>Publication | Address of<br>Publisher              |
|------------|---------------------------------|------------------------------------------------------------|-----------------|------------------------|--------------------------------------|
| 1          | Dr. K.V. Datye &<br>A.A. Vaidya | Chemical Processing<br>of Synthetic and Its<br>Blends      | 2 <sup>nd</sup> | 1984                   | A Wiley Inter<br>science Publication |
| 2          | Dr. A. V. Shenai                | Tech. of Finishing<br>Vol. X                               | 3 <sup>rd</sup> | 1990                   | Sevak Publication                    |
| 3          | J.T. Marsh                      | Introduction To<br>Textile Finishing                       | $2^{nd}$        | 1979                   | B.I. Publication                     |
| 4          | Marks, Atlas &<br>Wooding       | Chemical After<br>Treatments of<br>Textiles.               | 4 <sup>th</sup> | 1971                   | Wiley Inter science                  |
| 5          | R.M. Mittal & S.<br>S Trivedi   | Chemical Processing<br>of Polyester &<br>Cellulosic Blends | 3rd             | 1984                   | ATIRA,<br>Ahemadabad                 |
| 6          | R. S. Bhagwat                   | Handbook of Textile<br>Finishing Machinery                 |                 |                        |                                      |
| 7          | ACMIT                           | Finishing, Reference<br>Book of Textile<br>Technologies    |                 |                        |                                      |
| 8          | Heywood                         | Textile Finishing                                          |                 |                        | SDC Publications                     |

Course Name : Diploma in Textile Technology Course Code : TC Semester : Third Subject Title : Elements of Chemical Engineering Operation Subject Code : 17470

#### **Teaching and Examination Scheme**

| Teaching Scheme |    |    |               |     | Examinati | on Scheme |    |       |
|-----------------|----|----|---------------|-----|-----------|-----------|----|-------|
| TH              | TU | PR | PAPER<br>HRS. | TH  | PR        | OR        | TW | TOTAL |
| 03              |    |    | 03            | 100 |           |           |    | 100   |

NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 100 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rational:**

This subject intends to provide a self-contained introduction and back ground of cognate topics of fluid or momentum transfer, heat transfer, and mass transfer. The chemical processing of textile is very diverse in nature and involves the transfer of the fluid material from one place to other for its use in the machines. The technologists in this industry should have the basic understanding of the principles of fluid flow, heat transfer and mass transfer in order to control the process by operating it to an optimum level.

#### **Objectives:**

The student will be able to:

- Learn basics of the unit operations of Chemical Engineering.
- Understand the importance of the subject to textile industry.
- Apply the knowledge of the subject to textile industry practices.

#### **Learning Structure:**



# **CONTENTS:** Theory

| Chapter | Name of the Topic                                                                                                                                                                                                 | Hours | Marks |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
|         | Unit Systems And Introduction to Fluid Flow                                                                                                                                                                       |       |       |
|         | Specific Objectives: Student will be able to understand                                                                                                                                                           |       |       |
|         | Different unit systems and conversions                                                                                                                                                                            |       |       |
|         | Properties of fluids & their variations                                                                                                                                                                           |       |       |
|         |                                                                                                                                                                                                                   |       |       |
|         | • Review of various unit systems.                                                                                                                                                                                 |       |       |
| 01      | • Study of units and conversions of some of the important                                                                                                                                                         | 07    | 10    |
| 01      | physical quantities.                                                                                                                                                                                              | 07    | 12    |
|         | • Introduction & importance of fluid flow studies to textiles.                                                                                                                                                    |       |       |
|         | • Definition of fluid, study of fluid properties like density,                                                                                                                                                    |       |       |
|         | viscosity, statement of Newton's Law of Viscosity,                                                                                                                                                                |       |       |
|         | • Definition of compressible, incompressible, real & ideal                                                                                                                                                        |       |       |
|         | fluids.                                                                                                                                                                                                           |       |       |
|         | Study of rheology of Non Newtonian fluids.                                                                                                                                                                        |       |       |
|         | Study of Fluids In Motion                                                                                                                                                                                         |       |       |
|         | Specific Objectives: Student will be able to understand                                                                                                                                                           |       |       |
|         | Various flow equations & their significance                                                                                                                                                                       |       |       |
|         | Material & energy balances                                                                                                                                                                                        |       |       |
|         |                                                                                                                                                                                                                   |       |       |
| 02      | • Reynolds Experiment for fluid flow through pipes.                                                                                                                                                               | 05    | 12    |
|         | • Equation of continuity and Bernoulli's Equation                                                                                                                                                                 | 00    | 12    |
|         | (Only expressions no derivation) with the significance of the                                                                                                                                                     |       |       |
|         | equations.                                                                                                                                                                                                        |       |       |
|         | • Concept of energy losses & friction factor (no derivations &                                                                                                                                                    |       |       |
|         | no numerical)                                                                                                                                                                                                     |       |       |
|         | • Pipe Fittings: Types & Purpose                                                                                                                                                                                  |       |       |
|         | I ransportation of Fluids And Measurements of Fluid Flow:<br>Specific Objectives: Student will be able to                                                                                                         |       |       |
|         | Specific Objectives: Student will be able to                                                                                                                                                                      |       |       |
|         | Condensional working of machineries required for muld<br>transfer                                                                                                                                                 |       |       |
|         | <ul> <li>Measure &amp; control the flow rates</li> </ul>                                                                                                                                                          |       |       |
| 02      | <ul> <li>Need for pumping of liquids</li> </ul>                                                                                                                                                                   | 05    | 14    |
| 05      | <ul> <li>Dringinla construction &amp; working of centrifugal nump</li> </ul>                                                                                                                                      | 05    | 14    |
|         | <ul> <li>Immertance of fluid flow measurement in textile</li> </ul>                                                                                                                                               |       |       |
|         | <ul> <li>Importance of flow measuring devices;</li> </ul>                                                                                                                                                         |       |       |
|         | <ul> <li>Construction principle and working of venturi meter</li> </ul>                                                                                                                                           |       |       |
|         | • Construction, principle, and working of venturi neter,                                                                                                                                                          |       |       |
|         | Introduction to Heat Transfer                                                                                                                                                                                     |       |       |
|         | Specific Objectives: Student will be able to understand                                                                                                                                                           |       |       |
|         | <ul> <li>Concepts of heat transfer</li> </ul>                                                                                                                                                                     |       |       |
|         | > Application of conduction                                                                                                                                                                                       |       |       |
|         |                                                                                                                                                                                                                   |       |       |
| <u></u> | • Definition of heat transfer operation.                                                                                                                                                                          |       |       |
| 04      | • Study of modes of heat transfer.                                                                                                                                                                                | 08    | 14    |
|         | • Definition of terminologies like specific heat, heat capacity,                                                                                                                                                  |       |       |
|         | • Latent heat, sensible heat, thermal conductivity, and thermal                                                                                                                                                   |       |       |
|         | diffusivity, heat as a form energy, heat transfer rate and heat                                                                                                                                                   |       |       |
|         | transfer co-efficient.                                                                                                                                                                                            |       |       |
|         | • Energy conservation in textiles                                                                                                                                                                                 |       |       |
|         | <ul> <li>Latent heat, sensible heat, thermal conductivity, and thermal diffusivity, heat as a form energy, heat transfer rate and heat transfer co-efficient.</li> <li>Energy conservation in textiles</li> </ul> |       |       |

|          | • Conduction heat transfer: Fourier's law of heat conduction,                                                                                 |    |     |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
|          | • Study of heat flow through a thick slab, thick cylindrical                                                                                  | ľ  |     |
|          | pipe.                                                                                                                                         |    |     |
|          | • Study of thermal insulations.                                                                                                               |    |     |
|          | • Applications of conduction heat transfer in textile industry.                                                                               |    |     |
|          | Convection & Radiation heat transfer                                                                                                          |    |     |
|          | Specific Objectives: Student will be able to understand                                                                                       |    |     |
|          | Concept of convection & radiation                                                                                                             |    |     |
|          | > Applications of above from textile point of view                                                                                            |    |     |
|          | • Statement of Newton's Law of cooling                                                                                                        |    |     |
| 05       | <ul> <li>Statement of Newton's Law of cooling,</li> <li>concept of heat transfer coefficient</li> </ul>                                       | 05 | 1.4 |
| 05       | <ul> <li>Study of free &amp; forced convection</li> </ul>                                                                                     | 05 | 14  |
|          | <ul> <li>Applications of convection heat transfer to textile industry</li> </ul>                                                              |    |     |
|          | <ul> <li>Concept of heat transfer by radiation</li> </ul>                                                                                     |    |     |
|          | <ul> <li>concept of heat transfer by radiation,</li> <li>concept of black body radiation</li> </ul>                                           |    |     |
|          | <ul> <li>statement of basic laws of radiation</li> </ul>                                                                                      |    |     |
|          | <ul> <li>Applications</li> </ul>                                                                                                              |    |     |
|          | Introduction to Mass Transfer Operation                                                                                                       |    |     |
|          | Specific Objectives: Student will be able to understand                                                                                       |    |     |
|          | > Unit operations                                                                                                                             |    |     |
|          | Control of mass transfer, avoid wastage, conservation of                                                                                      |    |     |
|          | mass                                                                                                                                          |    |     |
| 06       | • Concert of mass transfer exerction & diffusion                                                                                              | 05 | 10  |
| 06       | <ul> <li>Concept of mass transfer operation &amp; diffusion.</li> <li>Definition of diffusion co officient mass transfer rate.</li> </ul>     | 05 | 10  |
|          | <ul> <li>Definition of unfusion co-efficient, mass transfer fate.</li> <li>Study of modes of mass transfer viz molecular diffusion</li> </ul> |    |     |
|          | and eddy diffusion                                                                                                                            |    |     |
|          | <ul> <li>Classification of mass transfer operations</li> </ul>                                                                                |    |     |
|          | <ul> <li>Definition and applications of distillation extraction</li> </ul>                                                                    |    |     |
|          | absorption, adsorption, crystallization, evaporation.                                                                                         |    |     |
|          | Simultaneous heat & Mass transfer operations                                                                                                  |    |     |
|          | Specific Objectives: Student will be able to understand                                                                                       |    |     |
|          | About drying & its need                                                                                                                       |    |     |
|          | Working of driers                                                                                                                             |    |     |
|          | • Introduction to drying as a unit operation.                                                                                                 |    |     |
|          | • Applications of drying techniques in general & particularly                                                                                 |    |     |
| 07       | to textile industry                                                                                                                           | 09 | 14  |
|          | • Study of diffusion and capillary theory of drying. Brief                                                                                    |    |     |
|          | • study of textile dryers :tumble drier, stenter                                                                                              |    |     |
|          | • Introduction to humidification operation. Importance of                                                                                     |    |     |
|          | <ul> <li>Definitions of the terms like dry hulb and wat hulb</li> </ul>                                                                       |    |     |
|          | • Definitions of the terms like dry build and wet build<br>tempratures dew point humidity percent humidity                                    |    |     |
|          | absolute and relative humidity.                                                                                                               |    |     |
| <u> </u> | Filtration and Membrane Separation Techniques                                                                                                 |    |     |
|          | Specific Objectives: Student will be able to understand                                                                                       |    |     |
| 08       | Filteration & its application in textile industry                                                                                             | 04 | 10  |
| 00       | advance techniques for effluent treatment                                                                                                     | 04 | 10  |
|          |                                                                                                                                               |    |     |
|          | • Introduction to filtration operation, filter aids, filter media,                                                                            |    |     |

| <ul> <li>Advanthese</li> <li>indust</li> <li>Study</li> </ul> | atages of membrane technology & applications of<br>techniques in general & in particular to textile<br>ry.<br>of micro, ultra filtration, reverse osmosis.<br>Total | 48 | 100 |
|---------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
| <ul><li>Applic</li><li>Introd</li></ul>                       | cations of filtration to textile industry.<br>uction to membrane separation Techniques.                                                                             |    |     |

# Learning Resources: Books:

| Sr.<br>No | Author                  | Title                                   | Edition         | Year of<br>Publication | Address of<br>Publisher    |
|-----------|-------------------------|-----------------------------------------|-----------------|------------------------|----------------------------|
| 01        | Badger & Banchero       | Introduction to<br>Chemical Engineering | $2^{nd}$        | 1991                   | McGraw Hill<br>Publication |
| 02        | Treybal                 | Mass Transfer                           | 5 <sup>th</sup> | 1985                   | McGraw Hill<br>Publication |
| 03        | Coulson &<br>Richardson | Chemical Engineering                    | Vol 1-5         | 1991                   | McGraw Hill<br>Publication |

Course Name : Diploma in Textile Technology Course Code : TC Semester : Fourth Subject Title : Textile Testing Subject Code : 17471

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |               |     | Examinati | on Scheme |     |       |
|-----------------|----|----|---------------|-----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS. | TH  | PR        | OR        | TW  | TOTAL |
| 03              |    | 02 | 03            | 100 |           |           | 25@ | 125   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 100 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Variety of raw materials for textile manufacturing are used, such as cotton, silk, synthetic fibers, etc. These raw materials are being used individually or mixed in different proportions to form a yarn of desired quality. The raw materials can be tested for numerous characteristics like fiber length, fineness, strength, maturity etc. Intermediate products like sliver, roving etc. are also required to be tested for controlling the process, for optimizing the process parameters or for developing existing process. Finally, to ensure the quality product, final product that may be yarn, fabric or garment, testing is imperative. This subject intends to equip students with the concepts, principles and methods of testing of various textile fiber, yarns and fabric, which is helpful in selection of raw materials, process control, process optimization, quality assurance and research purpose.

Since textile is system of mass production and contains lots of variations, lot of experimentation is required. Results obtained from specific number of observations are to be analyzed, interpreted and used for best outcomes. Therefore, students are equipped with the methods to analyze the testing results statistically.

### General objectives:

- 1. Understand principle & concept of Testing of Yarns / Fabric
- 2. Measure Count, Twist, Evenness and Strength of yarn.
- 3. Measure strength, cover factor, air permeability of fabric.
- 3. List standard methods used for testing textile material.
- 4. Define various terms used in yarn & fabric testing.
- 5. Correlate the result of the tests to the application of material.
#### **Learning Structure:**



## **Detailed Contents:**

| Chapter | Contents                                                                    | Hours | Marks |
|---------|-----------------------------------------------------------------------------|-------|-------|
|         | YARN TESTING:                                                               |       |       |
|         | Specific Objectives                                                         |       |       |
|         | Select yarn count measuring system.                                         |       |       |
|         | Describe the process testing of yarn twist.                                 |       |       |
|         | List different methods of twist measurement.                                |       |       |
|         | Interpretation of effects of twist on fabric properties                     |       |       |
|         | Know effects of unevenness.                                                 |       |       |
|         | 1.1 Yarn Count:                                                             |       |       |
|         | • Different systems of yarn numbering.(direct, indirect)                    | 10    | 16    |
|         | • Definition : British count, Metric, Tex, Denier count                     |       |       |
| 1       | • Standard method of determination of yarn count with                       |       |       |
| _       | electronic balance                                                          |       |       |
|         | <b>1.2 Yarn Twist:</b> Definition, direction twist, effect of twist on yarn |       |       |
|         | and fabric properties.                                                      |       |       |
|         | Measurement of yarn twist -                                                 |       |       |
|         | Twist Contraction principle                                                 |       |       |
|         | • Twist and Untwisting principle                                            |       |       |
|         | <b>1 3 Varn evenness:</b> Concept Types of variations in varn               |       |       |
|         | (random& periodic) Expressions used for unevenness: U% C V                  |       |       |
|         | % Imperfections                                                             | 06    | 08    |
|         | Effect of varn unevenness on varn & fabric properties                       |       |       |
|         | FABRIC TESTING:                                                             |       |       |
|         | Specific Objectives                                                         |       |       |
|         | <ul> <li>Know different fabric properties to be tested.</li> </ul>          |       |       |
|         | $\blacktriangleright$ List importance of fabric testing.                    |       |       |
|         | > Interpretation of test results.                                           |       |       |
|         | > Selection of Testing Methods as per End use.                              |       |       |
| 2       |                                                                             | 06    | 16    |
|         | 2.1 Fabric sampling method                                                  |       |       |
|         |                                                                             |       |       |
|         | 2.2 Fabric dimensional Properties: Fabric Length, Width,                    |       |       |
|         | Thickness, Weight measurement. Warp Count, Weft Count, and                  |       |       |
|         | Threads/Unit length, Cover factor (only formula), Crimp in Warp             |       |       |
|         | and weft.                                                                   |       |       |
|         | 2.3 Stiffness & Drape of fabric:                                            |       |       |
|         | Measurement of drape &stiffness.                                            | 04    | 14    |
|         | 2.4 Crease Recovery                                                         |       |       |
|         | Measurement by crease recovery angle                                        |       |       |
|         | 2.5 Serviceability of fabric                                                |       |       |
|         | Definition: serviceability, wear, and abrasion. Measurement of              |       |       |
|         | wear: Martindales Abrasion tester.                                          | 06    | 12    |
|         | Pilling of fabric: factors responsible for pilling of fabric.               |       |       |
|         | Measurement of pilling ICI Pill box tester.                                 |       |       |

|   | Sample size, principle, working of testers for Fabric tensile strength, tearing strength, Bursting strength.                                                                                                                                                                                                                                                                                                                                    | 04 | 12 |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|
|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                 |    |    |
|   | <b>3.2 Yarn Strength:</b> Measurement of single yarn strength & lea strength. Count Strength Product (CSP)                                                                                                                                                                                                                                                                                                                                      |    |    |
| 3 | <ul> <li>Specific Objectives</li> <li>Describe the process of tensile strength testing of yarn and fabric</li> <li>Describe the process of tearing strength, Bursting strength testing of and fabric.</li> <li>Use appropriate method of testing of tensile, tearing strength.</li> <li>3.1 Tensile Strength Testing:</li> <li>Definitions: load, elongation, Mass Stress, tenacity, work of rupture, work factor, elastic recovery.</li> </ul> | 04 | 10 |
|   | <ul> <li>2.6 Water and Air relation to fabric</li> <li>Definitions : Waterproof, shower proof fabrics, water<br/>Repellent fabrics.<br/>Measurement: <ul> <li>Spray test,</li> <li>Hydrostatic water head test.</li> </ul> </li> <li>Definition : Air-permeability, Air resistance, Porosity<br/>Measurements of air permeability, Factors affecting air-permeability.</li> </ul>                                                               | 08 | 12 |

## Skills to be developed

## 1) Intellectual Skills:

- 1. Proper selection of measuring instruments depending upon the data and precision required.
- 2. Analyze properties of matter & their use for the selection of material.
- 3. To interpret the results from observations and calculations.
- 4. To use these results for corrective actions in mechanical and wet processing.

## 2) Motor Skills:

- 1. Proper handling of instruments.
- 2. Measuring physical properties of yarn and fabric accurately.
- 3. To observe the phenomenon and to list the observations in proper tabular form.
- 4. To adopt proper procedure while performing the experiment.

#### **Practical:**

#### Skills to be developed:

#### **List of Practical:**

- 1. Determination of yarn count.
- 2. Determination of twist in single and doubled yarn.
- 3. Determination of breaking load and elongation of yarn.
- 4. Determination of lea strength & count strength product (CSP) of cotton yarn
- 5. Determination of tensile strength of fabric.
- 6. Determination tearing strength of fabric.
- 7. Determination of fabric stiffness.
- 8. Determination of drape of fabric.
- 9. Assessment of abrasion resistance and pilling propensity of fabric.

#### References: Books:

| Sr.<br>No. | Author        | Title                          | Publisher                      |
|------------|---------------|--------------------------------|--------------------------------|
| 1          | Angappan      | Textile Testing                | SS Textile Inst,<br>Coimbatore |
| 2          | J. E. Booth   | Principles of Textile Testing  |                                |
| 3          | Kothari       | Testing and Quality Management | IAFL, New Delhi                |
| 4          | B. P. Saville | Physical Testing of Textiles   |                                |

#### Websites:

1) www.scribd.com

2) www.fibre2fashion.com

Course Name : Diploma in Textile Technology Course Code : TC Semester : Fourth Subject Title : Professional Practices-II Subject Code : **17052** 

## **Teaching and Examination Scheme:**

| Tea | ching Sch | eme |               |    | Examination Scheme |    |     |       |  |
|-----|-----------|-----|---------------|----|--------------------|----|-----|-------|--|
| TH  | TU        | PR  | PAPER<br>HRS. | TH | PR                 | OR | TW  | TOTAL |  |
|     |           | 03  |               |    |                    |    | 50@ | 50    |  |

#### **Rationale:**

Most of the diploma holders join industries. Due to globalization and competition in the industrial and service sectors the selection for the job is based on campus interviews or competitive tests.

While selecting candidates a normal practice adopted is to see general confidence, ability to communicate and their attitude, in addition to basic technological concepts.

The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

#### **Objectives:**

Student will be able to:

- 1. Acquire information from different sources.
- 2. Prepare notes for given topic.
- 3. Present given topic in a seminar.
- 4. Interact with peers to share thoughts.
- 5. Prepare a report on industrial visit, expert lecture.

#### **Learning Structure:**



| Sr.<br>No. | Activities                                                                      | Hours |
|------------|---------------------------------------------------------------------------------|-------|
|            | Industrial Visits                                                               |       |
|            | Structured industrial visits be arranged and report of the same shall be        |       |
|            | submitted by the individual student, to form a part of the term work.           |       |
|            | The industrial visits may be arranged in the following areas / industries :     |       |
| 1          | i) Effluent treatment plant                                                     |       |
| 1          | ii) Auxiliary manufacturing unit                                                | 14    |
|            | iii) Research unit.                                                             |       |
|            | iv) Quality testing unit.                                                       |       |
|            | v) Machine manufacturing unit                                                   |       |
|            | vi) Dyeing & Printing Unit                                                      |       |
|            | Lectures by Professional / Industrial Expert lectures to be organized from      |       |
|            | any two of the following areas:                                                 |       |
|            | i) Interview Techniques.                                                        |       |
| 2          | ii) Energy conservation in textile.                                             | 06    |
|            | iii) Non conventional energy sources.                                           |       |
|            | iv) Woven and knit goods continuous processing & machines.                      |       |
|            | v) Nanotechnology.                                                              |       |
|            | Information Search:                                                             |       |
|            | Information search can be done through manufacturer's catalogue,                |       |
|            | websites, magazines, books etc. and submit a report any one topic.              |       |
|            | Following topics are suggested :                                                |       |
| 3          | i) Advances in chemicals & Auxiliaries.                                         | 08    |
|            | ii) Latest trends in wet processing.                                            |       |
|            | iii) Steam consumption & water consumption in processing machine.               |       |
|            | iv) Right first time technique in processing.                                   |       |
|            | v) Maintenance procedure for effluent treatment plant.                          |       |
|            | Seminar :                                                                       |       |
|            | Seminar topic shall be related to the subjects of fourth semester. Each student |       |
| 4          | shall submit a report of at least 10 pages and deliver a seminar (Presentation  | 10    |
|            | time - 10 minutes)                                                              |       |
|            | Mini Project / Activities : (any one)                                           |       |
|            | a) Conventional process study of any one machine in dveing.                     |       |
|            | b) Conventional process study of any one machine in printing.                   |       |
| 5          | c) Conventional process study of any one machine in bleaching.                  | 10    |
|            | d) Sketch and working of analytical instrument like spectrophotometer or        | 10    |
|            | microscope.                                                                     |       |
|            | e) Literature survey of any one given topic.                                    |       |
|            | Total                                                                           | 48    |

Course Name : Diploma in Textile Technology Course Code : TC Semester : Fourth Subject Title : Industrial Training

Subject Code : 17053

## **Teaching and Examination Scheme:**

| Tea | ching Sch | ieme |               |    | Examinati |    |    |       |
|-----|-----------|------|---------------|----|-----------|----|----|-------|
| TH  | TU        | PR   | PAPER<br>HRS. | TH | PR        | OR | TW | TOTAL |
|     |           | **   |               |    |           |    |    |       |

\*\* Industrial training for six weeks to be completed during summer break after Fourth semester. Assessment to be done in Fifth Semester

## **Objectives:**

- Experience the industrial environment for textile industrial processes, equipment & practices.
- Collect data about Plant lay out, equipment and machines-specifications and working available in different sections and collect data.
- Experience operation of machines and process parameters of spinning and weaving departments for the target production and collect data.
- Appreciate factory utilities power water illumination men and material movement, pollution control, industrial safety etc.
- Carryout the material testing at different stages of yarn and fabric production for quality.
- Experience maintenance schedules of all the equipment and collect information on the effects of negligence of maintenance.
- Diagnose problems and find solutions to problems related with operation, and maintenance of equipment.
- Study the organization structure, job description, job specifications, promotional schemes, motivational strategies, etc.
- Collect data on production incentives, methods study and time & motion studies.
- Critical study of all activities with a view to find the areas for improvement.
- Devise solution to problem areas.
- Collect information / data for project work and seminars.

However, the detailed list of areas of study, working and data collection has been prepared and is enclosed in **3.5** – **Specific area of study and working.** The student should regularly refer to this list and accordingly choose the areas and acquire the knowledge information and skills.

## **3.2 General Guidelines**

- The students have to undergo industrial training in chemical processing departments of fabric / yarn / garment for 6 weeks in between fourth and fifth semesters.
- The student has to maintain a daily diary, in which they will record the daily achievements, which should be countersigned by the industry officer.
- The student should carry out the critical study of different activities and try to locate the problem or problems in any of the areas of product quality, productivity, efficiency, cost control and cost reduction, etc. Then, he should try to devise solutions to such problem.
- After completion of training each student has to bring the certificate for the entire duration for satisfactory completion of training.
- The student will be required to submit a report in handwritten, which will be properly bound.
- The students will be examined through viva-voce by the internal and external examiners. (The external examiner should be from industry).

## **3.3 Maintenance of Daily Diary**

The students are required to maintain a daily diary, regularly in systematic manner. After the completion of day's work the important information is recorded clearly as per the instructions of section in charge and get it signed daily by him. Write in brief about observations made, daily work problems / project/s undertaken, discussion held, instructions given by section in charge, literature consulted, data etc.

## 3.4 Evaluation of daily diary

Term work assessment is based on daily diary maintenance, attendance, remarks of industry. Term-work Marks will be given on the basis of evidence of diary maintenance, adequacy and quality of record.

## 3.5 Specific areas of study and working: -

Students are required to collect the relevant information on the specific area given below. This information should be recorded in daily diary and further used in preparing the Final Report.

## (a) General Information

- 1. Name of mill, address, and year of establishment.
- 2. Type of organization, growth in terms of investment, assets, employment, sales, turnover, product diversification, technological development.
- 3. Training orientation programmer of the organization.
- 4. Employee's welfare schemes like PF, Medical, Canteen, Training, Recreation facilities etc.
- 5. Detailed lay out of the mill, number of spindles, warp weft, doubling, and total number of looms. (Non-automatic, automatic and total.)
- 6. Yarn counts spun-warp and weft. Average count of the yarn used.
- 7. Details of shifts: shift wise technical staff & number of workers in processing.
- 8. Quantity of fabrics produced in sq. meters. Quantity of fabrics exported in sq. meters. Types of finish given.
- MSBTE Final Copy Dt. 30/08/2013

#### 17053 TC4

9. Brief study of activities in quality control department.

## (b) Grey Checking

- 1. Lay out plan, lighting scheme and fire prevention methods.
- 2. Handling and transportation of fabric.
- 3. Methods of checking.
- 4. Classification of faults.
- 5. Segregation of various sorts.
- 6. Process control exercised in gray checking.
- 7. Labour complement.
- 8. Power requirements.
- 9. Operative hours and production.

## (c) Desizing

- 1. Lay out plan, lighting scheme and fire prevention methods.
- 2. Handling and transportation of fabric.
- 3. Type of desizing.
- 4. Desizing recipe and duration.
- 5. Labour complement.
- 6. Details of machineries used in desizing, if any.
- 7. Operative hours and production.
- 8. Water and steam consumption.
- 9. Power requirements.
- 10. Process control exercised in desizing.
- 11. Quality Control in desizing.
- 12. Costing.

#### (d) Scouring

- 1. Layout plan, lighting scheme and fire prevention methods.
- 2. Handling and transportation of fabric.
- 3. Types of scouring.
- 4. Scouring recipe, duration, temperature, and pressure.
- 5. Water and steam consumption.
- 6. Power requirements.
- 7. Operative hours and production.
- 8. Labour complements.
- 9. Process control followed in scouring.
- 10. Time study and work study in scouring.
- 11. Costing.

#### (e) Mercerization

- 1. Layout plan, lighting scheme and power requirements.
- 2. Handling and transportation of fabric.
- 3. Type of mercerization.

- 4. Details of mercersing agents and auxiliaries like wetting agents used in mercerization.
- 5. Study of mercerization of various sorts
- 6. Steam and water consumption.
- 7. Operative hours and production.
- 8. Labour complements
- 9. Process control followed in mercerization.
- 10. Quality control in mercerization.

## (f) Singeing

- 1. Layout plan, lighting scheme and power requirements
- 2. Handling and transportation of fabric
- 3. Type of singeing.
- 4. Operative hours and production.
- 5. Labour complement.
- 6. Process control in Singeing.

# (g) Bleaching

- 1. Layout plan, lighting scheme and power requirements.
- 2. Handling and transportation of fabric.
- 3. Type of bleaching
- 4. Study of bleaching of various sorts like Poplin, cambric, polyester, polyester/cellulosic blends, top dyed goods, terry towel etc.
- 5. Detailed study of machines used in bleaching.
- 6. Steam and water consumption.
- 7. Process control.
- 8. Quality control.
- 9. Labour complement.

# (h) Dyeing

- 1. Layout plan, lighting scheme and power requirements.
- 2. Handling and transportation of fabric.
- 3. Detailed of dyeing machines like jigger, jet-dyeing machine, winch, padding mangle, beam dyeing, loose fibre dyeing machine, etc.
- 4. Steam and water consumption.
- 5. Labour complement.
- 6. Process control in jigger dyeing, HTHP beam dyeing, jet dyeing, winch dyeing, fibre dyeing and cheese dyeing.
- 7. Quality control in dyeing.

# (i) Printing

- 1. Layout plan, lighting scheme and power requirements.
- 2. Handling and transportation of fabric.
- 3. Detailed study of various printing machines like roller, flat bed screen-printing, and rotary screen-printing m/c.

- 4. Preparation of screen.
- 5. Steam and water consumption.
- 6. Labour complement.
- 7. Operative hours and production.
- 8. Process control in printing.
- 9. Quality control in printing.

## (j) Finishing

- 1. Lay out plan, lighting scheme and power requirements.
- 2. Handling and transportation of fabric
- 3. Detail study of finishing machines like stenter (steam and oil heated), sanforising, decatising, calendaring, felt, milling, crabbing steam calendar, finishing machines for hosiery goods.
- 4. Study of finishing of various sorts of cotton, polyester, acrylic, wool silk nylon, and their blends.
- 5. Study of axillaries used for finishing of cotton, polyester, acrylic, wool, silk, nylon and their blends
- 6. Steam and water consumption in finishing.
- 7. Labour complement.
- 8. Operative hours and production.
- 9. Process control in finishing using various machines.
- 10. Quality control in finishing.

## (k) Drying and Washing

- 1. Layout plan, lighting scheme and power requirements.
- 2. Handling and transportation of fabric.
- 3. Brief study of various dyeing & washing machine.
- 4. Steam and water consumption.
- 5. Labour complement.
- 6. Operative hours and production
- 7. Process control in drying.

## (l) Boilers, Thermopac And Effluent Treatment Plant

- 1. Layout plan, layout of machine.
- 2. Steam generation, distribution, and utilization.
- 3. Boiler feed water.
- 4. Operative hours and production.
- 5. Study of various oils used in thermopac.
- 6. Water management
- 7. Effluent treatment plant

## (m) Costing

- 1. Fabric cost sheets for some sorts. Cost of dyes, chemicals
- 2. Wages of the time rate workers and their rate in each dept.

#### w.e.f Academic Year 2012-13

- 3. Wages for piece rate workers in each dept.
- 4. Power cost.
- 5. Cost of water and steam.
- 6. Government levies classification wise.

## (n) Laboratory

- 1. Testing and analysis of dyes, chemicals, and auxiliaries used in various departments.
- 2. Testing of bleached, dyed, and fabric, with respect to fastness properties.
- 3. Methods towards inventory control.

## **Assessment Strategy**

- a) Report of the industrial training shall be prepared by each student on the basis of his/her actual work done, during the six weeks industrial training.
- b) This report should be submitted in typed and bound form within 1 month after completion of the industrial training.
- c) Industrial training should be assessed equally by external and internal examiners for the oral exam assessment.
- d) Industrial training should be assessed by internal examiner only for term work assessment.

'G' Scheme

|       | MAHA                                                                                             | ARASHT     | RA STAT     | E BO              | ARD               | OF 7   | <b>FECHNI</b>            | CAL EI     | DUCAT   | <b>FION</b> , I | MUMB                 | AI                   |                    |                 |          |          |
|-------|--------------------------------------------------------------------------------------------------|------------|-------------|-------------------|-------------------|--------|--------------------------|------------|---------|-----------------|----------------------|----------------------|--------------------|-----------------|----------|----------|
|       |                                                                                                  |            | TEACH       | ING /             | AND               | EXA    | MINATI                   | ON SCI     | IEME    |                 |                      |                      |                    |                 |          |          |
| COU   | RSE NAME : DII A IN TE                                                                           | XTILE M    | IANUFAC     | TUR               | ES                |        |                          |            |         |                 |                      |                      |                    |                 |          |          |
| COU   | RSE CODE : TX                                                                                    |            |             |                   |                   |        |                          |            |         |                 |                      |                      |                    |                 |          |          |
| DUR   | ATION OF COURSE : 6 SEMES                                                                        | STER       |             |                   |                   |        |                          |            | WIT     | H EFF           | ECT F                | ROM 2                | 2012-1             | 3               |          |          |
| SEM   | ESTER : FOURTH                                                                                   |            |             |                   |                   |        |                          |            | DUR     | ATION           | N: 16                | WEEK                 | KS                 |                 |          |          |
| PAT   | <b>FERN : FULL TIME - SEMEST</b>                                                                 | ER         | <b></b>     |                   |                   |        | 1                        |            | SCH     | EME :           | G                    |                      |                    |                 |          | ,        |
| SR.   |                                                                                                  | Abbrevi    | SUB         | TE                | ACHI              | NG     | ,                        | I          | EX      | AMINA           | TION SO              | CHEME                |                    | I               |          | SW       |
| NO.   | SUBJECT TITLE                                                                                    | ation      | CODE        | S                 |                   | E      | PAPER                    | TH         | (1)     | PR              | . (4)                | OR                   | . (8)              | TW              | (9)      | (17400)  |
|       |                                                                                                  |            | 1 - 101     | TH                | TU                | PR     | HKS.                     | Max        | Min     | Max             | Min                  | Max                  | Min                | Max             | Min      |          |
| 1     | Environmental Studies \$                                                                         | EST        | 17401       | 01                |                   | 02     | 01                       | 50#*       | 20      |                 |                      |                      |                    | 25@             | 10       |          |
| 2     | Yarn Manufacturing-III                                                                           | YMA        | 17462       | 04                |                   | 02     | 03                       | 100        | 40      | 50#             | 20                   |                      |                    | 25@             | 10       |          |
| 3     | Fabric Manufacturing-III                                                                         | FMA        | 17463       | 03                |                   | 02     | 03                       | 100        | 40      | 50#             | 20                   |                      |                    | 25@             | 10       |          |
| 4     | Knitting Technology                                                                              | KTE        | 17464       | 03                |                   | 02     | 03                       | 100        | 40      | 50@             | 20                   |                      |                    | 25@             | 10       | 50       |
| 5     | Textile Testing-III                                                                              | TTE        | 17465       | 03                |                   | 02     | 03                       | 100        | 40      |                 |                      |                      |                    | 25@             | 10       |          |
| 6     | Textile Chemistry-II                                                                             | TCH        | 17466       | 03                |                   | 02     | 03                       | 100        | 40      |                 |                      |                      |                    | 25@             | 10       |          |
| 7     | Professional Practice-II                                                                         | PPS        | 17054       |                   |                   | 03     |                          |            |         |                 |                      |                      |                    | 50@             | 20       |          |
| 8     | Industrial Training                                                                              | ITR        | 17055       |                   |                   | **     |                          |            |         |                 |                      |                      |                    |                 |          |          |
|       |                                                                                                  |            | TOTAL       | 17                |                   | 15     |                          | 550        |         | 150             |                      |                      |                    | 200             |          | 50       |
| Stude | ent Contact Hours Per Week: 32                                                                   | Hrs.       |             |                   |                   |        |                          |            |         |                 |                      |                      |                    |                 |          |          |
| THE   | ORY AND PRACTICAL PERIO                                                                          | DS OF 6    | 0 MINUTI    | ES E/             | ACH.              |        |                          |            |         |                 |                      |                      |                    |                 |          |          |
| Total | Marks: 950                                                                                       |            |             |                   |                   |        | <b>—</b>                 |            | -       |                 | <b>* C</b>           |                      |                    |                 | 1.5      |          |
| @ Int | ernal Assessment, # External Asses                                                               | ssment, #* | Online Ex   | (amin             | ation,            |        | N                        | o Theory   | y Exam  | ination         | , \$ Con             | nmon to              | All Co             | onventi         | onal Di  | ploma,   |
| ** In | lustrial training for six weeks to be                                                            | complete   | d during su | ımme              | r brea            | k afte | r Fourth s               | semester   | . Asses | sment t         | to be do             | ne in F              | ifth Sei           | mester          |          |          |
| Abbre | Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Termwork, SW- Sessional Work. |            |             |                   |                   |        |                          |            |         |                 |                      |                      |                    |                 |          |          |
| A     | Conduct two class tests each of 2<br>sessional work (SW).<br>Progressive evaluation is to be do  | 5 marks fo | or each the | ory su<br>er as p | ubject<br>per the | . Sum  | of the tot<br>ailing cur | tal test n | narks o | f all sub       | oject are<br>n and a | e to be o<br>ssessmo | convert<br>ent nor | ed out o<br>ms. | of 100 1 | marks as |
|       | Code number for TIL DD OD or                                                                     | d TW and   | to he aires |                   |                   | 1 1 0  | 0                        | 4          | 41      | hingt an        | J.,                  |                      |                    |                 |          |          |

Code number for TH, PR, OR and TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.

**Course Name : All Branches of Diploma in Engineering & Technology** 

# Course Code : AE/CE/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/AU/FG

Semester : Fourth

Subject Title : Environmental Studies

Subject Code : 17401

**Teaching and Examination Scheme:** 

| Teac | hing Scl | neme |              |      | Examinati |    |     |       |
|------|----------|------|--------------|------|-----------|----|-----|-------|
| TH   | TU       | PR   | PAPER<br>HRS | TH   | PR        | OR | TW  | TOTAL |
| 01   |          | 02   | 01           | 50#* |           |    | 25@ | 75    |

#### **#\* Online Theory Examination**

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Environment essentially comprises of our living ambience, which gives us the zest and verve in all our activities. The turn of the twentieth century saw the gradual onset of its degradation by our callous deeds without any concern for the well being of our surrounding we are today facing a grave environmental crisis. The unceasing industrial growth and economic development of the last 300 years or so have resulted in huge ecological problems such as overexploitation of natural resources, degraded land, disappearing forests, endangered species, dangerous toxins, global warming etc.

It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

The curriculum covers the aspects about environment such as Environment and Ecology, Environmental impacts on human activities, Water resources and water quality, Mineral resources and mining, Forests, etc.

General Objectives: The student will be able to,

- 1. Understand importance of environment
- 2. Know key issues about environment

- 3. Understands the reasons for environment degradation
- 4. Know aspects about improvement methods
- 5. Know initiatives taken by the world bodies to restrict and reduce degradation

## **Learning Structure:**



# Theory:

| Topic 1: Nature of Environmental Studies       01       04         Specific Objectives:       > Definition, Scope and Importance of the environment in general public       01       04         • Definition, Scope and Importance of the environmental studies       • Importance of the studies irrespective of course       01       04         • Need for creating public awareness about environmental issues       01       04         Topic 2: Natural Resources and Associated Problems       Specific Objectives:       > Define natural resources and identify problems associated with them       > Identify alternate resources and their importance for environment       04         Contents:       • Definition       • Associated problems       04         2.1 Renewable and Non renewable resources       • Definition and benefits of forest resources       04       10         2.3 Forest Resources       • Functions and benefits of forest resources       04       10         2.3 Water Resources:       • General description of forest resources and ground water       • Use and overexploitation of surface and ground water       04       10         2.3 Water Resources:       • Gategories of mining activities       • Mine safety       04       10         2.4 Mineral Resources:       • Gategories of modern agriculture       • World food problem       04       10         2.5 Food Resources:       • Food for all </th <th>Topic and Contents</th> <th>Hours</th> <th>Marks</th>                                                                                                                                                                                                                                                                                        | Topic and Contents                                                | Hours | Marks |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|-------|-------|
| Specific Objectives:       > Define the terms related to Environmental Studies       > State importance of awareness about environment in general public       01       04         Contents:       • Definition, Scope and Importance of the environmental studies       • Importance of the studies irrespective of course       01       04         • Need for creating public awareness about environmental issues       01       04         Topic 2: Natural Resources and Associated Problems       Specific Objectives:       > Definition         > Identify uses and their overexploitation       > Identify uses and their overexploitation       > Identify alternate resources and their importance for environment         Contents:       • Definition       • Associated problems       04         2.2 Forest Resources       • Effects on environment due to deforestation, Timber       04         2.3 Water Resources       • Effect of floods, draught, dams etc. on water resources and community       04         2.3 Water Resources       • Hydrosphere: Different sources of water       04       10         2.4 Mineral Resources:       • Categories of mineral resources       04       10         2.4 Mineral Resources:       • Mine safety       04       10         2.5 Food Resources:       • Categories of mineral resources       04       10         2.5 Food Resources:       • Food for all       • Eff                                                                                                                                                                                                                                                                                                                                                                      | Topic 1: Nature of Environmental Studies                          |       |       |
| <ul> <li>Define the terms related to Environmental Studies</li> <li>State importance of awareness about environment in general public<br/>Contents:         <ul> <li>Definition, Scope and Importance of the environmental studies</li> <li>Importance of the studies irrespective of course</li> <li>Need for creating public awareness about environmental issues</li> </ul> </li> <li>Topic 2: Natural Resources and Associated Problems</li> <li>Specific Objectives:         <ul> <li>Define natural resources and identify problems associated with them</li> <li>Identify uses and their overexploitation</li> <li>Identify alternate resources and their importance for environment</li> </ul> </li> <li>Contents:         <ul> <li>1.1 Renewable and Non renewable resources</li> <li>Definition</li> <li>Associated problems</li> </ul> </li> <li>2.2 Forest Resources         <ul> <li>General description of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> <li>O4 10</li> </ul> </li> <li>2.3 Water Resources:         <ul> <li>Gate overxploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> <li>2.4 Mineral Resources:                 <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effects of modern agriculture</li> <li>World food problem</li> </ul> </li> <li>Topic 3. Ecosystems         <ul> <li>Concept of Ecosystem</li> <li>Structure and functions of ecosystem</li> <li>Major ecosystems in the world</li> </ul> </li> <li>Topic 4. Biodiversity and 1ts Conservation</li>     &lt;</ul></li></ul>                                                              | Specific Objectives:                                              |       |       |
| <ul> <li>State importance of awareness about environment in general public<br/>Contents:         <ul> <li>Definition, Scope and Importance of the environmental studies</li> <li>Importance of the studies irrespective of course</li> <li>Need for creating public awareness about environmental issues</li> </ul> </li> <li>Topic 2: Natural Resources and Associated Problems<br/>Specific Objectives:         <ul> <li>Define natural resources and identify problems associated with them</li> <li>Identify uses and their overexploitation</li> <li>Identify alternate resources and their importance for environment</li> </ul> </li> <li>Contents:         <ul> <li>Definition</li> <li>Associated problems</li> </ul> </li> <li>Identify alternate resources</li> <li>Definition             <ul> <li>Associated problems</li> </ul> </li> <li>Identify alternate resources</li> <li>General description of forest resources</li> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> <li>O4</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> </ul> <li>Atmeral Resources:         <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of modern agriculture</li> <li>World food problem</li> </ul> </li> <li>Topic 3. Ecosystems         <ul> <li>Concept of Ecosystem</li> <li>Structure and functions of ecosystem</li> <li>Concept of Ecosystem</li> <li>Structure and functions of ecosystem</li></ul></li>                                                                                                               | Define the terms related to Environmental Studies                 |       |       |
| Contents:       01       04         • Definition, Scope and Importance of the environmental studies       01       04         • Importance of the studies irrespective of course       •       •         • Need for creating public awareness about environmental issues       •       • <b>Topic 2: Natural Resources and Associated Problems</b> Specific Objectives:       •         > Define natural resources and identify problems associated with them       •       •         > Identify uses and their overexploitation       •       •       •         > Identify alternate resources and their importance for environment       •       •       •         Contents:       •       •       Definition       •       •       Associated problems         2.2 Forest Resources       •       General description of forest resources       •       •       •       •         •       Definition       •       Associated problems       •       •       •       •         2.1 Renewable and Non renewable resources       •       •       Forections and benefits of forest resources       •       •       •       •         2.2 Forest Resources       •       Effects on environment due to deforestation, Timber<br>extraction, Building of dams, waterways etc.       •       04                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | State importance of awareness about environment in general public | 01    | 0.4   |
| <ul> <li>Definition, Scope and Importance of the environmental studies         <ul> <li>Importance of the studies irrespective of course</li> <li>Need for creating public awareness about environmental issues</li> </ul> </li> <li>Topic 2: Natural Resources and Associated Problems         <ul> <li>Specific Objectives:</li> <li>Define natural resources and identify problems associated with             them             <ul> <li>Identify uses and their overexploitation</li> <li>Identify alternate resources and their importance for environment</li></ul></li></ul></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Contents:                                                         | 01    | 04    |
| <ul> <li>Importance of the studies irrespective of course         <ul> <li>Need for creating public awareness about environmental issues</li> </ul> </li> <li>Topic 2: Natural Resources and Associated Problems         <ul> <li>Specific Objectives:</li> <li>Define natural resources and identify problems associated with them</li> <li>Identify uses and their overexploitation</li> <li>Identify uses and their overexploitation</li> <li>Identify uses and their overexploitation</li> <li>Identify alternate resources and their importance for environment</li> </ul> </li> <li>Contents:         <ul> <li>2.1 Renewable and Non renewable resources</li> <li>Definition</li> <li>Associated problems</li> </ul> </li> <li>2.2 Forest Resources         <ul> <li>General description of forest resources</li> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> <li>04 10</li> </ul> </li> <li>2.3 Water Resources         <ul> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> </ul> </li> <li>2.4 Mineral Resources:         <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of modern agriculture</li> <li>World food problem</li> </ul> </li> <li>Topic 3. Ecosystems         <ul> <li>Concept of Ecosystem</li> <li>Structure and functions of ecosystem</li> <li>Major ecosystems in the world</li> </ul> </li> <li>Topic 4. Biodiversity and Its</li></ul>                                                                                                          | • Definition, Scope and Importance of the environmental studies   |       |       |
| <ul> <li>Need for creating public awareness about environmental issues</li> <li>Topic 2: Natural Resources and Associated Problems</li> <li>Specific Objectives:</li> <li>Define natural resources and identify problems associated with them</li> <li>Identify uses and their overexploitation</li> <li>Associated problems</li> <li>2.2 Forest Resources</li> <li>General description of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> <li>04</li> <li>10</li> <li>2.3 Water Resources</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> <li>2.4 Mineral Resources:         <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> </ul> </li> <li>2.5 Food Resources:         <ul> <li>Food for all</li> <li>Effects of modern agriculture</li> <li>World food problem</li> </ul> </li> <li>Topic 3. Ecosystems         <ul> <li>Concept of Ecosystem</li> <li>Structure and functions of ecosystem</li> <li>Major ecosystems in the world</li> </ul> </li> <li>Topic 4. Biodiversity and Its Conservation         <ul> <li>Definition of Biodiversity</li> </ul> </li></ul> | Importance of the studies irrespective of course                  |       |       |
| Topic 2: Natural Resources and Associated Problems         Specific Objectives:         > Define natural resources and identify problems associated with them         > Identify uses and their overexploitation         > Identify uses and their overexploitation         > Identify alternate resources and their importance for environment         Contents:         2.1 Renewable and Non renewable resources         • Definition         • Associated problems         2.2 Forest Resources         • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.       04         2.3 Water Resources         • Hydrosphere: Different sources of water         • Use and overexploitation of surface and ground water         • Effect of floods, draught, dams etc. on water resources and community         2.4 Mineral Resources:         • Categories of mineral resources         • Basics of mining on environment         2.5 Food Resources:         • Food for all         • Effect of modern agriculture         • World food problem         Topic 3. Ecosystems         • Concept of Ecosystem         • Structure and functions of ecosystem         • Structure and functions of ecosystem         • Definition of Biodiversity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | • Need for creating public awareness about environmental issues   |       |       |
| Specific Objectives:       > Define natural resources and identify problems associated with them         > Identify uses and their overexploitation       > Identify uses and their overexploitation         > Identify alternate resources and their importance for environment         Contents:       2.1 Renewable and Non renewable resources         • Definition       • Associated problems         2.2 Forest Resources       • General description of forest resources         • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.       04         2.3 Water Resources       • Hydrosphere: Different sources of water         • Use and overexploitation of surface and ground water       • Effect of floods, draught, dams etc. on water resources and community         2.4 Mineral Resources:       • Categories of mineral resources       • Basics of mining on environment         2.5 Food Resources:       • Food for all       • Effects of modern agriculture         • World food problem       • Concept of Ecosystem       01         • Structure and functions of ecosystem       • Other optimication of ecosystem       01         • Energy flow in ecosystem       • Definition of Biodiversity       • Definition of Biodiversity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Topic 2: Natural Resources and Associated Problems                |       |       |
| <ul> <li>Define natural resources and identify problems associated with them</li> <li>Identify uses and their overexploitation</li> <li>Identify alternate resources and their importance for environment Contents:</li> <li>2.1 Renewable and Non renewable resources         <ul> <li>Definition</li> <li>Associated problems</li> </ul> </li> <li>2.2 Forest Resources         <ul> <li>General description of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> <li>04 10</li> </ul> </li> <li>2.3 Water Resources         <ul> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> </ul> </li> <li>2.4 Mineral Resources:         <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> </ul> </li> <li>2.5 Food Resources:         <ul> <li>Food for all</li> <li>Effects of modern agriculture</li> <li>World food problem</li> </ul> </li> <li>Topic 3. Ecosystems         <ul> <li>Concept of Ecosystem</li> <li>Structure and functions of ecosystem</li> <li>Energy flow in ecosystem</li> <li>Major ecosystems in the world</li> </ul> </li> <li>Definition of Biodiversity and Its Conservation         <ul> <li>Definition of Biodiversity</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                | Specific Objectives:                                              |       |       |
| them       > Identify uses and their overexploitation         > Identify alternate resources and their importance for environment         Contents:         2.1 Renewable and Non renewable resources         • Definition         • Associated problems         2.2 Forest Resources         • Effects on environment due to deforestation, Timber         • extraction, Building of dams, waterways etc.         04         2.3 Water Resources         • Hydrosphere: Different sources of water         • Use and overexploitation of surface and ground water         • Effect of floods, draught, dams etc. on water resources and community         2.4 Mineral Resources:         • Categories of mineral resources         • Basics of mining activities         • Mine safety         • Effect of modern agriculture         • Food for all         • Effects of modern agriculture         • World food problem <b>Topic 3. Ecosystems</b> • Concept of Ecosystem         • Structure and functions of ecosystem         • Benergy flow in ecosystem         • Biodiversity and Its Conservation         • Definition of Biodiversity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | > Define natural resources and identify problems associated with  |       |       |
| <ul> <li>Identify uses and their overexploitation</li> <li>Identify alternate resources and their importance for environment</li> <li>Contents:         <ol> <li>Definition</li> <li>Associated problems</li> </ol> </li> <li>2.2 Forest Resources         <ol> <li>General description of forest resources</li> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> <li>04 10</li> </ol> </li> <li>2.3 Water Resources         <ol> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> </ol> </li> <li>2.4 Mineral Resources:         <ol> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of modern agriculture</li> <li>World food problem</li> </ol> </li> <li>Topic 3. Ecosystems         <ol> <li>Concept of Ecosystem</li> <li>Structure and functions of ecosystem</li> <li>Energy flow in ecosystem</li> <li>Major ecosystems in the world</li> </ol> </li> <li>Topic 4. Biodiversity and Its Conservation         <ul> <li>Definition of Biodiversity</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | them                                                              |       |       |
| <ul> <li>Identify alternate resources and their importance for environment<br/>Contents:         <ol> <li>Renewable and Non renewable resources                 <ul></ul></li></ol></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Identify uses and their overexploitation                          |       |       |
| Contents:       2.1 Renewable and Non renewable resources       0         Definition       Associated problems         2.2 Forest Resources       General description of forest resources         • General description of forest resources       Functions and benefits of forest resources         • Effects on environment due to deforestation, Timber       04         cxtraction, Building of dams, waterways etc.       04         2.3 Water Resources       0         • Hydrosphere: Different sources of water       04         • Use and overexploitation of surface and ground water       04         • Effect of floods, draught, dams etc. on water resources and community       04         2.4 Mineral Resources:       0         • Categories of mineral resources       Basics of mining activities         • Mine safety       Effect of mining on environment         2.5 Food Resources:       • Food for all         • Effects of modern agriculture       •         • World food problem       01         Topic 3. Ecosystems       01         • Structure and functions of ecosystem       01         • Energy flow in ecosystem       01         • Major ecosystems in the world       01         • Definition of Biodiversity       01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Identify alternate resources and their importance for environment |       |       |
| 2.1 Renewable and Non renewable resources <ul> <li>Definition</li> <li>Associated problems</li> </ul> 2.2 Forest Resources <ul> <li>General description of forest resources</li> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> <li>04 10</li> </ul> 2.3 Water Resources <ul> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> </ul> <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> </ul> <ul> <li>Effect of modern agriculture</li> <li>World food problem</li> </ul> <ul> <li>Of on all</li> <li>Effects of modern agriculture</li> <li>World food problem</li> </ul> <ul> <li>Of out of the cosystem</li> <li>Structure and functions of ecosystem</li> <li>Structure and functions of ecosystem</li> <li>Major ecosystems in the world</li> </ul> <ul> <li>Definition of Biodiversity</li> <li>Definition of Biodiversity</li> <li>Major ecosystems</li> <li>Definition of Biodiversity</li> </ul> <ul> <li>Definition of Biodiversity</li> </ul> <td>Contents:</td> <td></td> <td></td>                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Contents:                                                         |       |       |
| <ul> <li>Definition         <ul> <li>Associated problems</li> </ul> </li> <li>2.2 Forest Resources         <ul> <li>General description of forest resources</li> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> <li>04 10</li> </ul> </li> <li>2.3 Water Resources         <ul> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> </ul> </li> <li>2.4 Mineral Resources:         <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> </ul> </li> <li>2.5 Food Resources:         <ul> <li>Food for all</li> <li>Effects of modern agriculture</li> <li>World food problem</li> </ul> </li> <li>Topic 3. Ecosystems         <ul> <li>Structure and functions of ecosystem</li> <li>Structure and functions of ecosystem</li> <li>Major ecosystems in the world</li> </ul> </li> <li>Topic 4. Biodiversity and Its Conservation         <ul> <li>Definition of Biodiversity</li> </ul> </li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 2.1 Renewable and Non renewable resources                         |       |       |
| <ul> <li>Associated problems</li> <li>2.2 Forest Resources</li> <li>General description of forest resources</li> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber<br/>extraction, Building of dams, waterways etc.</li> <li>O4 10</li> <li>2.3 Water Resources</li> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and<br/>community</li> <li>2.4 Mineral Resources:         <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of modern agriculture</li> <li>World food problem</li> </ul> </li> <li>Topic 3. Ecosystems         <ul> <li>Concept of Ecosystem</li> <li>Structure and functions of ecosystem</li> <li>Energy flow in ecosystem</li> <li>Major ecosystems in the world</li> </ul> </li> <li>Topic 4. Biodiversity and Its Conservation         <ul> <li>Definition of Biodiversity</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | • Definition                                                      |       |       |
| 2.2 Forest Resources       General description of forest resources       04         9       Functions and benefits of forest resources       04         10       Effects on environment due to deforestation, Timber       04         2.3 Water Resources       04       10         2.3 Water Resources       04       10         2.3 Water Resources       04       10         2.4 Mineral Resources       04       10         2.4 Mineral Resources:       04       10         2.4 Mineral Resources:       04       10         2.5 Food Resources:       Categories of mineral resources       10         2.5 Food Resources:       Food for all       10         2.5 Food Resources:       Food for all       10         2.5 Food Resources:       0       10       04         0.5 Structure and functions of ecosystem       01       04         0.6 Oncept of Ecosystem       01       04         0.7 Energy flow in ecosystems in the world       01       04                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Associated problems                                               |       |       |
| <ul> <li>General description of forest resources</li> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber<br/>extraction, Building of dams, waterways etc.</li> <li>04 10</li> <li>2.3 Water Resources</li> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and<br/>community</li> <li>2.4 Mineral Resources:         <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of modern agriculture</li> <li>World food problem</li> </ul> </li> <li>Topic 3. Ecosystem         <ul> <li>Concept of Ecosystem</li> <li>Structure and functions of ecosystem</li> <li>Major ecosystems in the world</li> </ul> </li> <li>Topic 4. Biodiversity and Its Conservation         <ul> <li>Definition of Biodiversity</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 2.2 Forest Resources                                              |       |       |
| <ul> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber<br/>extraction, Building of dams, waterways etc.</li> <li>2.3 Water Resources</li> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and<br/>community</li> <li>2.4 Mineral Resources:         <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> </ul> </li> <li>2.5 Food Resources:         <ul> <li>Food for all</li> <li>Effects of modern agriculture</li> <li>World food problem</li> </ul> </li> <li>Topic 3. Ecosystems         <ul> <li>Concept of Ecosystem</li> <li>Structure and functions of ecosystem</li> <li>Major ecosystems in the world</li> </ul> </li> <li>Topic 4. Biodiversity and Its Conservation         <ul> <li>Definition of Biodiversity</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | General description of forest resources                           |       |       |
| <ul> <li>Effects on environment due to deforestation, Timber<br/>extraction, Building of dams, waterways etc.</li> <li>2.3 Water Resources         <ul> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> </ul> </li> <li>2.4 Mineral Resources:         <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of modern agriculture</li> <li>World food problem</li> </ul> </li> <li>Topic 3. Ecosystems         <ul> <li>Concept of Ecosystem</li> <li>Structure and functions of ecosystem</li> <li>Major ecosystems in the world</li> </ul> </li> <li>Other and the conservation</li> <li>Definition of Biodiversity</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | • Functions and benefits of forest resources                      |       |       |
| extraction, Building of dams, waterways etc.04102.3 Water ResourcesIfferent sources of water0410• Use and overexploitation of surface and ground waterEffect of floods, draught, dams etc. on water resources and community102.4 Mineral Resources:Categories of mineral resourcesBasics of mining activities10• Effect of mining on environmentEffect of mining on environment102.5 Food Resources:Food for all10• Effects of modern agricultureWorld food problem10Topic 3. Ecosystems0104• Energy flow in ecosystem0104• Major ecosystems in the world0104                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | • Effects on environment due to deforestation, Timber             |       |       |
| 2.3 Water Resources       Hydrosphere: Different sources of water         Use and overexploitation of surface and ground water         Effect of floods, draught, dams etc. on water resources and community         2.4 Mineral Resources:         Categories of mineral resources         Basics of mining activities         Mine safety         Effect of mining on environment         2.5 Food Resources:         Food for all         Effects of modern agriculture         World food problem         Topic 3. Ecosystems         Structure and functions of ecosystem         Major ecosystems in the world         Topic 4. Biodiversity and Its Conservation         Definition of Biodiversity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | extraction, Building of dams, waterways etc.                      | 04    | 10    |
| <ul> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> <li>2.4 Mineral Resources:         <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> </ul> </li> <li>2.5 Food Resources:         <ul> <li>Food for all</li> <li>Effects of modern agriculture</li> <li>World food problem</li> </ul> </li> <li>Topic 3. Ecosystems         <ul> <li>Concept of Ecosystem</li> <li>Structure and functions of ecosystem</li> <li>Major ecosystems in the world</li> </ul> </li> <li>Topic 4. Biodiversity and Its Conservation         <ul> <li>Definition of Biodiversity</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 2.3 Water Resources                                               | 0.    | 10    |
| <ul> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> <li>2.4 Mineral Resources:         <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> </ul> </li> <li>2.5 Food Resources:         <ul> <li>Food for all</li> <li>Effects of modern agriculture</li> <li>World food problem</li> </ul> </li> <li>Topic 3. Ecosystems         <ul> <li>Concept of Ecosystem</li> <li>Structure and functions of ecosystem</li> <li>Major ecosystems in the world</li> </ul> </li> <li>Topic 4. Biodiversity and Its Conservation         <ul> <li>Definition of Biodiversity</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | • Hydrosphere: Different sources of water                         |       |       |
| <ul> <li>Effect of floods, draught, dams etc. on water resources and community</li> <li>2.4 Mineral Resources:         <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> </ul> </li> <li>2.5 Food Resources:         <ul> <li>Food for all</li> <li>Effects of modern agriculture</li> <li>World food problem</li> </ul> </li> <li>Topic 3. Ecosystems         <ul> <li>Concept of Ecosystem</li> <li>Structure and functions of ecosystem</li> <li>Major ecosystems in the world</li> </ul> </li> <li>Topic 4. Biodiversity and Its Conservation         <ul> <li>Definition of Biodiversity</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | • Use and overexploitation of surface and ground water            |       |       |
| community2.4 Mineral Resources:• Categories of mineral resources• Basics of mining activities• Mine safety• Effect of mining on environment2.5 Food Resources:• Food for all• Effects of modern agriculture• World food problemTopic 3. Ecosystems• Concept of Ecosystem• Structure and functions of ecosystem• Major ecosystems in the world• Major ecosystems in the world• Definition of Biodiversity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | • Effect of floods, draught, dams etc. on water resources and     |       |       |
| 2.4 Mineral Resources:       Categories of mineral resources         Basics of mining activities       Basics of mining activities         Mine safety       Effect of mining on environment         2.5 Food Resources:       Food for all         Effects of modern agriculture       Vorld food problem         Topic 3. Ecosystems       01         Structure and functions of ecosystem       01         Major ecosystems in the world       O1         Definition of Biodiversity       Definition of Biodiversity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | community                                                         |       |       |
| <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> <li>2.5 Food Resources:         <ul> <li>Food for all</li> <li>Effects of modern agriculture</li> <li>World food problem</li> </ul> </li> <li>Topic 3. Ecosystems         <ul> <li>Concept of Ecosystem</li> <li>Structure and functions of ecosystem</li> <li>Energy flow in ecosystem</li> <li>Major ecosystems in the world</li> </ul> </li> <li>Topic 4. Biodiversity and Its Conservation         <ul> <li>Definition of Biodiversity</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 2.4 Mineral Resources:                                            |       |       |
| <ul> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> <li>2.5 Food Resources:         <ul> <li>Food for all</li> <li>Effects of modern agriculture</li> <li>World food problem</li> </ul> </li> <li>Topic 3. Ecosystems         <ul> <li>Concept of Ecosystem</li> <li>Structure and functions of ecosystem</li> <li>Major ecosystems in the world</li> </ul> </li> <li>Topic 4. Biodiversity and Its Conservation         <ul> <li>Definition of Biodiversity</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Categories of mineral resources                                   |       |       |
| <ul> <li>Mine safety         <ul> <li>Effect of mining on environment</li> </ul> </li> <li>2.5 Food Resources:         <ul> <li>Food for all</li> <li>Effects of modern agriculture</li> <li>World food problem</li> </ul> </li> <li>Topic 3. Ecosystems         <ul> <li>Concept of Ecosystem</li> <li>Structure and functions of ecosystem</li> <li>Major ecosystems in the world</li> </ul> </li> <li>Topic 4. Biodiversity and Its Conservation         <ul> <li>Definition of Biodiversity</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Basics of mining activities                                       |       |       |
| <ul> <li>Effect of mining on environment</li> <li>2.5 Food Resources:         <ul> <li>Food for all</li> <li>Effects of modern agriculture</li> <li>World food problem</li> </ul> </li> <li>Topic 3. Ecosystems         <ul> <li>Concept of Ecosystem</li> <li>Structure and functions of ecosystem</li> <li>Major ecosystems in the world</li> </ul> </li> <li>Topic 4. Biodiversity and Its Conservation         <ul> <li>Definition of Biodiversity</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | • Mine safety                                                     |       |       |
| 2.5 Food Resources:       Food for all         • Food for all       Effects of modern agriculture         • World food problem       Topic 3. Ecosystems         • Concept of Ecosystem       01         • Structure and functions of ecosystem       01         • Energy flow in ecosystem       01         • Major ecosystems in the world       Topic 4. Biodiversity and Its Conservation         • Definition of Biodiversity       Image: Conservation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | • Effect of mining on environment                                 |       |       |
| <ul> <li>Food for all</li> <li>Effects of modern agriculture</li> <li>World food problem</li> </ul> Topic 3. Ecosystems <ul> <li>Concept of Ecosystem</li> <li>Structure and functions of ecosystem</li> <li>Structure and functions of ecosystem</li> <li>Energy flow in ecosystem</li> <li>Major ecosystems in the world</li> </ul> Topic 4. Biodiversity and Its Conservation <ul> <li>Definition of Biodiversity</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 2.5 Food Resources:                                               |       |       |
| <ul> <li>Effects of modern agriculture</li> <li>World food problem</li> <li>Topic 3. Ecosystems         <ul> <li>Concept of Ecosystem</li> <li>Structure and functions of ecosystem</li> <li>Structure and functions of ecosystem</li> <li>Energy flow in ecosystem</li> <li>Major ecosystems in the world</li> </ul> </li> <li>Topic 4. Biodiversity and Its Conservation         <ul> <li>Definition of Biodiversity</li> <li>Logic 4. Biodiversity</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | • Food for all                                                    |       |       |
| • World food problem         Topic 3. Ecosystems         • Concept of Ecosystem         • Structure and functions of ecosystem         • Energy flow in ecosystem         • Major ecosystems in the world         Topic 4. Biodiversity and Its Conservation         • Definition of Biodiversity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | • Effects of modern agriculture                                   |       |       |
| Topic 3. Ecosystems       01         • Concept of Ecosystem       01         • Structure and functions of ecosystem       01         • Energy flow in ecosystem       01         • Major ecosystems in the world       01         Topic 4. Biodiversity and Its Conservation       01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | World food problem                                                |       |       |
| <ul> <li>Concept of Ecosystem</li> <li>Structure and functions of ecosystem</li> <li>Energy flow in ecosystem</li> <li>Major ecosystems in the world</li> <li><b>Topic 4. Biodiversity and Its Conservation</b></li> <li>Definition of Biodiversity</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Topic 3. Ecosystems                                               |       |       |
| Structure and functions of ecosystem     Energy flow in ecosystem     Major ecosystems in the world     Topic 4. Biodiversity and Its Conservation     Definition of Biodiversity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Concept of Ecosystem                                              |       |       |
| Energy flow in ecosystem     Major ecosystems in the world     Topic 4. Biodiversity and Its Conservation     Definition of Biodiversity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | • Structure and functions of ecosystem                            | 01    | 04    |
| Major ecosystems in the world     Topic 4. Biodiversity and Its Conservation     Definition of Biodiversity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <ul> <li>Energy flow in ecosystem</li> </ul>                      | 01    | 0.    |
| Topic 4. Biodiversity and Its Conservation         • Definition of Biodiversity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <ul> <li>Major ecosystems in the world</li> </ul>                 |       |       |
| Definition of Biodiversity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Topic 4. Biodiversity and Its Conservation                        |       |       |
| Definition of Biodiversity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Definition of Biodiversity                                        |       |       |
| • Levels of high-print 02 06                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <ul> <li>Levels of biodiversity</li> </ul>                        | 02    | 06    |
| Value of biodiversity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Value of biodiversity                                             | 02    | 00    |
| Threats to biodiversity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Threats to biodiversity                                           |       |       |

| Conservation of biodiversity                                     |    |     |
|------------------------------------------------------------------|----|-----|
| Topic 5. Environmental Pollution                                 |    |     |
| Definition                                                       |    |     |
| • Air pollution: Definition, Classification, sources, effects,   |    |     |
| prevention                                                       |    | 0.0 |
| • Water Pollution: Definition, Classification, sources, effects, | 03 | 08  |
| prevention                                                       |    |     |
| • Soil Pollution: Definition, sources, effects, prevention       |    |     |
| • Noise Pollution: Definition, sources, effects, prevention      |    |     |
| Topic 6. Social Issues and Environment                           |    |     |
| Concept of development, sustainable development                  |    |     |
| • Water conservation, Watershed management, Rain water           |    |     |
| harvesting: Definition, Methods and Benefits                     | 03 | 10  |
| Climate Change, Global warming, Acid rain, Ozone Layer           | 03 | 10  |
| Depletion, Nuclear Accidents and Holocaust: Basic concepts       |    |     |
| and their effect on climate                                      |    |     |
| Concept of Carbon Credits and its advantages                     |    |     |
| <b>Topic 7. Environmental Protection</b>                         |    |     |
| Brief description of the following acts and their provisions:    |    |     |
| Environmental Protection Act                                     |    |     |
| • Air (Prevention and Control of Pollution) Act                  |    |     |
| • Water (Prevention and Control of Pollution) Act                | 02 | 08  |
| Wildlife Protection Act                                          | 02 | 00  |
| Forest Conservation Act                                          |    |     |
| Population Growth: Aspects, importance and effect on             |    |     |
| environment                                                      |    |     |
| Human Health and Human Rights                                    |    |     |
| Total                                                            | 16 | 50  |

## Practical: Skills to be developed:

## Intellectual Skills:

- 1. Collection of information, data
- 2. Analysis of data
- 3. Report writing

## Motor Skills:

- 1. Presentation Skills
- 2. Use of multi media

## **List of Projects:**

**Note:** Any one project of the following:

- 1. Visit to a local area to document environmental assets such as river / forest / grassland / hill / mountain
- 2. Visit to a local polluted site: Urban/Rural/Industrial/Agricultural
- 3. Study of common plants, insects, birds
- 4. Study of simple ecosystems of ponds, river, hill slopes etc

Prepare a project report on the findings of the visit illustrating environment related facts, analysis and conclusion. Also suggest remedies to improve environment.

## Learning Resources: Books:

| Sr.<br>No. | Author                                                | Title                                        | Publisher               |
|------------|-------------------------------------------------------|----------------------------------------------|-------------------------|
| 01         | Anindita Basak                                        | Environmental Studies                        | Pearson Education       |
| 02         | R. Rajgopalan                                         | Environmental Studies<br>from Crises to Cure | Oxford University Press |
| 03         | Dr. R. J. Ranjit Daniels, Dr.<br>Jagdish Krishnaswamy | Environmental Studies                        | Wiley India             |

Course Name : Diploma in Textile Manufactures Course Code : TX Semester : Fourth Subject Title : Yarn Manufacturing-III Subject Code : 17462

## **Teaching and Examination Scheme**

| Tea | aching Sch | neme |               |     | Examinati | on Scheme |     |       |
|-----|------------|------|---------------|-----|-----------|-----------|-----|-------|
| TH  | TU         | PR   | PAPER<br>HRS. | TH  | PR        | OR        | TW  | TOTAL |
| 04  |            | 02   | 03            | 100 | 50#       |           | 25@ | 175   |

## NOTE:

- > Two tests of 25 mark each, to be conducted as per the schedule given by MSBTE.
- > Total of test marks for all theory subjects are to be converted out of 50 and to be entered in mark-sheet under the head Sessional Work (SW).

#### **Rationale:**

In the third semester, detailed study of the preparatory part of the spinning processes was covered. In Yarn Manufacturing-II carding & draw frames were discussed.

In this fourth semester, Yarn Manufacturing III - is a continuation of the detailed study of spinning process. This subject covers further part of spinning process comber preparatory and comber fly frame & ring frame. It covers the study of principles and description of these processes and functions of all machines and their parts with related information and skills.

## **Objective:**

The student will able to:

- a. Understand comber preparatory & comber fly frame & ring frame process.
- b. Draw the sketch and gearing of all above machines.
- c. Calculate draft, production of all above machines.

#### **Learning Structure**



# **Contents: Theory**

| Topic and Contents                                                                                                             | Hours | Marks |
|--------------------------------------------------------------------------------------------------------------------------------|-------|-------|
| <b>Topic 1.</b> Study of Comber lap preparation and Comber                                                                     |       |       |
| Specific objective: The student will able to                                                                                   |       |       |
| > Understand the concept of parallelization & blending of fibers                                                               |       |       |
| $\triangleright$ Understand effect of setting & process parameters on material.                                                |       |       |
| ➤ Understand the importance of comber needles.                                                                                 |       |       |
| <ul> <li>Understand the defect in combing preparatory &amp; combing process</li> </ul>                                         |       |       |
| Content:-                                                                                                                      |       |       |
| 1.1 Introduction – Preparation to combing and comber operation                                                                 |       |       |
| 1.2 Objects of Sliver lan Ribbon I an and Super I an                                                                           |       |       |
| 1.2 Objects of Shiver hap, Roboth Lap and Super Lap.                                                                           |       |       |
| Pibbon lan and Super lan                                                                                                       |       |       |
| 1.4 Influence of lap propagation on combing, evenness of lap sheet, deposition of                                              |       |       |
| the books                                                                                                                      |       |       |
| the nooks.                                                                                                                     |       |       |
| 1.5 Causes of defective production and their remedies at above machines                                                        | 24    | 36    |
| 1.6 Calculation related to production & draft of Sliver lap & Ribbon Lap                                                       |       |       |
| 1.7 Types of Comber - Sequence of operation of rectilinear comber                                                              |       |       |
| 1.8 Technology of combing- parameters influencing the combing operation,                                                       |       |       |
| influence of the combing on quality.                                                                                           |       |       |
| 1.9 Influence of machine component and setting on combing Feed distance                                                        |       |       |
| moved per cycle, type of feed ,the detachment setting, number of points                                                        |       |       |
| on the comb, the depth of penetration of top comb, piecing.                                                                    |       |       |
| 1.10 The comb- cylinder comb, top comb, operations of comb                                                                     |       |       |
| 1.11 Drafting arrangement, waste removal                                                                                       |       |       |
| 1.12 Study of important setting and its effects on working - step gauge, distance                                              |       |       |
| gauge, top comb settings.                                                                                                      |       |       |
| 1.13 Specification of Modern Comber                                                                                            |       |       |
| 1.14 Causes and remedies of defective production at Comber                                                                     |       |       |
| 1.15 Calculation of Hank, Draft, Production ,and Noil Percentage                                                               |       |       |
| Topic 2. The study of Speed frame                                                                                              |       |       |
| Specific objective: The student will able to                                                                                   |       |       |
| Understand the concept of drafting & twisting of fibers                                                                        |       |       |
| Understand effect of setting & process parameters on material.                                                                 |       |       |
| > Understand the importance of stop motions.                                                                                   |       |       |
| > Understand the defect in Speed frame.                                                                                        |       |       |
| Content:                                                                                                                       |       |       |
| 2.1 The necessity of Speed frame.                                                                                              |       |       |
| 2.2 Description of functions of Speed frame – operating sequence, effect of                                                    |       |       |
| arrangement of bobbins in two rows.                                                                                            |       |       |
| 2.3 Operating regions of the roving- creel. Spindle and flyer -                                                                | 20    | 32    |
| Imparting twist the spindle the flyer the flyer top the presser arm                                                            |       |       |
| 24 Winding of the bobbin Elver leading and bobbin leading its comparison                                                       |       |       |
| 2.5 Gearing diagram of Speed frame (Ouestion not to be asked in theory Exam)                                                   |       |       |
| 26 Bobbin drive cone drive transmission lifter motion                                                                          |       |       |
| 2.5 Booon drive, cone drive danshission, inter motion<br>2.7 Study of building mechanism of Speed frame, shifting of cone belt |       |       |
| reversal of bobbin rail shortening of lift                                                                                     |       |       |
| 2.8 Monitoring device, sliver ston motion, roving ston motion                                                                  |       |       |
| 2.6 Promotion guevice- silver stop motion, toving stop motion                                                                  |       |       |
| 2.7 Ocal change position of the Speed frames areas drafting and collecting range.                                              |       |       |
| 2.10 Galculation of Hank Draft Twist & Production                                                                              |       |       |

| 2.12 Causes of defects and remedies.                                                      |    |     |
|-------------------------------------------------------------------------------------------|----|-----|
| Topic.3. Study of Ring frame process                                                      |    |     |
| Specific objectives: The student will able to                                             |    |     |
| Understand the concept of drafting & twisting of fibers                                   |    |     |
| Understand effect of setting & process parameters on material.                            |    |     |
| Understand the importance of balloon control rings.                                       |    |     |
| Understand the defect in ring frame.                                                      |    |     |
| Content:                                                                                  |    |     |
| 3.1 Introduction                                                                          |    |     |
| 3.2 Function and mode of operation.                                                       |    |     |
| 3.3 Design feature of machine- Frame, creel, drafting arrangement,                        |    |     |
| 3.4 Spindle drive, yarn guiding device, balloon control ring, separators, types of rings. | 20 | 32  |
| 3.5 Traveller-task and function. Types, wire profile of Traveller. Traveller              |    |     |
| clearer. Traveller numbering system                                                       |    |     |
| 3.7 Variable drive                                                                        |    |     |
| 3.8 Structure of Ring bobbin, Winding process, Builder motion of ring                     |    |     |
| bobbin, building the base.                                                                |    |     |
| 39 Monitoring system, ring data system                                                    |    |     |
| 3.10 Modern development in Ring frame                                                     |    |     |
| 3.11 Calculation of draft, twist and production of Ring frame,                            |    |     |
| 3.12 Average count and 20 <sup>s</sup> conversion.                                        |    |     |
| Total                                                                                     | 64 | 100 |

#### Practical: Skills to be developed: Intellectual Skills:

- 1. Calculate the speeds of various machine parts in comber preparation, comber, Speed frame and ring frame.
- 2. Calculate the production of comber preparation, comber. Speed frame and ring frame.
- 3. Select various settings of comber, Speed frame and ring frame.
- 4. Identify various change places at comber preparatory, comber speed frame and ring frame.

#### Motor Skill:

- 1. Draw gearing diagram of, Comber preparatory and Comber machines speed frame and ring frame.
- 2. Draw the sketches of, Comber preparatory and Comber Machines speed frame and ring frame.
- 3. Measure the speed of Comber preparatory and Comber machine speed frame and ring frame components using tachometer.
- 4. Follow standard setting procedure for various Comber preparatory and Comber machine speed frame and ring frame components.

## List of Practical

1. Study of gearing diagram and passage of the sliver lap machine, calculations of speed of various parts, draft and production.

- 2. Study of gearing diagram and passage of the Ribbon lap machine, calculations of speed of various parts, draft and production.
- 3. Study of gearing diagram and passage of the Comber machine, calculations of speed of various parts, draft and production.
- 4. Study of comber setting, (Step gauge, distance gauge, top comb setting, feed roll setting )
- 5. Study of gearing diagram and passage of the Speed frame machine, calculations of speed of various parts, draft and production.
- 6. Study of gearing diagram and passage of the Ring frame machine, calculations of speed of various parts, draft and production
- 7. Study of Drafting system, building mechanism and change places of ring frame.
- 8. Study of building mechanism, differential motions and drafting systems of a speed frame machine.
- 9. Ring rail leveling, thread guide setting & spindle gauging of a ring frame.

#### **Learning Resources:**

| Sr.<br>No. | Author                                                 | Titles                                                | Publication                              |
|------------|--------------------------------------------------------|-------------------------------------------------------|------------------------------------------|
| 1          | T. K. Pattabhiram                                      | Essential Facts in Cotton<br>Spinning.                | Somaiya Publication Pvt. Ltd.<br>Mumbai. |
| 2          | A. R. Garde (Editor)                                   | Spinning Tablet Series (9<br>numbers)                 | The Textile association, India.          |
| 3          | A. E. De Barr, H.<br>Catling                           | The Principles and Theory Of<br>Ring Spinning. Vol. 5 | The Textile Institute Manchester.        |
| 4          | Ed. By K. Ganesh,<br>A. R. Garde                       | Cotton Spinning.                                      | The Textile association, India.          |
| 5          | R.Chattopadhyay, R.<br>Rengasamy J                     | Spinning- Drawing, Combing and Roving.                | NCUTE, IIT Delhi                         |
| 6          | K. R. Salhotra, R.<br>Alagirusamy, R.<br>Chattopadhyay | Ring Spinning, Doubling and<br>Twisting               | NCUTE, IIT Delhi                         |
| 7          | R. Chattopadhyay                                       | Advances in Technology of Yarn Production.            | NCUTE, IIT Delhi                         |
| 8          | W.klein                                                | Practical Guide to combing & Drawing                  | The Textile Institute Manchester         |
| 9          | W.S.Tagart                                             | Cotton Spinning vol-2                                 | Macmillian & Company ltd.                |
| 10         | A. R.Khare                                             | Cotton Spinning                                       | The Textile Institute Manchester.        |
| 11         | T. K. Pattabhiram                                      | Elements of practical cotton spinning                 | Somaiya Publication Pvt. Ltd.<br>Mumbai. |

Course Name : Diploma in Textile Manufactures Course Code : TX Semester : Fourth Subject Title : Fabric Manufacturing-III Subject Code : 17463

#### **Teaching and Examination Scheme:**

| Tea | ching Sch | eme | Examination Scheme           |     |     |  |     |       |
|-----|-----------|-----|------------------------------|-----|-----|--|-----|-------|
| TH  | TU        | PR  | PAPER<br>HRS. TH PR OR TW TO |     |     |  |     | TOTAL |
| 03  |           | 02  | 03                           | 100 | 50# |  | 25@ | 175   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

The textile manufacturing is done in various stages. In first year, we have experienced that this subject of fabric manufacture dealt with yarn preparation in winding and ordinary weaving on simple loom. In this second year, this subject deals with subsequent steps of yarn preparation and automatic weaving. These are essential stages in the fabric production. This subject intends to impart knowledge and skills in the area of important weaving process, i.e. warping, sizing operation and fabric production on automatic looms.

#### **Objectives:**

The student will be able to

- 1. Understand Sizing and automatic looms.
- 2. Identify the Sizing ingredients as per the yarn, fabric and sizing machine.
- 3. Calculate the Sizing & Auto loom production.
- 4. Understand the working of Automatic loom and it's preparation.

## Learning Structure:



# **Detailed Content:**

| Chapter | Торіс                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Hours | Marks |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
| 1       | <ul> <li>Sizing</li> <li>1.1 Objects of Sizing.</li> <li>1.2 Kinds and functions of Sizing ingredients.</li> <li>1.3 Cooking of size paste- number and quantity of sizing ingredients required sequence of addition of ingredients during cooking. Cooking of size paste with pressure cooker and storage. Size paste properties: congealing and keeping properties and their importance. Study of viscosity and concentration of size paste.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 10    | 16    |
| 2       | <ul> <li>Study of Sizing Machine:</li> <li>2.1 Creel construction, types, their merits and demerits, braking systems, tension control on warp.</li> <li>2.2 Size box: All elements in size box, and their functions, size paste level control, temperature control, squeeze roller and weighting system, immersion roller. Wet splitting &amp; its importance.</li> <li>2.3 Drying zone: phenomena of multi-cylinder drying, removal of condensed water, Teflon coating, drive to cylinders, temperatures and its control.</li> <li>2.4 Splitting zone: leasing, splitting, moisture control. Details of headstock, marking and measuring device, comb, sheeting rollers, drag roller.</li> <li>2.5 Winding zone: drive to the weavers beam.</li> <li>2.6 Drive to sizing machine: complete machine drive, use of PIV gears, differential cone drive, multi-motor drive, drives of different modern sizing machines, (Benniger, West Point etc.)</li> </ul> | 10    | 24    |
| 3       | <ul> <li>Stretch and migration control:</li> <li>3.1 Definition and importance of stretch, measurement of stretch and its control at different zones (stretch meter), definition of lappers and migration, measurement of migration.</li> <li>3.2 Size pick up: requirement of size pick up, size add-on, factors effecting size pickup. Testing of sized yarn Calculations of efficiency, size mixture, moisture in ingredients, water vaporising capacity, costing and dead loss, count of sized warp.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                         | 10    | 16    |
| 4       | <ul> <li>Automatic Weaving</li> <li>4.1. Introduction, differences between ordinary loom and<br/>automatic loom.</li> <li>4.2. Study of pirn changing mechanism, different types of weft<br/>feelers.</li> <li>4.3. Warp stop motion of different types.</li> <li>4.4. Various types of positive let off motions: Bartlett, Ruti,<br/>CIMMCO, etc.</li> <li>4.5. Centre weft fork motion, its comparison with side weft fork<br/>motion.</li> <li>4.6. Shuttle changing motion, its comparison with Pirn changing<br/>motion.</li> <li>4.7. Study of colour retaining device on multiple box loom</li> </ul>                                                                                                                                                                                                                                                                                                                                                | 14    | 36    |

|   | 4.8. Study of centre selvedge.                                    |    |     |
|---|-------------------------------------------------------------------|----|-----|
|   | 4.9. Study of the warp preparation method for the Automatic       |    |     |
|   | looms.                                                            |    |     |
|   | Reaching In and Drawing In                                        |    |     |
|   | 5.1 Different type of Reaching, Drawing-in, denting and knotting: |    |     |
|   | Methods & machines.                                               |    |     |
| 5 | 5.2 Study of design of healds and types of healds.                | 04 | 08  |
|   | 5.3 Study of design of different reeds.                           |    |     |
|   | 5.4 Calculation regarding count of heald sett and reed count.     |    |     |
|   | 5.5 Selection, care and storage of healds & reeds.                |    |     |
|   | Total                                                             | 48 | 100 |

## Practical: Skills to be developed

## Intellectual skill

- 1. Select sizing ingredients.
- 2. Identify the requirements of auto loom.

## Motor Skills

- 1. Operate auto loom.
- 2. Prepare size paste.

## **List of Practical**

- 1. Study of sizing machines (at least two visits to sizing units) and sketching the passage of warp on sizing machine and various mechanisms.
- 2. Dismantling, refitting, setting and timing of following mechanisms on Automatic shuttle looms.
  - 1. Shedding,
  - 2. Under-picking,
  - 3. Dagger-shaft, Swell mechanism
  - 4. Battery, Loose end cutter mechanism
  - 5. Weft fork and anti-crack,
  - 6. Let-off motion,
  - 7. Shuttle changing mechanism,
  - 8. Feeler mechanism,,,
  - 9. Warp stop motion,
  - 10. Operating the automatic loom to produce good cloth.

#### Reference: Books:

| Sr.<br>No | Sr. Name of Author Title Publication |                                      | Publication                                                                                                |
|-----------|--------------------------------------|--------------------------------------|------------------------------------------------------------------------------------------------------------|
| 1.        | Robinson and Marks                   | Principle of Weaving                 | The Textile Institute,<br>10 Black friars Street, Manchester<br>M3 5DR                                     |
| 2.        | Bennett                              | An introduction to automatic weaving | Indo Overseas Trading Co.<br>280 Carnac Road, Bombay and<br>Columbine Press Co.Ltd.,<br>Manchester, London |

| 3. | Banerjee N.N., Smt<br>Banerjee | Weaving Mechanism, Vol I<br>& Vol II       | Smt.T.Bnerjee, Textile Book House,<br>29, Krishna Nath Road, Berhampore<br>– 742 101, West Bengal India |
|----|--------------------------------|--------------------------------------------|---------------------------------------------------------------------------------------------------------|
| 4. | J.B. Aitken                    | Automatic Weaving.                         | Columbine Press (Publishers) Ltd.,<br>Old Clony House South king, Street,<br>Manchester-2               |
| 5. | A. Ormerod,                    | Modern preparation and weaving machinery.  | Butterworths & Co.<br>(Publishers) Ltd., London, 88,<br>Kingsway, W.C.2                                 |
| 6. | Talukdar M K                   | Weaving: Materials<br>Methods and Machines | Mahajan Publishers Pvt Ltd<br>Ahmedabad-9(1998)                                                         |
| 7. | Wadekar                        | Sizing                                     | Mahajan Publishers Pvt Ltd<br>Ahmedabad-9(1998)                                                         |

# **Specific Objectives:**

| Chapter | The Students will be able to                                                                                                                                                           |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | <ul><li>a) Identify sizing ingredients, Cooking of size paste. Number of sizing ingredients required.</li><li>b) List characteristics features of sizing ingredients.</li></ul>        |
| 2       | <ul><li>a) Draw the design of the sizing machine.</li><li>b) List functions of various motions in sizing machine.</li></ul>                                                            |
| 3       | <ul><li>a) Measure stretch and its control at different zones using stretch meter</li><li>b) Able to measure lappers and migration. size pick up, size add-on.</li></ul>               |
| 4       | <ul><li>a) Identify working of different motions from Automatic loom.</li><li>b) Develop the good quality of cloth.</li></ul>                                                          |
| 5       | <ul><li>a) Identify requirements of drawing-in and it's process for different fabrics.</li><li>b) Develop the relation between design requirements and weaving requirements.</li></ul> |

Course Name : Diploma in Textile Manufactures Course Code : TX Semester : Fourth Subject Title : Knitting Technology Subject Code : 17464

#### **Teaching and Examination Scheme:**

| Tea | ching Sch | ieme | Examination Scheme         |     |     |  |     |       |
|-----|-----------|------|----------------------------|-----|-----|--|-----|-------|
| TH  | TU        | PR   | PAPER<br>HRS TH PR OR TW T |     |     |  |     | TOTAL |
| 03  |           | 02   | 03                         | 100 | 50@ |  | 25@ | 150   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Knitting technology is the important area of textile industry. Knitted fabrics due to its stretchable and favourable properties are in good demand and it is expected to rise day by day. Knitted fabrics find uses for under garments, sports Uniforms, summer and winter dresses, etc. to a large extent. This sector is now diversifying into synthetics, domestic fabric, carpets, technical and geo textiles. Similarly, since last few years young generation has been attracted to readymade garments due to quality, cost and readiness of availability. As such, large opportunities for the textile technologist particularly diploma pass-outs exist in this field. Already many diploma pass outs are finding employment in this area. Therefore, the main object is to equip the students with all the relevant technical knowledge for manufacturing of knitted fabrics, articles, garments and the maintenance aspects of the machines used. This subject will help the students to start their small scale industrial units which will help them for self employment.

#### **General Objectives:**

The student will be able to,

Student will be able to

- a. Understand Warp & Weft knitting machine.
- b. Identify different Knitted structures.
- c. Calculate Knitting machines production and efficiency.

#### **Learning Structure:**



# Theory:

| Topic and Contents                                                                   | Hours | Marks |
|--------------------------------------------------------------------------------------|-------|-------|
| Topic 1. Overview of Knitting Process                                                |       |       |
| Specific objective: The student will able to                                         |       |       |
| • To define knitting process                                                         |       |       |
| • To interpret the difference between Woven & Knitted fabric.                        |       |       |
| Content:                                                                             |       |       |
| 1.1) Introduction to knitting process.                                               | 02    | 06    |
| 1.2) Introduction of Warp & Weft Knitting.                                           |       |       |
| 1.3) Reasons for growth of knitting                                                  |       |       |
| 1.4) Indian Knitting industry                                                        |       |       |
| 1.5) Comparison of Woven and Knitted fabrics                                         |       |       |
| 1.6) Classification of Weft knitting machines.                                       |       |       |
| Topic 2. Weft Knitting                                                               |       |       |
| Specific objective: The student will able to                                         |       |       |
| • Define basic terminology of Knitting.                                              |       |       |
| • Identify different parts of Knitting and their function                            |       |       |
| Describe intermeshing process for Knitting                                           |       |       |
| Content.                                                                             |       |       |
| 2.1 Definition of Basic terms in weft knitting: closed loop face loop                |       |       |
| needle loop, sinker loop, course wale                                                |       |       |
| 2.2 Function elements in Knitting                                                    |       |       |
| - Types of needle & its comparison                                                   | 06    | 10    |
| - Knitting action of different needles                                               |       |       |
| - Sinker & its function                                                              |       |       |
| - Cylinder : Gauge nitch                                                             |       |       |
| - Cams                                                                               |       |       |
| - Feeder/stripper                                                                    |       |       |
| - Fabric spreader                                                                    |       |       |
| 2.3 Needles with different butt positions: Use in design                             |       |       |
| 2.4 Positive feeder- its functions, types.                                           |       |       |
| <b>Topic.3.</b> Weft knitting Machines                                               |       |       |
| Specific objectives: The student will be able to                                     |       |       |
| • Operate knitting machine.                                                          |       |       |
| <ul> <li>Interpret different knitted fabric structure for appropriate use</li> </ul> |       |       |
| <ul> <li>Select the procedure of knitted fabric production</li> </ul>                |       |       |
| Content.                                                                             |       |       |
| 3.1 Passage of varn through Single jersey machine                                    |       |       |
| 3.2 Single jersey machine -Structure loop diagram knitting                           | 08    | 16    |
| elements knitting action                                                             |       | -     |
| 3.3 Rih knitting machine-Structure, loop diagram, Needle arrangement                 |       |       |
| knitting action, machine construction.                                               |       |       |
| 3.4 Interlock machine-loop diagram structure needle Arrangement                      |       |       |
| trick arrangement knitting action                                                    |       |       |
| 3.5 Purl Machine-loop diagram, structure, knitting action                            |       |       |
| 3.6 Characteristics of Single jersev, rib, interlock, purl fabrics                   |       |       |
| <b>Topic 4.</b> Weft knitted fabrics                                                 |       |       |
| <b>Specific objective:-</b> The student will able to                                 |       |       |
| • Represent the knitted fabric on paper                                              | 06    | 12    |
| Draw different knitted fabric structure                                              |       |       |
|                                                                                      | 1     |       |

| Differentiate the knitted fabrics                                         |    |    |
|---------------------------------------------------------------------------|----|----|
| Content:                                                                  |    |    |
| 4.1) Principle stitches in weft knitting-knit, tuck, miss.                |    |    |
| 4.2) Notations in weft knitting                                           |    |    |
| 4.3) Ornamentation of plain knit fabrics                                  |    |    |
| - La-coste, According, Thick Fleece, Jersey blister                       |    |    |
| 4.4) Ornamentation of Rib Structure                                       |    |    |
| - Half cardigan, Full cardigan                                            |    |    |
| 4.5) Ornamentation of Interlock                                           |    |    |
| - Eight lock structure                                                    |    |    |
| 4.6) Double knit structures-Milan Rib, Double pique, pique poplin,        |    |    |
| punto di roma, ottoman rib, texi pique                                    |    |    |
| Topic 5. Knitting Calculations                                            |    |    |
| Specific objective: The student will able to                              |    |    |
| <ul> <li>Calculate knitting production in Kg/Day or Meters/day</li> </ul> |    |    |
| • Estimate yarn requirement for a particular production                   |    |    |
| • Calculate no. of machine required for designed output                   |    |    |
| Content :                                                                 | 06 | 12 |
| 5.1) Production Calculation                                               |    |    |
| 5.2) Grams per square meter calculation                                   |    |    |
| 5.3) Tightness factor                                                     |    |    |
| 5.4) Stitch length calculation                                            |    |    |
| 5.5) Weight per linear meter calculation                                  |    |    |
| Topic 6 : Warp knitting                                                   |    |    |
| Specific objective : The student will able to                             |    |    |
| • Describe the process of warp knitting                                   |    |    |
| Compare different knitting technologies.                                  |    |    |
| Content:-                                                                 |    |    |
| 6.1) Introduction of warp knitting                                        | 03 | 08 |
| 6.2) Loop structure                                                       |    |    |
| 6.3) Comparison of warp and weft knitting                                 |    |    |
| 6.4) Basic Warp knitting terms- overlap, underlap, open & closed lap      |    |    |
| 6.5) Application of warp knit fabrics                                     |    |    |
| 6.6) Classification of warp knitting                                      |    |    |

| TOTAL                                                         | 48 | 100 |
|---------------------------------------------------------------|----|-----|
| 9.3) Quality tests for weft knitted fabrics.                  |    |     |
| 9.2) Defects and their remedies in knitted fabrics.           |    |     |
| 9.1) Basic properties of yarns used for knitting              |    |     |
| Content:-                                                     | 03 | 08  |
| • Define the knitted fabric defects.                          | 02 | 00  |
| • Understand quality parameters of knitted fabric.            |    |     |
| <b>Specific objective:-</b> The student will able to          |    |     |
| <b>Topic 9</b> :Ouality aspects of knitting                   |    |     |
| 8.4) Yarn path in flat knitting machine Knitting cycle.       |    |     |
| 8 3) Knitting elements                                        |    |     |
| 8 2) Types and classification                                 |    |     |
| 8 1) Introduction of flat knitting                            | 05 | 00  |
| Content:-                                                     | 03 | 08  |
| <ul> <li>To understand mechanism of flat knitting.</li> </ul> |    |     |
| • To differentiates flat knitting and circular knitting       |    |     |
| Specific objective: The student will able to                  |    |     |
| Topic 9 Elet Dod Initing                                      |    |     |
| 7.1.4) Dringing stitches in ware britting                     |    |     |
| 7.1.2) Pattern wheel, pattern drum and chain links            |    |     |
| 7.1.1) Introduction of patterning.                            |    |     |
| Sub topic 7.1 :Patterning in warp knitting 8 Marks            |    |     |
| 7.6) Notation for warp knit structures                        |    |     |
| 7.5) Knitting action of Rachel machine                        |    |     |
| 7.4) Elements of Rachel knitting machine                      |    |     |
| 7.3) Knitting cycles of Tricot m/c                            |    |     |
| 7.2) Elements of Tricot knitting machine                      | 11 | 20  |
| 7.1) Comparison of tricot And Rachel machine                  |    |     |
| Content:-                                                     |    |     |
| • Prepare the chain links.                                    |    |     |
| • Understand mechanism of patterning.                         |    |     |
| • Represent the warp knitted fabric on paper.                 |    |     |
| • Identify different parts of warp knitting machine.          |    |     |
| Specific objective: The student will able to                  |    |     |
| Topic 7 : Warp Knitting machine12 Marks                       |    |     |
| Topic 7 Warm Knitting maching                                 |    |     |

# Practical:

Skills to be developed:

# Intellectual Skills:

- 1) The functions of knitting mechanisms.
- 2) Different knitted fabric structures.
- 3) The designs of needles and cams.

## **Motor Skills:**

- 1) Identify different knitted fabric structures.
- 2) Draw diagrams of needles and cams.

### **List of Practical's:**

- 1. Study of Single jersey machine (Drawing, Understand the function of element).
- 2. Study of Double jersey machine (Drawing, Understand the function of elements).
- 3. Study of Flat knitting machine (Sketch yarn passage, Identify parts).
- 4. Study of various elements used on Circular knitting machine (Drawing, Identification of parts).
- 5. Study of principle stitches used on circular knitting machine (draw the loop diagram, assembling different cams).
- 6. Study of knitted fabric design, notation representation of fabric on paper(plotting design on paper, unroving the yarn, counting the C.P.I & W.P.I)
- 7. Analysis of Single jersey fabric (Identification, Unroving, counting of fabric cpi & wpi)
- 8. Analysis of R ib Fabric (Identification, Unroving, counting of fabric cpi & wpi)
- 9. Analysis of Interlock fabric (Identification, Unroving, counting of fabric cpi & wpi)
- 10. Study of Warp knitting machine (Drawing, Identification of various parts).
- 11. Study of gearing arrangement of circular knitting machine
- 12. Visit to modern Knitting unit (plot the process flow)

## List of Assignments:

1. Draw diagrammatic notation & symbolic notation for different knitted structure.

## **Learning Resources:**

1. Books:

| Sr.<br>No. | Author                | Title                                                     | Publisher                                      |
|------------|-----------------------|-----------------------------------------------------------|------------------------------------------------|
| 1          | David Spencer.        | Knitting Technology:                                      | Woodhead Publishing India<br>Pvt. Ltd.         |
| 2          | S. Raz.               | Warp Knitting Production                                  | Verlag meliand textile berichte,<br>Heidelberg |
| 3          | A. Reisfeld.          | Warp Knit Engineering                                     | National Knitedoutwear association, Newyork    |
| 4          | D. F. Paling.         | Warp Knitting technology                                  | Cloumbine Press, London                        |
| 5          | Dr.N.Anbumani         | Knitting- fundamentals, machine, structure & Developments | New Age International(P) ltd.                  |
| 6          | Sadhan Chandra<br>ray | Fundamentals and advances in knitting technology          | Woodhead Publishing India<br>Pvt. Ltd.         |

## 2. CDs, PPTs, Models, Charts etc. :

## 3. IS, BIS and International Codes:

- 1. Reference: ASTM D 3882-85 for fabric skewness.
- 2. Reference: AATCC 178-1994 for barre.

## 4. Websites:

- 1. http://www.shimaseiki.com/
- 2. http://www.kern-liebers.com/

- 3. http://www.groz-beckert.com/
- 4. http://www.knittingindustry.com

# List of Instruments, Equipment and Machines:

- 1. Single jersey machine.
- 2. Double jersey machine.
- 3. Flat knitting machine.
- 4. Warp knitting machine.
- 5. Electronic weighing scale.
- 6. Pick glass.
Course Name : Diploma in Textile Manufactures Course Code : TX Semester : Fourth Subject Title : Textile Testing-III Subject Code : 17465

### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    | Examination Scheme |     |    |    |     |       |
|-----------------|----|----|--------------------|-----|----|----|-----|-------|
| TH              | TU | PR | PAPER<br>HRS.      | TH  | PR | OR | TW  | TOTAL |
| 03              |    | 02 | 03                 | 100 |    |    | 25@ | 125   |

### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

### **Rationale:**

There is variety of raw materials for textile manufacturing, such as cotton, silk, synthetic fibers, etc. These raw materials are being used individually or mixed in different proportions to form a yarn of desired quality. The raw materials can be tested for numerous characteristics like fiber length, fineness, strength, maturity etc. Intermediate products like sliver, roving etc. are also required to be tested for controlling the process, for optimizing the process parameters or for developing existing process. Finally, to ensure the quality product, final product that may be yarn, fabric or garment, testing is imperative. This subject intends to equip students with the concepts, principles and methods of testing of various textile fiber and yarns, and fabric which is helpful in selection of raw materials, process control, process optimization, quality assurance and research purpose.

Since textile is system of mass production and contains lots of variations, lot of experimentation is required. Results obtained from specific number of observations are to be analyzed, interpreted and used for best outcomes. Therefore, students are equipped with the methods to analyze the testing results statistically.

### **General Objectives:**

Student will be able to:

- 1. Understand principle & advanced concept of Testing of fibre/ Yarns / Fabric
- 2. Determine tensile, tearing & bursting strength of fabric.
- 3. List standard methods used for testing textile material.
- 4. Define various terms used in yarn & fabric testing.
- 5. Correlate the result of the tests to the application of material.

#### **Learning Structure:**



### **Detailed Contents:**

| Chapter | Contents                                                                                                                                                                                                                                                                                                                                                                                             | Hours | Marks |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
|         | Fabric Testing:                                                                                                                                                                                                                                                                                                                                                                                      |       |       |
|         | Specific Objectives                                                                                                                                                                                                                                                                                                                                                                                  |       |       |
|         | Know different fabric properties to be tested.                                                                                                                                                                                                                                                                                                                                                       |       |       |
|         | List importance of fabric testing.                                                                                                                                                                                                                                                                                                                                                                   |       |       |
|         | Interpretation of test results.                                                                                                                                                                                                                                                                                                                                                                      |       |       |
|         | Selection of Testing Methods as per End use.                                                                                                                                                                                                                                                                                                                                                         |       |       |
|         | 1.1 Fabric sampling methods                                                                                                                                                                                                                                                                                                                                                                          | 08    | 16    |
|         | <b>1.2 Fabric dimensional Properties</b> : Fabric Length, Width,<br>Thickness, Weight measurement. Warp Count, Weft Count, and<br>Threads/Unit length, Crimp in Warp and weft. Effect of crimp on<br>fabric properties. Method of determination of crimp percentage<br>(Crimp Tester). Cloth covers (IS 1963:1981 SP-15 Part-II 2000).<br>Mathematical relation between Cover Factor, yarn count and |       |       |
|         | diameter.                                                                                                                                                                                                                                                                                                                                                                                            |       |       |
|         | 1.3 Stiffness & Drape of fabric:                                                                                                                                                                                                                                                                                                                                                                     |       |       |
|         | • Terms and Definitions                                                                                                                                                                                                                                                                                                                                                                              |       |       |
|         | • Measurement of stiffness of fabric by tester based on cantilever principle (IS 6490-1971).                                                                                                                                                                                                                                                                                                         |       |       |
| 1       | • Determination of drape coefficient by drape meter (IS 8357-1977).                                                                                                                                                                                                                                                                                                                                  | 04    | 14    |
|         | 1.4 Crease Recovery:                                                                                                                                                                                                                                                                                                                                                                                 |       |       |
|         | • Measurement by crease recovery angle (IS 4687:1981 SP-<br>15 Part-II 2000).                                                                                                                                                                                                                                                                                                                        |       |       |
|         | 1.5 Serviceability of fabric                                                                                                                                                                                                                                                                                                                                                                         |       |       |
|         | • Definition: serviceability, wear, and abrasion.                                                                                                                                                                                                                                                                                                                                                    | 06    | 12    |
|         | Measurement of Abrasion - Martindale Abrasion Tester                                                                                                                                                                                                                                                                                                                                                 |       |       |
|         | (ASTM D 4966-1998).                                                                                                                                                                                                                                                                                                                                                                                  |       |       |
|         | • Pilling of fabric: factors responsible for pilling of fabric.                                                                                                                                                                                                                                                                                                                                      |       |       |
|         | • Measurement of pilling : ICI pill box Tester (IS 10971:1984                                                                                                                                                                                                                                                                                                                                        |       |       |
|         | SP 15 Part- II)                                                                                                                                                                                                                                                                                                                                                                                      |       |       |
|         | 1.6 Water and Air relation to fabric                                                                                                                                                                                                                                                                                                                                                                 |       |       |
|         | • Definitions : Waterproof, shower proof fabrics, water                                                                                                                                                                                                                                                                                                                                              |       |       |
|         | Repellent fabrics.                                                                                                                                                                                                                                                                                                                                                                                   |       |       |
|         | Measurement:                                                                                                                                                                                                                                                                                                                                                                                         |       |       |
|         | • Spray test,                                                                                                                                                                                                                                                                                                                                                                                        | 08    | 14    |
|         | Hydrostatic water head test.                                                                                                                                                                                                                                                                                                                                                                         |       |       |
|         | • Definition : Air-permeability, Air resistance, Air Porosity                                                                                                                                                                                                                                                                                                                                        |       |       |
|         | • Measurements of air permeability.                                                                                                                                                                                                                                                                                                                                                                  |       |       |
|         | • Factors affecting air-permeability.                                                                                                                                                                                                                                                                                                                                                                |       |       |
|         | Tensile Testing                                                                                                                                                                                                                                                                                                                                                                                      |       |       |
|         | Specific Objectives                                                                                                                                                                                                                                                                                                                                                                                  |       |       |
|         | Describe the process of tensile, tearing strength testing of                                                                                                                                                                                                                                                                                                                                         |       |       |
| 2       | fabric                                                                                                                                                                                                                                                                                                                                                                                               | 06    | 14    |
|         | Use appropriate method of fabric strength testing.                                                                                                                                                                                                                                                                                                                                                   |       |       |
|         | Fabric strength:                                                                                                                                                                                                                                                                                                                                                                                     |       |       |

|   | • Tensile strength (IS 6359:1971 SP-15 Part – II 2000),        |    |     |
|---|----------------------------------------------------------------|----|-----|
|   | • Tearing strength(IS 6359:1971 SP-15 Part – II 2000), ,       |    |     |
|   | • Bursting strength (IS 1966:1975 SP-15 Part – II 2000),       |    |     |
|   | Modern Testing Instruments                                     |    |     |
|   | Specific Objective                                             |    |     |
|   | Describe Modern Fibre and yarn testing Instruments             |    |     |
| 2 | <b>3.1</b> Principle, working, parameters in brief.            | 00 | 16  |
| 3 | High Volume Instruments (HVI)                                  | 08 | 10  |
|   | • AFIS testing.                                                |    |     |
|   | • Tenso-Jet                                                    |    |     |
|   | • Tenso-Rapid yarn testing,                                    |    |     |
|   | Garment Testing                                                |    |     |
|   | Describe the testing methods for garments                      |    |     |
|   | 4.1Colour Fastness :                                           |    |     |
| 4 | Grey Scale for Colour Change and Staining                      | 09 | 14  |
| 4 | • Test Procedure for fastness of colour & Staining Fastness to | 08 |     |
|   | Washing, Dry-cleaning, & Light, Rubbing & Perspiration.        |    |     |
|   | 4.2 Dimensional Stability: Expansion, Shrinkage, Swelling,     |    |     |
|   | <b>4.3 Seam</b> : strength, slippage.                          |    |     |
|   | Total                                                          | 48 | 100 |

### Skills to be developed

### 1) Intellectual skills:

- 1. Proper selection of measuring instruments depending upon the data and precision required.
- 2. Analyze properties of matter & their use for the selection of material.
- 3. To interpret the results from observations and calculations.
- 4. To use these results for corrective actions in mechanical and wet processing.

### 2) Motor skills:-

- 1. Proper handling of instruments.
- 2. Measuring physical dimensions of fibre and yarn, fabric accurately.
- 3. To observe the phenomenon and to list the observations in proper tabular form.
- 4. To adopt proper procedure while performing the experiment.

### List of Practical: Determination of:

- 1. Determination of Cover factor.
- 2. Determination of Crimp % in warp & weft of the fabric.
- 3. Determination of Stiffness of fabric.
- 4. Determination of Drape of fabric.
- 5. Determination of Crease Recovery angle of fabric.
- 6. Determination of Tearing Strength of fabric.
- 7. Determination of Tensile strength of fabric.
- 8. Determination of dimensional stability of fabric
- 9. Determination of fibre parameters by HVI/AFIS

### References: Books:

| Sr.<br>No. | Author Title  |                                        | Publisher                      |
|------------|---------------|----------------------------------------|--------------------------------|
| 1          | Angappan      | Textile Testing                        | SS Textile Inst,<br>Coimbatore |
| 2          | J. E. Booth   | Principles of Textile Testing          |                                |
| 3          | Kothari       | Testing and Quality Management         | IAFL, New Delhi                |
| 4          | B. P. Saville | Physical Testing of Textiles           |                                |
| 5          |               | Methods of Tests, Fibre, Yarn & Fabric | CIRCOT, Mumbai                 |

### Websites:

1) www.scribd.com

2) www.fibre2fashion.com

| Course Name        | : Diploma in Textile Manufactures |
|--------------------|-----------------------------------|
| <b>Course Code</b> | : TX                              |
| Semester           | : Fourth                          |
| Subject Title      | : Textile Chemistry - II          |
| Subject Code       | : 17466                           |

### **Teaching & Examination Scheme:**

| Teaching Scheme |    |    | Examination Scheme |     |    |    |     |       |
|-----------------|----|----|--------------------|-----|----|----|-----|-------|
| TH              | TU | PR | PAPER<br>HRS.      | TH  | PR | OR | TW  | TOTAL |
| 03              |    | 02 | 03                 | 100 |    |    | 25@ | 125   |

NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

### **Rationale:**

The textile yarns and fabrics are being used in all occasions of life, which have varieties of patterns, colours and designs all over the world. The people use fabrics treated with either with natural and/or man made synthetic colours and chemicals to produce the desired effect in numerous hue and tone of different colours. The physical and chemical properties of these chemicals and colours are of prime interest to the people in textile industry. While working in various capacities in textile industry, it is very essential to acquire the necessary knowledge and skills in using these chemicals. In textile Chemistry-I Fiber manufacturing, sizing and pretreatments have been covered. In textile Chemistry II discussion will be about

- 1. Dyeing of yarns and fabrics.
- 2. Printing of fabrics.
- 3. Finishing of fabrics like mercerizing, sanforising, etc.

### **Objectives:**

The students will be able to

- 1. Study of various dyes and dyeing methods
- 2. Understand the dyeing machineries for cotton and polyesters
- 3. Select suitable ingredients for formulation of print paste used in printing cotton and other textiles
- 4. Classify the finishing processes

### **Learning Structure:**



### **Detailed Content:**

| Chapter | Торіс                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Marks | Hours |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
| 1       | <ul> <li>Dyeing</li> <li>Specific Objectives;</li> <li>Student will be able to</li> <li>list the type of dyes used for various types of fibres</li> <li>Explain dyeing process for various textile fibres.</li> <li>1.1 Dyeing of cellulose materials with Direct, Sulphur, Vat, Reactive and Azoic dyes.</li> <li>1.2 Dyeing of Polyester with disperse dyes.</li> <li>1.3 Dyeing of Nylon with disperse and reactive dyes.</li> <li>1.4 Dyeing of acrylic with cationic dyes.</li> <li>1.5 Study of dyeing of blends (Polyester and cotton or viscose)</li> </ul> | 28    | 14    |
| 2       | <ul> <li>Dyeing Machinery</li> <li>Specific Objectives;</li> <li>Student will be able to,</li> <li>Identify machinery used for dyeing of fibre, yarn and fabrics.</li> <li>Understand method for blend dyeing.</li> <li>2.1. Construction and working of machinery used for dyeing yarn and fabric: Package Dyeing, Jigger Winch, Padding Mangle And Jet Dyeing Machine.</li> </ul>                                                                                                                                                                                 | 20    | 10    |
| 3       | <ul> <li>Printing</li> <li>Specific Objectives;</li> <li>Student will be able to ,</li> <li>List the various chemicals used in printing</li> <li>Understand different styles of printing</li> <li>3.1 Printing of cellulosic fabrics with dyes direct, reactive, vat, and pigment colours.</li> <li>3.2 Study of direct, discharge and resist styles of printing.</li> <li>3.3 Brief study of flat bed printing machine, Roller printing machine and Rotary printing machine</li> </ul>                                                                             | 24    | 12    |
| 4       | <ul> <li>Finishing</li> <li>4.1 Object and classification of Finishing processes.</li> <li>4.2 Finishes applied on cellulose and synthetic fabrics: resin finishing, water proofing, flame retarding, soil release finish heat setting, optical brightening agent treatment.</li> <li>4.3 Construction and working of Drying, Stenter, Calendaring, Mercerisation, Sanforising Machine</li> </ul>                                                                                                                                                                   | 28    | 12    |
|         | Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 100   | 48    |

### Practical: Skills to be developed

### Intellectual skills

- a. To Dye of yarn and fabric
- b. Match with the standard shed card

### **Motor Skills**

- a. Weigh accurately the dyes
- b. Handle the glass apparatus carefully

### **List of Practical:**

- 1. Dyeing of cellulosic fabric with different classes of dyes-5experiments.
- 2. Dyeing of synthetic fabric with different classes of dyes- 2experiments.
- 3. Testing of colour fastness (washing, light, and abrasion) for dyed fabrics and garments. 1experiments
- 4. Preparation of screen for printing One experiment.
- 5. Preparation of printing paste of different dyes. 3 experiments.
- 6. Fixation of prints with steaming and curing methods.
- 7. Visit to process house.

#### References

| Sr.<br>No | Author                       | Title          |
|-----------|------------------------------|----------------|
| 1         | Dr.V. A. Shenai              | Textile Fibres |
| 2         | D. B. Ajgaonkar              | Sizing         |
| 3         | V. A. Shenai                 | Bleaching      |
| 4         | V. A. Shenai                 | Dyeing         |
| 5         | Printing                     | V. A. Shenai   |
| 6         | An introduction of finishing | J. T. Marsh    |
| 7         | Finishing                    | V. A. Shenai   |
| 8         | Bleaching                    | E.R. Trotman   |

Course Name : Diploma in Textile Manufactures Course Code : TX Semester : Fourth Subject Title : Professional Practices-II Subject Code : 17054

**Teaching and Examination Scheme:** 

| Teaching Scheme |    |    | Examination Scheme |    |    |    |     |       |
|-----------------|----|----|--------------------|----|----|----|-----|-------|
| TH              | TU | PR | PAPER<br>HRS.      | TH | PR | OR | TW  | TOTAL |
|                 |    | 03 |                    |    |    |    | 50@ | 50    |

### **Rationale:**

Most of the diploma holders join industries for jobs. Due to globalization and competition in the industrial and service sectors the selection for the job is based on campus interviews or competitive tests.

While selecting candidates a normal practice adopted is to see general confidence, ability to communicate and their attitude, in addition to basic technological concepts.

The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

### **Objectives:**

Student will be able to:

- 1. Acquire information from different sources.
- 2. Prepare notes for given topic.
- 3. Present given topic in a seminar.
- 4. Interact with peers to share thoughts.
- 5. Prepare a report on industrial visit, expert lecture.

| Serial<br>No. | Activities                                                                      |     |  |  |  |  |  |
|---------------|---------------------------------------------------------------------------------|-----|--|--|--|--|--|
| 1100          | Industrial Visits                                                               |     |  |  |  |  |  |
|               | Structured industrial visits be arranged and report of the same shall be        |     |  |  |  |  |  |
| 1             | submitted by the individual student, to form a part of the term work.           | 16  |  |  |  |  |  |
| 1             | The industrial visits may be arranged in the following areas / industries :     |     |  |  |  |  |  |
|               | Spinning /Weaving / wet processing/ garment/Knitting                            |     |  |  |  |  |  |
|               | Lectures by Professional / Industrial Expert Lectures to be organized           |     |  |  |  |  |  |
|               | from any two of the following areas:                                            |     |  |  |  |  |  |
|               | 1) Interview Techniques.                                                        |     |  |  |  |  |  |
|               | 2) Modern Ring frame                                                            |     |  |  |  |  |  |
| 2             | 3) Applications of Sensors and Transducers in Textiles                          | 08  |  |  |  |  |  |
|               | 4) Different methods of Yarn manufacturing other than ring spinning             |     |  |  |  |  |  |
|               | 5) Latest developments in weaving machines                                      |     |  |  |  |  |  |
|               | 6) Other related topics                                                         |     |  |  |  |  |  |
|               | Information Search:                                                             |     |  |  |  |  |  |
|               | Information search can be done through manufacturer's catalogue, websites,      |     |  |  |  |  |  |
|               | magazines, books etc. and submit a report any one topic.                        |     |  |  |  |  |  |
|               | Following topics are suggested :                                                |     |  |  |  |  |  |
|               | 1) Lubricants & additives                                                       |     |  |  |  |  |  |
|               | 2) Humidification and air conditioning in textile mills                         |     |  |  |  |  |  |
|               | 3) Illumination in textile mill                                                 |     |  |  |  |  |  |
| 3             | 4) Technical features of Spinning preparatory and spinning machineries          | 12  |  |  |  |  |  |
|               | 5) Technical features of weaving preparatory and weaving machineries            |     |  |  |  |  |  |
|               | 6) Technical features of garment manufacturing machineries                      |     |  |  |  |  |  |
|               | 7) Specialty textiles                                                           |     |  |  |  |  |  |
|               | 8) Intelligent textiles                                                         |     |  |  |  |  |  |
|               | 9) Different drives/Transmission systems in textile machines.                   |     |  |  |  |  |  |
|               | 10) Types of bearings – applications and suppliers.                             |     |  |  |  |  |  |
|               | 11) Solar equipment and lighting systems in textiles                            |     |  |  |  |  |  |
|               | Seminar:                                                                        |     |  |  |  |  |  |
|               | Seminar topic shall be related to the subjects of fourth semester. Each student | 4.5 |  |  |  |  |  |
| 4             | shall submit a report of at least 10 pages and deliver a seminar (Presentation  |     |  |  |  |  |  |
|               | time - 10 minutes)                                                              |     |  |  |  |  |  |
|               | Total                                                                           | 48  |  |  |  |  |  |

Course Name : Diploma in Textile Manufactures Course Code : TX Semester : Fourth Subject Title : Professional Practices-II Subject Code : 17055

**Teaching and Examination Scheme:** 

| <b>Teaching Scheme</b> |    |    | Examination Scheme |    |    |    |    |       |
|------------------------|----|----|--------------------|----|----|----|----|-------|
| TH                     | TU | PR | PAPER<br>HRS.      | TH | PR | OR | TW | TOTAL |
|                        |    | ** |                    |    |    |    |    |       |

**\*\* Industrial training for six weeks to be completed during summer break after Fourth semester.** Assessment to be done in Fifth Semester

### **Objectives:**

- Experience the industrial environment for textile industrial processes, equipment & practices.
- Collect data about Plant lay out, equipment and machines-specifications and working available in different sections and collect data.
- Experience operation of machines and process parameters of spinning and weaving departments for the target production and collect data.
- Appreciate factory utilities power water illumination men and material movement, pollution control, industrial safety etc.
- Carryout the material testing at different stages of yarn and fabric production for quality.
- Experience maintenance schedules of all the equipment and collect information on the effects of negligence of maintenance.
- Diagnose problems and find solutions to problems related with operation, and maintenance of equipment.
- Study the organization structure, job description, job specifications, promotional schemes, motivational strategies,etc.
- Collect data on production incentives, methods study and time & motion studies.
- Critical study of all activities with a view to find the areas for improvement.
- Devise solution to problem areas.
- Collect information / data for project work and seminars.

However, the detailed list of areas of study, working and data collection has been prepared and is enclosed in **3.5** – **Specific area of study and working.** The student should regularly refer to this list and accordingly choose the areas and acquire the knowledge information and skills.



- The students have to undergo industrial training in spinning and or weaving departments for 6 weeks in between fourth and fifth semesters.
- The student has to maintain a daily diary, in which they will record the daily achievements, which should be countersigned by the industry officer.
- The student should carry out the critical study of different activities and try to locate the problem or problems in any of the areas of product quality, productivity, efficiency, cost control and cost reduction, etc. Then, he should try to devise solutions to such problem.
- After completion of training each student has to bring the certificate for the entire duration for satisfactory completion of training.
- The student will be required to submit a report in handwritten, which will be properly bound.
- The students will be examined through viva-voce by the internal and external examiners. (The external examiner should be from industry).

### **3.3 Maintenance of Daily Diary**

The students are required to maintain a daily diary, regularly in systematic manner. After the completion of day's work the important information is recorded clearly as per the instructions of section in charge and get it signed daily by him. Write in brief about observations made, daily work problems / project/s undertaken, discussion held, instructions given by section in charge, literature consulted, data etc.

### 3.4 Evaluation of daily diary

Term work assessment is based on daily diary maintenance, attendance, remarks of industry. Term-work Marks will be given on the basis of evidence of diary maintenance, adequacy and quality of record.

### 3.5 Specific areas of study and working: -

Students are required to collect the relevant information on the specific area given below. This information should be recorded in daily diary and further used in preparing the Final Report.

### (a) General Information

Name of the Mill, Address and year of establish. No. of spindles-warp, weft, Doubling and Total. No. of loom-Non automatic, Automatic, Shuttle less, Total Yarn counts spun, ..... Warp. Weft. Average count of the Spg. Dept..... Shift wise No. of workers-Spinning, weaving processing, Engineering, General, Time office, Technical staff. No. Of workers per 1000 spindles. No. Of workers per 100 looms. No. Of preparations in spinning. Mill Building-type Roof plan. No. Of sorts running. Quantity of cotton consumed per month in kg. Quantity of yarn produced in kg. Per month Quantity of fabrics produced in sq. meters. Quantity of fabrics exported in sq. meters. Types of finishes given Note on Quality Control, Research and Development. Plan of various department, Showing general layout of the departments. Welfare schemes for Workers And staff.

17055 TX4

Safety measures provided.

### (b) Spinning

### i) Mixing & Blow-Room

- 1. Layout plan, lighting scheme and fire prevention method.
- 2. Handling and transportation of bales.
- 3. Temperature and Humidity.
- 4. Mixings (if possible) Type and Cotton used, Assessment of staple lengths, trash content.
- 5. Wastes (in details) with resale realization rate & disposal.
- 6. Speeds and settings of various beaters.
  - i) Vertical ii) Horizontal iii) Modern openers, production of various machines, line diagram of the processing sequence for the mixing adopted in the mills.
- 1 Cleaning points for various mixings, Blows per inch, (Adopted for processing a particular mixing)
- 2 Productive and ancillary workers, shift wise.
- 3 Lap wt. Wrapping, wt/Yd tolerance limit, lap rejection percent.
- 4 Machinery maintenance programme-Charts.
- 5 Quality control programme charts, warping stds.
- 6 Operative hours and machine hours per 100 kg.
- 7 Other particulars, if any.
- 8 No of bales consumed and the weight of cotton used.

### ii) Carding

- 1. Layout plan, lighting scheme and fire prevention methods.
- 2. Materials handling Quality and mode.
- 3. Temperature and Humidity.
- 4. Speeds of various parts, like cylinder, licker in, doffer, flats doffer: mb, stripping rollers Grinders Rollers (fast and slow)
- 5. Hank of lap fed and hank of card sliver.
- 6. Draft constant and production constant of card.
- 7. Settings of card, size of the can.
- 8. Waste extracted (details) and Disposal of waste.
- 9. Frequency of stripping grinding flat grinding, Burnishing, re-clothing.
- 10. Shift wise productive and ancillary workers.
- 11. Production per hour Operative hours and machine hours per 100 kg.
- 12. Metallic card clothing and its information ( if any)
- 13. Semi high production and high production card (note)
- 14. Maintenance schedule.
- 15. Quality control scheme-charts-wrapping stds,
- 16. Can size and special features fitted on a card.

### iii) Draw Frame

- 1. Layout plan lighting scheme, fire prevention methods.
- 2. Temp, humidity and materials handing.
- 3. No of draw frames, No. of passages package size No. of deliveries for each mixings.
- 4. Drafting systems for a draw frame.
- 5. Sliver hank and Wt. Tolerance limits, can size.
- 6. Speed of F.R. of draw frame, Production / Delivery / hour.
- 7. Hank of sliver fed and sliver delivered.
- 8. Setting of different rollers.
- 9. Production-operative hours and machine hour per 100 kg.
- 10. Shift wise productive and ancillary labour.
- 11. Maintenance schedule.

#### MSBTE - Final Copy Dt. 30/08/2013

#### 17055 TX4

- 12. Quality control scheme and chart, wrapping stds.
- 13. Special features (if any)

### iv) Slubber, Inter, Roving Frames:

- 1. Layout plan, lighting, humidity and materials, handling.
- 2. No. of slubber, inter and roving frames and spindles each preparation.
- 3. Spindle speeds.
- 4. Twist multiple and T.P.I. used for each preparation,
- 5. Drafts, hank-fed and hank delivered,
- 6. Production in Hanks / spindle / 8 hours.
- 7. Drafting systems, can size, roving bobbin size.
- 8. No. of teeth on change wheels. (Like draft change wheel, twist wheel lay gear wheel etc.)
- 9. Top arm weighting arrangement systems.
- 10. Machinery maintenance schedule, roller, covering, scouring spindle roller setting and gauges used for different cottons, oiling schedule.
- 11. Shift wise number of productive and ancillary workers.
- 12. Production per 8 hours, operative hours of machine hours per 100 kg. of production.
- 13. Breakage rate, waste details, doffing time and No. of persons for doffing.
- 14. Quality control programme, control chart used wrapping stds.
- 15. Duties of various persons.
- 16. Threading methods used for Back and Front few bobbin.

### v) Combers

- 1. Layout of combing dept.
- 2. No. of sliver lap Ribbon lap comber type and make.
- 3. Machine particulars and processing particulars, hank of sliver draft No. of doublings.
- 4. Production of sliver lap. Ribbon lap (lap size and lap weight and comber
- 5. Comber settings for different preparations.
- 6. Speed of sliver lap. Ribbon lap and combers (nips)
- 7. Waste percent foe different preparation.
- 8. Waste percent for different preparations.
- 9. Quantity of waste obtained and waste realization price and disposal of waste.
- 10. R.H. Temp. Lighting arrangement, material transport.
- 11. Note on high production comber (if any)
- 12. Quality Control programme- wrapping Standards.
- 13. Shift wise number of productive and ancillary workers.
- 14. Special feature, if any.

### vi) Ring Frame Department

- 1. Layout of plan, lighting arrangement, humidification
- 2. No. of warp and weft ring frame with spindles / frame.
- 3. Spindle speeds, front roller speed, twist constant, draft constant, drafting arrangement
- 4. TPI Draft (back and front Zone) Twist factors used traveled.
- 5. Hank of sliver fed and counts spun.
- 6. Net weight / bobbin, per doff per operative, per hour
- 7. Production per frame per 8 hours operative hours and hours.
- 8. Yarn breakage rate, detail study of yarn breaks, Calculation of breaks / 100 spindle hours
- 9. Shift wise No. of productive and ancillary workers.
- 10. R.H. and temp
- 11. Quality control programme.
- 12. Machinery maintenance programme oiling, schedule, spindle gauge schedule spindle oil used.
- 13. Wrapping standards, yarn count, yarn strength, CSP and U% or C.V.% values for all counts.

#### **Summary Of Spinning Section**

Production in Hanks per frame and gms./spindle.

MSBTE - Final Copy Dt. 30/08/2013



## 

| Sequence | Hank Count | Ends<br>Doubled | Draft<br>T | Speed<br>PI | spindles per 8<br>hrs<br>hank/labs kg. |  |
|----------|------------|-----------------|------------|-------------|----------------------------------------|--|
|          |            |                 |            |             |                                        |  |

Similar information should be tabulated for other mixing and counts.

### Labour Organisation

| Deptt         | I Shift                 | II Shift                 | III Shift               |             |
|---------------|-------------------------|--------------------------|-------------------------|-------------|
|               | Productive<br>Ancillary | Productive<br>Ancillary  | Productive<br>Ancillary | Grand Total |
| Mixing & Blow |                         |                          |                         |             |
| Room to Ring  |                         |                          |                         |             |
| Frame         |                         |                          |                         |             |
| Total         |                         |                          |                         |             |
|               |                         | <b>Maintenance Staff</b> |                         |             |
| Department    | I Shift                 | II Shift                 | III Shift               | Total       |

Maintenance schedule – as followed in the Mill. (Department – wise date)

### (c) WEAVING

### i) Warp & weft winding

- 1. Layout plan, Lighting scheme, humidification and fire prevention installations.
- 2. Temp. and humidity maintained, materials handling.
- 3. Types of warp winding machines, their speed in meters per counts, worked, slub catcher settings, tensions, used, Eff. and H.P. required.
- 4. Spindles per operative (count-wise)
- 5. Production per operative (count-wise)
- 6. Breakage rate per 100 bobbins.
- 7. Yarn content of cones or cheeses in kg.
- 8. Tailing percentage (for B.C spooler)
- 9. Types of knots.
- 10. Quantity of waste obtained and waste realisation price and disposal of waste.
- 11. Operations to be performed by operatives.
- 12. Preparation for cheese dyeing (Note)
- 13. Preparation for weft re-winding.
- 14. Study of ribbon breaking, unwinding accelerator.
- 15. Maintenance schedule.
- 16. Quality control programme (if any)
- 17. Shift wise productive and ancillary labour.

#### ii) Warping

- 1. Layout lighting, humidification and fire prevention scheme.
- 2. Types of warping machines.
- 3. Types of creels their capacities and special features.
- 4. Speed and break application.
- 5. Beam dimensions and yarn content in metres or in kg.
- 6. Production per shift of 8 hrs. (Count wise)
- 7. Breakage rate per 400 ends per 1000 metres (Count wise).
- 8. Shift wise productive and ancillary labour.

#### iii) Sizing

- 1. Types of machines (2 Cylinder, Hot-air, multi cylinder)
- 2. Average sizing speed,
- 3. Drying capacity in kg / Hr.
- 4. Expected and actual production in kg.
- 5. Efficiency.
- 6. Special features and controls fitted on the sizing M/c.
- 7. Shift wise productive and ancillary layout.
- 8. Size recipes for different size-mix
- 9. Method of preparation of a size-mix
- 10. Cost of Size-mix material per kg.

#### iv) Drawing- In

- 1. Average No. of ends drawn/shift/operative for plain sorts, for drill sorts, for dobby sorts.
- 2. Particulars about drawing in and knotting machine. There production rate.
- 3. Labour complement shift wise (i) Productive (ii) Ancillary

#### v) Weaving Shed

- 1. Types of looms-width of the looms-Reed space available.
- 2. Jobber-wise allocation of looms.
- 3. Shift wise labour complement (i) Productive (ii) Ancillary
- 4. Duties of ancillary workers
- 5. Sort particulars.
- 6. Sort No
- 7. Name of the fabric
- 8. Finish given
- 9. Finished state Dimensions (i) width (ii) Length
- 10. Grey state Dimensions (i) width (ii) Length
- 11. Reed space in cms. Or inches.
- 12. Tape length in metres or yards.
- 13. Pick per cm. Or inch.
- 14. Reed count
- 15. Total selvedge ends.
- 16. Total ends.
- 17. Size % on warp weight
- 18. Count of warp yarn
- 19. Count of weft yarn
- 20. Count of selvedge yarn
- 21. Loom width in inches
- 22. Loom speed in R.P.M
- 23. Expected efficiency
- 24. Production in metres or yards / shift
- 25. Warp yarn required with waste allowance / per shift
- 26. Weft yarn required with waste allowance / per shift

#### MSBTE - Final Copy Dt. 30/08/2013

#### 17055 TX4

- 27. Selvedge yarn required with waste allowance / per shift
- 28. Mixed counts working on looms.

#### vi) Automatic Weaving (if available)

- 1) Sorts worked and their particulars in the above manner
- 2) Organisation of auto-looms section.
  - a) No of looms to a weaver with reference to width and type of auto loom.
  - b) No of looms to jobber
  - c) No of looms to Batter filler
  - d) No of looms to smash hand
  - e) No of looms to Oiler, helper, cleaner
  - f) Breakage rate study on some sorts
  - g) Wages paid to different categories of workers.
  - h) Layout of looms and humidification and lighting and ventilation system.
  - i) Quality control programme.
  - j) Different type of wastes.
  - k) Jobber and their work load duties.
- 3) Breakage rate study on all types of sorts possible.
- 4) Note on shuttle less loom (if existing)

#### **Summary of Labour Organisation**

| Deptt | I Shift    | II Shift | III Shift |       |
|-------|------------|----------|-----------|-------|
|       | Productive | P.A.     | P.A.      | Total |
|       | Ancillary  |          |           |       |

#### vii) Grey Room

- 1. Inspection of Goods
- 2. Classification of Faults
- 3. Grey room Record
- 4. Stitching of Goods for preparing lots
- 5. Give particulars of goods in Grey Room
- 6. How are the stains removed?
- 7. What are the other corrective processes carried out in Grey room
- 8. No of workers in Grey room and there functions
- 9. How are the grey goods assessed for faults?
- 10. How is the ink prepared?
- 11. Lay out of grey room
- 12. No of Stitching machine
- 13. Manufacturers of Stitching machine
- 14. Particulars of Thread Used in stitching machine with reference to fibre composition count etc.
- 15. Design of Observation tables
- 16. No of Supervisors per Shift.

#### (d) Testing and Quality Control

- 1. Layout plan, lighting scheme, fire prevention methods.
- 2. Temperature, humidity, air-conditioning & its effects on fibre properties.
- 3. Sampling techniques used for testing fibres, yarn & fabric.
- 4. Fibre length, fineness, maturity & strength determination, equipment & methods.
- 5. Selection of mechanical process in Spinning depending upon fibre parameters.
- 6. Evenness testing of lap, sliver & roving and suggestions for corrective measures.
- 7. Yarn Count, Twist, Strength determination, equipment & methods.

#### MSBTE - Final Copy Dt. 30/08/2013

#### 17055 TX4

- 8. Evenness & hairiness testing of yarn & suggestions for corrective measures.
- 9. Fabric testing & inspection.
- 10. Other testing such as trash content in cotton, nep count, waste percentage, cleaning efficiency etc.
- 11. Synchronisation of Quality Control with Maintenance activities.

#### (e) Costing

The following information can be gathered, **if possible**. If the management is reluctant to supply the information, do not insist upon.

- 1. Raw cotton cost for different types of wastes.
- 2. Waste realisation prices for different types of wastes.
- 3. Wages and fringe benefits given to the worker of various department.
- 4. Method of depreciation used for cost purpose.
- 5. Administrative charge percentage.
- 6. Selling expenses charges per kg or per Yd.
- 7. Spindle, Shift OH charges for different counts.
- 8. Selling price of yarn cost per kg. (if the yarn is sold to out side parties)
- 9. Waste multipliers for different mixings.
- 10. Loom shift OH charges for different mixings.
- 11. Method of costing.
- 12. Fabric cost sheet for some sorts.
- 13. Wages for the time rate workers in each department.
- 14. Wages for the piece rate workers in each department.

#### **CRITICAL STUDY**

Can you suggest ways to improve the operational deficiency and organisational technique, considering first each department you have studied separately and then collectively? Your suggestions may be based on (a) Material handling procedures, (b) Quality control programme (c) Maintenance schedules. (d) Production improvement techniques, (e) Quality improvement

Technique.

w.e.f Academic Year 2012-13

'G' Scheme

WITH EFFECT FROM 2012-13

**DURATION : 16 WEEKS** 

SCHEME : G

## MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI

### TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES

### COURSE NAME : DIPLOMA IN AUTOMOBILE ENGINEERING

**COURSE CODE : AE** 

### **DURATION OF COURSE : 6 SEMESTERS**

### **SEMESTER : FOURTH**

### PATTERN : FULL TIME - SEMESTER

|           |                                                                                                     |                  |             |    | TEACHING |    | EXAMINATION SCHEME |      |     |      |     |      |     |     |     |               |
|-----------|-----------------------------------------------------------------------------------------------------|------------------|-------------|----|----------|----|--------------------|------|-----|------|-----|------|-----|-----|-----|---------------|
| SR.<br>NO | SUBJECT TITLE                                                                                       | Abbrev<br>iation | SUB<br>CODE |    | SCHEME   |    | PAPER              | ТН   | (1) | PR   | (4) | OR   | (8) | TW  | (9) | SW<br>(17400) |
| 110       |                                                                                                     | lution           | CODE        | ТН | TU       | PR | HRS.               | Max  | Min | Max  | Min | Max  | Min | Max | Min | (17400)       |
| 1         | Environmental Studies \$                                                                            | EST              | 17401       | 01 |          | 02 | 01                 | 50#* | 20  |      |     |      |     | 25@ | 10  |               |
| 2         | Automobile Manufacturing<br>Processes                                                               | AMP              | 17403       | 03 |          | 02 | 03                 | 100  | 40  |      |     |      |     | 25@ | 10  |               |
| 3         | Heat Power Engineering                                                                              | HPE              | 17407       | 03 |          | 02 | 03                 | 100  | 40  |      |     | 25 # | 10  | 25@ | 10  |               |
| 4         | Automobile Engines                                                                                  | AEN              | 17408       | 03 |          | 04 | 03                 | 100  | 40  | 50#  | 20  |      |     | 25@ | 10  | 50            |
| 5         | Automobile Systems and Body<br>Engineering                                                          | ASB              | 17409       | 03 |          | 02 | 03                 | 100  | 40  | 25 # | 10  |      |     | 25@ | 10  |               |
| 6         | Theory of Machines β                                                                                | TOM              | 17412       | 03 |          | 02 | 03                 | 100  | 40  |      |     |      |     | 25@ | 10  |               |
| 7         | Professional Practices-II                                                                           | PPT              | 17035       |    |          | 02 |                    |      |     |      |     |      |     | 50@ | 20  |               |
|           |                                                                                                     |                  | TOTAL       | 16 |          | 16 | -                  | 550  |     | 75   |     | 25   |     | 200 |     | 50            |
| **        | * Industrial Training (Optional) Examination in 5 <sup>th</sup> Semester Professional Practices-III |                  |             |    |          |    |                    |      |     |      |     |      |     |     |     |               |

Student Contact Hours Per Week: 32 Hrs.

### THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.

Total Marks: 900

@ - Internal Assessment, # - External Assessment, No Theory Examination, \$ - Common to all branches, #\* - Online Examination,

 $\beta$  - Common to ME, PG, PT, MH, MI

Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work

\*\* Industrial Training (Optional) - Student can undergo Industrial Training of four weeks after fourth semester examination during summer vacation.

Assessment will be done in Fifth semester under Professional Practices-III. They will be exempted from activities of Professional Practices-III of 5<sup>th</sup> Semester.

- Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subjects is to be converted out of 50 marks as sessional work (SW).
- > Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.
- Code number for TH, PR, OR, TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.

#### Course Name : All Branches of Diploma in Engineering & Technology

## Course Code : AE/CE/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG/AU

Semester : Fourth

Subject Title : Environmental Studies

Subject Code : 17401

**Teaching and Examination Scheme:** 

| Teac | ching Scl | heme |              |      | Examinati | on Scheme |     |       |
|------|-----------|------|--------------|------|-----------|-----------|-----|-------|
| TH   | TU        | PR   | PAPER<br>HRS | TH   | PR        | OR        | TW  | TOTAL |
| 01   |           | 02   | 01           | 50#* |           |           | 25@ | 75    |

### **#\* Online Theory Examination**

NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

### **Rationale:**

Environment essentially comprises of our living ambience, which gives us the zest and verve in all our activities. The turn of the twentieth century saw the gradual onset of its degradation by our callous deeds without any concern for the well being of our surrounding we are today facing a grave environmental crisis. The unceasing industrial growth and economic development of the last 300 years or so have resulted in huge ecological problems such as overexploitation of natural resources, degraded land, disappearing forests, endangered species, dangerous toxins, global warming etc.

It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

The curriculum covers the aspects about environment such as Environment and Ecology, Environmental impacts on human activities, Water resources and water quality, Mineral resources and mining, Forests, etc.

General Objectives: The student will be able to,

- 1. Understand importance of environment
- 2. Know key issues about environment
- 3. Understands the reasons for environment degradation
- 4. Know aspects about improvement methods
- 5. Know initiatives taken by the world bodies to restrict and reduce degradation

### **Learning Structure:**



## Theory:

| Topic and Contents                                                                                                                      | Hours | Marks |
|-----------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
| Topic 1: Nature of Environmental Studies                                                                                                |       |       |
| Specific Objectives:                                                                                                                    |       |       |
| Define the terms related to Environmental Studies                                                                                       |       |       |
| State importance of awareness about environment in general public                                                                       | 01    | 04    |
| Contents:                                                                                                                               | 01    | 04    |
| • Definition, Scope and Importance of the environmental studies                                                                         |       |       |
| Importance of the studies irrespective of course                                                                                        |       |       |
| <ul> <li>Need for creating public awareness about environmental issues</li> </ul>                                                       |       |       |
| <b>Topic 2: Natural Resources and Associated Problems</b>                                                                               |       |       |
| Specific Objectives:                                                                                                                    |       |       |
| Define natural resources and identify problems associated with<br>them                                                                  |       |       |
| Literin                                                                                                                                 |       |       |
| <ul> <li>Identify uses and their overexploitation</li> <li>Identify alternate resources and their importance for environment</li> </ul> |       |       |
| Contents.                                                                                                                               |       |       |
| 2.1 Renewable and Non renewable resources                                                                                               |       |       |
| Definition                                                                                                                              |       |       |
| Associated problems                                                                                                                     |       |       |
| 2.2 Forest Resources                                                                                                                    |       |       |
| General description of forest resources                                                                                                 |       |       |
| Eulerian description of forest resources                                                                                                |       |       |
| <ul> <li>Effects on environment due to deforestation. Timber</li> </ul>                                                                 |       |       |
| extraction. Building of dams, waterways etc.                                                                                            |       |       |
| 2.3 Water Resources                                                                                                                     | 04    | 10    |
| • Hydrosphere: Different sources of water                                                                                               |       |       |
| • Use and overexploitation of surface and ground water                                                                                  |       |       |
| • Effect of floods, draught, dams etc. on water resources and                                                                           |       |       |
| community                                                                                                                               |       |       |
| 2.4 Mineral Resources:                                                                                                                  |       |       |
| Categories of mineral resources                                                                                                         |       |       |
| Basics of mining activities                                                                                                             |       |       |
| • Mine safety                                                                                                                           |       |       |
| • Effect of mining on environment                                                                                                       |       |       |
| 2.5 Food Resources:                                                                                                                     |       |       |
| • Food for all                                                                                                                          |       |       |
| • Effects of modern agriculture                                                                                                         |       |       |
| World food problem                                                                                                                      |       |       |
| Topic 3. Ecosystems                                                                                                                     |       |       |
| Concept of Ecosystem                                                                                                                    |       |       |
| Structure and functions of ecosystem                                                                                                    | 01    | 04    |
| • Energy flow in ecosystem                                                                                                              |       |       |
| Major ecosystems in the world                                                                                                           |       |       |
| Topic 4. Biodiversity and Its Conservation                                                                                              |       |       |
| Definition of Biodiversity                                                                                                              | 02    | 06    |
| • Levels of biodiversity                                                                                                                |       |       |

| • Value of biodiversity                                                                       |    |    |
|-----------------------------------------------------------------------------------------------|----|----|
| Threats to biodiversity                                                                       |    |    |
| Conservation of biodiversity                                                                  |    |    |
| <b>Topic 5. Environmental Pollution</b>                                                       |    |    |
| • Definition                                                                                  |    |    |
| • Air pollution: Definition, Classification, sources, effects,                                |    |    |
| prevention                                                                                    | 03 | 08 |
| <ul> <li>Water Pollution: Definition, Classification, sources, effects, prevention</li> </ul> | 05 | 00 |
| • Soil Pollution: Definition, sources, effects, prevention                                    |    |    |
| • Noise Pollution: Definition, sources, effects, prevention                                   |    |    |
| Topic 6. Social Issues and Environment                                                        |    |    |
| Concept of development, sustainable development                                               |    |    |
| • Water conservation, Watershed management, Rain water                                        | 03 | 10 |
| harvesting: Definition, Methods and Benefits                                                  |    |    |
| Climate Change, Global warming, Acid rain, Ozone Layer                                        | 05 | 10 |
| Depletion, Nuclear Accidents and Holocaust: Basic concepts                                    |    |    |
| and their effect on climate                                                                   |    |    |
| Concept of Carbon Credits and its advantages                                                  |    |    |
| Topic 7. Environmental Protection                                                             |    |    |
| Brief description of the following acts and their provisions:                                 |    |    |
| Environmental Protection Act                                                                  |    |    |
| • Air (Prevention and Control of Pollution) Act                                               |    |    |
| • Water (Prevention and Control of Pollution) Act                                             | 02 | 08 |
| Wildlife Protection Act                                                                       | 02 | 00 |
| Forest Conservation Act                                                                       |    |    |
| Population Growth: Aspects, importance and effect on                                          |    |    |
| environment                                                                                   |    |    |
| Human Health and Human Rights                                                                 |    |    |
| Total                                                                                         | 16 | 50 |

### Practical: Skills to be developed:

### **Intellectual Skills**:

- 1. Collection of information, data
- 2. Analysis of data
- 3. Report writing

### Motor Skills:

- 1. Presentation Skills
- 2. Use of multi media

### List of Projects:

Note: Any one project of the following:

- 1. Visit to a local area to document environmental assets such as river / forest / grassland / hill / mountain
- 2. Visit to a local polluted site: Urban/Rural/Industrial/Agricultural
- 3. Study of common plants, insects, birds

4. Study of simple ecosystems of ponds, river, hill slopes etc

Prepare a project report on the findings of the visit illustrating environment related facts, analysis and conclusion. Also suggest remedies to improve environment.

Learning Resources: Books:

| Sr.<br>No. | Author                                                | Title                                        | Publisher               |  |  |
|------------|-------------------------------------------------------|----------------------------------------------|-------------------------|--|--|
| 01         | Anindita Basak                                        | Environmental Studies                        | Pearson Education       |  |  |
| 02         | R. Rajgopalan                                         | Environmental Studies<br>from Crises to Cure | Oxford University Press |  |  |
| 03         | Dr. R. J. Ranjit Daniels, Dr.<br>Jagdish Krishnaswamy | Environmental Studies                        | Wiley India             |  |  |

Course Name : Diploma in Automobile Engineering Course Code : AE Semester : Fourth Subject Title : Automobile Manufacturing Processes Subject Code : 17403

### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |     | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|-----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH  | PR        | OR        | TW  | TOTAL |
| 03              |    | 02 | 03           | 100 |           |           | 25@ | 125   |

### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)

### **Rationale:**

Automobile manufacturing processes is a core technological subject. With advent of technology there are many advances in manufacturing processes and equipments. The knowledge of these advances is essential for a diploma student engaged in manufacturing organizations. Students should be able to write and apply CNC programs in manufacturing industry.

### **General Objectives:**

Student will be able to,

- > Know the forging process and it's use in manufacturing automobile parts.
- ▶ Know the different press tools and their operations.
- > Understand different welding processes used in industry.
- > Selection and applications of different surface cleaning and coating processes
- ➤ Know the different methods of surface finishing.
- ▶ Know about sub-systems of CNC machines and write CNC programs.

### **Learning Structure:**



### Theory

| Topic and Contents                                                                                                                                | Hours | Marks |
|---------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
| 1: Forging 16 Marks                                                                                                                               |       |       |
| Specific Objectives:                                                                                                                              |       |       |
| Understand forging processes and their applications                                                                                               |       |       |
| Contents:                                                                                                                                         |       |       |
|                                                                                                                                                   |       |       |
| 1.1Introduction:08 Marks                                                                                                                          | 06    | 16    |
| • Forgeable materials and forgeability                                                                                                            |       |       |
| Classification of forging processes                                                                                                               |       |       |
| <ul> <li>Advantages and limitations of forging processes</li> </ul>                                                                               |       |       |
| 1.2Forging sequences for Auto components-08 Marks                                                                                                 |       |       |
| Connecting rods, Crankshafts, Camshafts and Spanners                                                                                              |       |       |
| 2: Press and press work 24 Marks                                                                                                                  |       |       |
| Specific Objectives:                                                                                                                              |       |       |
| Know the press operations and their applications                                                                                                  |       |       |
| Contonts                                                                                                                                          |       |       |
| 2.1 Introduction <b>08 Marks</b>                                                                                                                  |       |       |
| Materials used in press work for automobile applications                                                                                          |       |       |
| <ul> <li>Materials used in press work for automobile applications.</li> <li>Classifications of presses and terminology used in presses</li> </ul> |       |       |
| Classifications of presses and terminology used in presses                                                                                        | 12    | 24    |
| • Major parts of Fly press                                                                                                                        |       |       |
| Derts of standard die set                                                                                                                         |       |       |
| <ul> <li>Parts of standard die set</li> <li>Die accessories Dilets Stong Strippers Dressure neds and Knock outs</li> </ul>                        |       |       |
| • Die accessories- Fliots, Stops, Suppers, Flessure paus and Knock outs<br>• Types and construction of diag. Simple, progressive                  |       |       |
| • Types and construction of dies—simple, progressive,                                                                                             |       |       |
| 2.3 Press operations. 04 Marks                                                                                                                    |       |       |
| Blanking niercing bending drawing                                                                                                                 |       |       |
| 3: Welding processes 16 Marks                                                                                                                     |       |       |
| Specific Objectives:                                                                                                                              |       |       |
| Know various welding operations and their applications                                                                                            |       |       |
|                                                                                                                                                   |       |       |
| Contents:                                                                                                                                         |       |       |
| 3.1 Introduction 04 Marks                                                                                                                         | 08    | 16    |
| <ul> <li>Classification and selection of welding process.</li> </ul>                                                                              |       |       |
| <ul> <li>Working principle of Gas welding and types of flames.</li> </ul>                                                                         |       |       |
| 3.2 Arc welding process <b>08 Marks</b>                                                                                                           |       |       |
| • Metal arc, TIG and MIG                                                                                                                          |       |       |
| 3.3 Resistance welding, Brazing and soldering 04 Marks                                                                                            |       |       |
| 4: Surface treatment and finishing processes 10 Marks                                                                                             |       |       |
| Specific Objectives:                                                                                                                              |       |       |
| Know various surface cleaning, coating and finishing operations.                                                                                  |       |       |
| Contents:                                                                                                                                         |       |       |
| 4.1 Surface cleaning and coating processes 06 Marks                                                                                               | 04    | 10    |
| • Surface cleaning processes- acid alkaline electrolytic cleaning blasting                                                                        |       |       |
| and tumbling                                                                                                                                      |       |       |
| • Metallic surface coating- Electroplating, Galvanizing and metal spraving                                                                        |       |       |
| 4.2 Surface finishing processes 04 Marks                                                                                                          |       |       |

| Tot                                                               | al 48 | 100 |
|-------------------------------------------------------------------|-------|-----|
| Milling.                                                          |       |     |
| CNC and VMC for operations like turning, drilling and             |       |     |
| • Simple Part programming as per ISO codes on                     |       |     |
| • ISO Codes used in programming                                   |       |     |
| • Procedure for developing the Part program                       | 10    | 18  |
| • Axes configuration- X, Y and Z axes.                            | 10    | 10  |
| Content :                                                         |       |     |
| > Understand and write CNC part programming                       |       |     |
| Specific Objectives:                                              |       |     |
| 6. CNC Part programming 18 Marks                                  |       |     |
| Absolute and Incremental Co-ordinate system.                      |       |     |
| <ul> <li>Type of tools used on turning center and VMC.</li> </ul> |       |     |
| <ul> <li>Advantages and disadvantages of CNC machines.</li> </ul> |       |     |
| Classification of CNC machines.                                   |       |     |
| Working principle of CNC machines.                                |       |     |
| • Difference between conventional machines and CNCs.              | 08    | 16  |
| NC and CNC Machines.                                              |       |     |
| Contents:                                                         |       |     |
| Know the basic components of CNC machines and tools.              |       |     |
| Specific Objectives:                                              |       |     |
| 5: Introduction to CNC machines 16 Marks                          |       |     |
| applications, advantages and limitations.                         |       |     |
| • Lapping, honing, super finishing, buffing, burnishing and their |       |     |
|                                                                   |       |     |

### Practical:

Skills to be developed:

### Intellectual Skills:

- 1. Understand the different types of press and welding components.
- 2. Know the different types of programming codes

### **Motor Skills:**

- 1. To prepare given job on milling machine.
- 2. To use press machine to produce various auto components
- 3. To prepare job by welding process
- 4. To produce a job on CNC turning center

### List of Practicals:

- 1. One job involving different milling machine operations such as key way cutting, gear cutting by indexing in a batch of 2 students.
- 2. One press work job involving operations like blanking, piercing and drawing. (Job should be selected from market utility).
- 3. One resistance welding job to show the working principle of resistance welding. Calculate current and time required for completion of a resistance welding job.
- 4. One simple part programming job on CNC machine. One job on CNC lathe having plain turning, taper turning, step turning, threading, boring and grooving (Batch of 2 students).

OR

One job on CNC milling having following operations – face milling, slotting, contour machining (Batch of 2 students)

5. Industrial visit shall be arranged to demonstrate different Milling machines, grinding machines, CNC machines, forging operations, press operations, Surface treatment and surface finishing processes. Write a report.

# Note: Different machine tools and operations may be shown during industrial visits arranged under Professional Practices -IV

### List of Assignments:

- 1. ISO codes for turning and machining center used in CNC programming.
- 2. Prepare Process sheet for forging operations of a simple automobile component.
- 3. Prepare Process sheet for press working operation using compound or progressive die.

### Learning Resources:

1. Books:

| Sr<br>No. | Author                                                          | Title                                            | Publication                                            |
|-----------|-----------------------------------------------------------------|--------------------------------------------------|--------------------------------------------------------|
| 1.        | S. K. Hajra Choudhury.<br>A. K. Hajra Choudhury.<br>Nirjhar Roy | Elements of Workshop<br>Technology. Vol I and II | Media Promoters<br>and Publishers Pvt. Ltd.<br>Mumbai. |
| 2.        | H. S. Bawa                                                      | Workshop Technology<br>Vol I and II.             | Tata McGraw-Hill<br>Publishing Co. Ltd. New<br>Delhi.  |
| 3.        | R. K. Jain                                                      | Production Technology                            | Khanna Publishers.<br>Delhi.                           |
| 4.        | P.N.Rao                                                         | CAD/CAM Principles and applications              | Tata McGraw-Hill<br>Publishing Co. Ltd. New<br>Delhi.  |
| 5.        | Aditan Pabla                                                    | CNC machines programming and applications        | New Age International<br>Publication                   |
| 6.        | Serope Kalpakjian<br>Steven R. Schmid                           | Manufacturing Engineering and Technology         | Pearson                                                |
| 7         | N.K. Chougule                                                   | CAD/CAM/CAE                                      | Scietech                                               |

### 1. CDs, PPTs Etc.:

Electronics Trades and Technology Development Corporation (A Govt. Of India undertaking), Akbar Hotel Anex, Chankyapuri, New Delhi-110 021.

Learning Materials: Transparencies, CBT packages developed by N.I.T.T.E.R. Bhopal.

### 2. Websites:

www.npkauto.com www.youtube.com **Course Name : Diploma in Automobile Engineering** 

Course Code : AE

Semester : Fourth

Subject Title : Heat Power Engineering

Subject Code : 17407

**Teaching and Examination Scheme** 

| Teac | hing Sch | ieme |              |     | Examinati | on Scheme |     |       |
|------|----------|------|--------------|-----|-----------|-----------|-----|-------|
| TH   | TU       | PR   | PAPER<br>HRS | TH  | PR        | OR        | TW  | TOTAL |
| 03   |          | 02   | 03           | 100 |           | 25#       | 25@ | 150   |

### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

### **Rationale:**

Heat energy is the basis for most of the power producing and power absorbing devices. In order to understand the principles and working of these devices it is essential to understand the basic laws and concepts of thermodynamic processes and gas cycles, properties of steam, generation of steam with modern boilers, steam condensers and turbines. As modern diesel engine vehicles are turbocharged. Students should also understand the working principles and constructions of air compressors gas turbines and jet engines. Due to energy crunch of petroleum products worldwide hunt for alternative energy sources is being done for the last three decades. Hence students should also have comparative brief idea about various conventional energy sources, calorific values, carbon value and evaporative power of fuels and exploration of various alternative energy sources. Student should have capability to know the necessary parameters affecting efficiency of heat absorption, rejection or conversion devices into work.

### **Objectives:**

Students will be able to:

- Correlate the theoretical knowledge with practical aspects of systems of work producing and work absorbing devices like boilers, condensers, steam turbines, air compressors, gas turbines etc.
- > Describe various sources of energy and ways to harness it.
- Understand the chemistry of fuel and Estimate calorific value, mass of air required for complete combustion of fuels.
- Identify and locate various parts of equipments, use of instruments, tools for assembly and dismantling of various devices.
- > Observe the working of devices with change in parameters

### Learning Structure:



| Theory:                                                                     |       |       |  |  |
|-----------------------------------------------------------------------------|-------|-------|--|--|
| Topic and Content                                                           | Hours | Marks |  |  |
| 1. Fundamentals of thermodynamics.18 marks                                  |       |       |  |  |
| Specific Objectives:                                                        |       |       |  |  |
| Understand the concepts of thermodynamic processes and air cycles.          |       |       |  |  |
| Know applications of thermodynamic principles and processes in              |       |       |  |  |
| various heat engines and power absorbing devices.                           |       |       |  |  |
| Contents:                                                                   |       |       |  |  |
| 1.1 Study of thermodynamic processes for ideal gases                        |       |       |  |  |
| • Represent Isobaric, Isochoric, Isothermal, Adiabatic and polytrophic      |       |       |  |  |
| processes on P-V and T-S diagram, formulae of work done, change in          |       |       |  |  |
| internal energy and change in enthalpy.                                     | 09    | 18    |  |  |
| • Relation between P,V and T                                                |       |       |  |  |
| (Derivations only for adiabatic process, No mathematical calculations       |       |       |  |  |
| for any process)                                                            |       |       |  |  |
| 1.2 Air cycles:                                                             |       |       |  |  |
| • P-V and T-S diagram and equations for air standard efficiency of          |       |       |  |  |
| Carnot, Otto, Diesel and Dual combustion cycle.                             |       |       |  |  |
| 1.3 Fundamental of Heat transfer                                            |       |       |  |  |
| • Modes of heat transfer – conduction, convection and radiation             |       |       |  |  |
| Application of heat transfer in automobiles                                 |       |       |  |  |
| 2. Properties of Steam and Steam Power 18 Marks                             |       |       |  |  |
| Specific Objectives:                                                        |       |       |  |  |
| Know the process of formation of steam and efficient use of heat            |       |       |  |  |
| Content                                                                     |       |       |  |  |
| Colliciti.                                                                  |       |       |  |  |
| 2.1 Formation of steam, various phases like wet steam, dry saturated steam, |       |       |  |  |
| • Drynass fraction degree of superheat sensible heat Latent heat            |       |       |  |  |
| • Dryness fraction, degree of superficat, sensible ficat, Latent field,     | 00    | 10    |  |  |
| using Steam table                                                           | 09    | 10    |  |  |
| 2 2 Steam boilers-                                                          |       |       |  |  |
| construction and working of i) Three pass packaged type boiler              |       |       |  |  |
| ii) La Mont Boiler                                                          |       |       |  |  |
| 2.3 Steam condenser: <b>6 Marks</b>                                         |       |       |  |  |
| Function locations in steam power plant                                     |       |       |  |  |
| • Construction and working of two pass down flow Surface condenser.         |       |       |  |  |
| • Condenser efficiency and sources of air leakage in condenser              |       |       |  |  |
| 3. Air Compressors 18 Marks                                                 |       |       |  |  |
| Specific Objectives:                                                        |       |       |  |  |
| Know the working of reciprocating and rotary air compressor and it's        |       |       |  |  |
| application.                                                                |       |       |  |  |
| Understand working of different pneumatic tools.                            |       |       |  |  |
| Content:                                                                    |       |       |  |  |
| 3.1 Classification of air compressor - Construction and working of          | 08    | 18    |  |  |
| single stage and two stage reciprocating air compressors with P-V.          |       |       |  |  |
| diagram. Necessity of multi-staging and inter cooling.                      |       |       |  |  |
| Construction and working of rotary compressors i) Centrifugal               |       |       |  |  |
| compressor ii) Axial flow compressor iii) Screw compressor,                 |       |       |  |  |
| Comparison of various compressors                                           |       |       |  |  |
| 3.2 Air compressor terminology like i) Free air delivered, ii) Capacity of  |       |       |  |  |

| Compressor, iii) Piston displacement, iv) I. P., v) B. P., vi) Volumetric                                            |    |     |
|----------------------------------------------------------------------------------------------------------------------|----|-----|
| efficiency, vii) Isothermal efficiency, viii) Overall Isothermal or                                                  |    |     |
| Compressor efficiency. (Only definitions), Factors affecting volumetric                                              |    |     |
| Efficiency of reciprocating air compressors.                                                                         |    |     |
| 3.3 Applications of compressed air: construction and working of i) Rock                                              |    |     |
| drill, ii) pneumatic torque wrench                                                                                   |    |     |
| 4. Gas Turbines 14 Marks                                                                                             |    |     |
| Specific Objectives:                                                                                                 |    |     |
| Know the working of gas turbine and its application in aviation                                                      |    |     |
| industries.                                                                                                          |    |     |
| Content:                                                                                                             |    |     |
| 4.1 Brayton cycle - P.V. diagram and thermal efficiency. <b>4 Marks</b>                                              | 06 | 14  |
| • Classification of gas turbines.                                                                                    |    |     |
| 4.2 Construction and working of gas turbines i) open cycle, ii)closed cycle                                          |    |     |
| gas Turbines PV and TS diagrams 10 Marks                                                                             |    |     |
| Turboiet and turbonron engine                                                                                        |    |     |
| (no numerical)                                                                                                       |    |     |
| 5 Sources of Energy and Power plants 16 Marks                                                                        |    |     |
| Specific Objectives:                                                                                                 |    |     |
| Know various sources of conventional and non-conventional energy                                                     |    |     |
| with their applications                                                                                              |    |     |
| 5.1 Classification of various conventional and non-conventional sources of                                           |    |     |
| onergy Construction and working of power plants based on conventional                                                |    |     |
| energy, construction and working of power plants based on conventional                                               |    |     |
| a) Thermal power plant                                                                                               | 08 | 16  |
| a) Therman power plant<br>b) Gas turbing power plant                                                                 |    |     |
| a) Nuclear power plant. Drassurized water reactor                                                                    |    |     |
| c) Nuclear power prant - Pressurized water reactor.                                                                  |    |     |
| • Parameters for the site selection of conventional power plants.                                                    |    |     |
| i) Solar ii) Diamaga iii) Wind anargy                                                                                |    |     |
| 1) Solar, 11) Blomass, 111) wind energy                                                                              |    |     |
| Concepts of Geothermal and fidal power plant.                                                                        |    |     |
| <b>6.</b> Fuels and Combustion <b>10</b> Marks                                                                       |    |     |
| Specific Objectives:                                                                                                 |    |     |
| Know the comparative information of properties of various fuels.                                                     |    |     |
| Know the chemistry of combustion of fuels.                                                                           |    |     |
| Calculate H.C.V./L.C.V of fuels and requirement of theoretical or<br>minimum singurarized for some baseling of facel |    |     |
| minimum air required for combustion of fuel.                                                                         |    |     |
| Content:<br>6.1 Types of finals                                                                                      |    |     |
| 0.1 Types of fuels – 4 Marks                                                                                         |    |     |
| Definition, classification, properties, Calorific value of fuels.                                                    |    |     |
| • Ultimate analysis and proximate analysis of solid fuels.                                                           | 08 | 16  |
| • Liquid fuels- Comparative information about composition, specific                                                  |    |     |
| gravity and gross calorific values of liquid fuel.                                                                   |    |     |
| • Gaseous fuels- natural, LPG, CNG, and other artificially prepared                                                  |    |     |
| gaseous fuels.                                                                                                       |    |     |
| 6.2 Higher and lower Calorific values of fuel and it's estimation, carbon                                            |    |     |
| value, evaporative power of fuel. Dulong's formula, construction and                                                 |    |     |
| working of Bomb calorimeter. 8 Marks                                                                                 |    |     |
| 6.3 Combustion of fuels – combustion chemistry of carbon, hydrogen and                                               |    |     |
| methane. Mass of air required for complete combustion of fuel, excess                                                |    |     |
| air. 4 Marks                                                                                                         |    |     |
| Total                                                                                                                | 48 | 100 |

### Practical:

Skills to be developed:

### Intellectual skills:

- 1. Describe the locations of components.
- 2. Analyse the functioning of systems and respective components.
- 3. Describe the direction flow of fluids and work
- 4. Analyse the parameters affecting safety and efficiency of devices.

### **Motor Skills:**

- 1. Proper use of tools.
- 2. Practice of safe working procedures.
- 3. Variations in parameters affecting efficiency.

### **List of Practicals:**

1) Visit to any industry where boiler is installed with reference to observations of locations, constructions and working of boiler mountings like safety valve and Bourdon's pressure gauge and boiler accessories like a) economizer b) super-heater.

(The same should also be explained on cut- section and table model in laboratory)

- 2) Visit to cogeneration plant of sugar factory or any other thermal power plant with reference to observation of components, path of steam, minimum and maximum r.p.m., governing, bleeding and maintenance schedule of steam turbine.
- 3) Study the provisions of Indian boiler act with reference to duties of boiler inspector, chief inspector, annual registration process and accident.
- 4) Dismantling and assembling of one reciprocating and one rotary compressor.
- 5) Study of system components of gas turbines used in turbocharger with reference to direction of flow of air and flue gas, shape of vanes, blades also describe maintenance schedule of gas turbine.
- 6) Study any solar water heater and calculate it's efficiency.
- 7) Determination of calorific value of solid or liquid fuel using Bomb calorimeter.
- 8) Visit a wind mill to study the various features and prepare report containing specification, materials, operating speed range, wind speed data, locking mechanism, protective coatings and efficiency.

#### Learning Resources 1. Books

| Sr.<br>No. | Author                          | Title                                            | Publisher             |
|------------|---------------------------------|--------------------------------------------------|-----------------------|
| 1          | R. S. Khurmi and J. K.<br>Gupta | A Text book of Thermal<br>Engineering            | S. Chand and Co. Ltd. |
| 2          | Patel, Karamchandani            | Elements of Heat Engines<br>(Vol. I, II and III) | Acharya Book Depot.   |

| 3 | A course in Thermal<br>Engineering                      | S. Domkundwar, Dr C.P.<br>Kothandaramanand A.V.<br>DOmkundwar | Dhanpat Rai and Co.(P)Ltd,<br>New Delhi |
|---|---------------------------------------------------------|---------------------------------------------------------------|-----------------------------------------|
| 4 | Engineering<br>Thermodynamics                           | Jones and Dugan                                               | Prentice hall of India<br>Publication.  |
| 5 | Thermodynamics                                          | Yunus Cegeland Mike Boles                                     | Tata McGraw Hill Publication            |
| 6 | Engineering<br>Thermodynamics Work<br>and Heat Transfer | Gordon Rogers<br>Yon Mayhew                                   | Pearson                                 |
| 7 | Govt. of India                                          | Indian Boiler Act - 1923                                      |                                         |

### 2. Websites

www.howstuffworks.com www.wikipedia.com www.watertubeboiler.org www.scince.uwaterloo.ca
**Course Name : Diploma in Automobile Engineering** 

Course Code : AE

Semester : Fourth

Subject Title : Automobile Engines

Subject Code : 17408

**Teaching and Examination Scheme:** 

| Teaching Scheme |    |    |              |     | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|-----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH  | PR        | OR        | TW  | TOTAL |
| 03              |    | 04 | 03           | 100 | 50#       |           | 25@ | 175   |

# NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)

# **Rationale:**

This is a core technology subject. I C engines are required to run the vehicles. The basic principles of Thermodynamics are applied in I C engine. This subject forms the basis for the Advanced Automobile Engine and vehicle maintenance. Knowledge of various engine systems will be helpful in finding and evaluating engine maintenance problems.

# **General Objectives:**

Students will be able to,

- > Understand working principles, comparison and applications of I C engine.
- ➤ Know constructional details of different types of engine.
- Draw layout and understand construction and working of various systems required in engine.
- > Perform tests on I.C. engine and estimate performance parameters.

# **Learning Structure:**

| Applications | Automobiles, Airplanes, Locomotives, Electricity Generators, Earth moving machinery and so on.                                            |  |  |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------|--|--|
|              |                                                                                                                                           |  |  |
| Procedures   | Induction, Heat addition, Ignition, Injection, Heat rejection, Cooling, Lubrication, Exhaust, Testing, Measurement.                       |  |  |
|              |                                                                                                                                           |  |  |
| Principles   | Otto cycle, Diesel cycle, Combustion, Heat transfer, Friction,                                                                            |  |  |
|              |                                                                                                                                           |  |  |
| Concepts     | 4 stroke cycle, crank and valve operating mechanism, properties of fluids (coolants, lubricants, and fuels), performance testing methods. |  |  |
|              |                                                                                                                                           |  |  |
| Facts        | Components of I.C. engine systems                                                                                                         |  |  |

# Theory:

| Topics and Contents                                                       | Hours | Marks |
|---------------------------------------------------------------------------|-------|-------|
| 01. Fundamentals of I.C. Engine 16 marks                                  |       |       |
| Specific Objectives:                                                      |       |       |
| Understand working principle of four and two stroke cycle engines.        |       |       |
| Write nomenclature of engine.                                             |       |       |
| Compare petrol and diesel engines, four stroke and two stroke engines.    |       |       |
| Classify I.C. engines and write their specifications.                     |       |       |
|                                                                           |       |       |
| Content                                                                   |       |       |
| 1.1 Introduction 4 Marks                                                  |       |       |
| • Definition of I C engine.                                               |       |       |
| • Engine nomenclature.                                                    |       |       |
| 1.2 The working principle of Engine 6 Marks                               |       |       |
| • Four-Stroke Spark Ignition Engine                                       |       |       |
| Four-Stroke Compression Ignition Engine                                   | 08    | 16    |
| Comparison of Four Stroke SL and CL Engine                                |       |       |
| Two Stroke Engines                                                        |       |       |
| • I wo-subke Englies                                                      |       |       |
| • Scavenging.                                                             |       |       |
| • Comparison of Four-Stroke and Two-Stroke Engine.                        |       |       |
| 1.3 Classification, Specifications and applications 6 Marks               |       |       |
| • Classification of engine on the basis of: Cycle of operation, Fuel,     |       |       |
| Method of Charging, Ignition, Cooling, Cylinder arrangement,              |       |       |
| camshaft layout.                                                          |       |       |
| • Merits and Demerits of Vertical and horizontal engines.                 |       |       |
| • Engine Specifications - Two Wheelers, Light Motor Vehicle, Medium       |       |       |
| Motor Vehicle and Heavy Motor Vehicle.                                    |       |       |
| Applications of I C Engines.                                              |       |       |
| 02. Construction of I. C. Engine 20 Marks                                 |       |       |
| Specific Objectives:                                                      |       |       |
| Describe function, Construction and material of engine components.        |       |       |
| > Understand Types of drives required to operate, draw and describe       |       |       |
| various mechanisms.                                                       |       |       |
| Understand and draw Valve and port timing diagrams.                       |       |       |
| Content                                                                   |       |       |
| 2.1 Function, construction, materials and manufacturing methods of Engine |       |       |
| components 16 Marks                                                       |       |       |
| • Cylinder block, Cylinder liners – Dry and Wet, Cylinder head, Inlet and |       |       |
| Exhaust manifold, Tappet cover, Timing cover, Crank case. Oil Sump.       | 10    | 20    |
| • Crank Mechanism: Piston and piston rings, Piston pin, Connecting rod,   |       |       |
| Crank Shaft, Cam shaft, Flywheel, Bearings, Oil seals, Gaskets. (Only     |       |       |
| the Name of commonly used Manufacturing Method is expected)               |       |       |
| • Valve and Valve Operating Mechanisms: Overhead Valve and                |       |       |
| Overhead Cam arrangements.                                                |       |       |
| Valve Cooling.                                                            |       |       |
| 2.2 Camshaft Drives and Valve Timing 4 Marks                              |       |       |
| • Camshaft drives: Timing Gears. Chain and Belt drive Relation            |       |       |
| between speed of camshaft and crank Shaft.                                |       |       |
| • Valve timing Diagram, Port timing Diagram.                              |       |       |

| 03. Fuel and Air Feed System 16 Marks                                                                                                    |      |    |
|------------------------------------------------------------------------------------------------------------------------------------------|------|----|
| Specific Objectives:                                                                                                                     |      |    |
| Draw layout of fuel and air feed systems.                                                                                                |      |    |
| > Understand, describe, and compare the construction and working or                                                                      | f    |    |
| components involved in the systems.                                                                                                      |      |    |
|                                                                                                                                          |      |    |
| Content                                                                                                                                  |      |    |
| 3.1 Petrol fuel supply system. 8 Marks                                                                                                   |      |    |
| • Conventional Petrol Engine: Gravity feed, Pump feed (Layout                                                                            | ,    |    |
| Function of Components and location).                                                                                                    |      |    |
| • Construction and working of components: Fuel Tank, Fuel Filter, S. U                                                                   | . 08 | 16 |
| Electrical Fuel Pump, Air cleaners – dry type and Oil wetted types.                                                                      | 00   | 10 |
| • Working Principle of Simple Carburettor, Air Fuel ratio requirements                                                                   | ,    |    |
| Circuits in Two-wheeler carburettor and Solex carburettor.                                                                               |      |    |
| 3.2 Diesel Fuel supply system 8 Marks                                                                                                    |      |    |
| • Diesel Engine: Need and requirements of Fuel Injection Systems.                                                                        |      |    |
| • Layout of Fuel Injection systems – Individual pump, Unit injector                                                                      |      |    |
| System, Distributor system and Common ran system.                                                                                        |      |    |
| • Fuel injector and types of hozzles.                                                                                                    |      |    |
| • Fuel metering in Fuel Injection Pump (Inline pump and Distributor                                                                      |      |    |
| Working principle of Machanical Covernor in Fuel Injection Dump                                                                          |      |    |
| • Working principle of Mechanical Governor in Fuel injection Fullip.                                                                     |      |    |
| Specific Objectives:                                                                                                                     |      |    |
| Understand ignition systems                                                                                                              |      |    |
| <ul> <li>Understand firing order of the engine.</li> </ul>                                                                               |      |    |
| <ul> <li>Compare various types of mufflers</li> </ul>                                                                                    |      |    |
| Content                                                                                                                                  |      |    |
| 4.1 Introduction to Ignition System 4 Marks                                                                                              | 04   | 08 |
| • Requirements of ignition system.                                                                                                       | -    |    |
| • Magneto and Battery Ignition systems (Working only).                                                                                   |      |    |
| • Firing order used in 3,4 and 6 cylinder engines                                                                                        |      |    |
| 4.2 Types of Exhaust system 4 Marks                                                                                                      |      |    |
| • Function of Exhaust manifold.                                                                                                          |      |    |
| • Construction, Working and types of silencer / Mufflers.                                                                                |      |    |
| 05. Cooling and Lubrication systems 20 Marks                                                                                             |      |    |
| Specific Objectives:                                                                                                                     |      |    |
| Identify components and types of cooling and lubrication systems                                                                         |      |    |
| Compare Cooling and Lubrication systems.                                                                                                 |      |    |
|                                                                                                                                          |      |    |
| Content:<br>5.1 Engine appling system                                                                                                    |      |    |
| 5.1 Engine cooling system 4 Marks                                                                                                        |      |    |
| Ineed of cooling system.                                                                                                                 | 10   | 20 |
| • Limitations of cooling system.                                                                                                         | c    |    |
| • Types: Air, water/ Liquid cooling system (Layout and Function of                                                                       | Ē    |    |
| Components)     Properties of coolents and coolent additives                                                                             |      |    |
| Flopentes of coolants and coolant additives     5.2 Construction and working of cooling system     6 Morles                              |      |    |
| Construction and working of Thermostet value. Water expension terls                                                                      |      |    |
| Construction and working or. Thermostal valve, water expansion tank     Temperature Indicators Pressure can Water nump. Fan and fan belt | ,    |    |
| <ul> <li>Electrically driven Fan circuit</li> </ul>                                                                                      |      |    |
|                                                                                                                                          |      |    |

| Radiator: Construction and type of radiator cores.                                                     |    |     |
|--------------------------------------------------------------------------------------------------------|----|-----|
| 5.3 Introduction to Lubrication system 4 Marks                                                         |    |     |
| • Need of lubrication system.                                                                          |    |     |
| • Properties of lubricating oil, additives of lubricating oil.                                         |    |     |
| • Parts to be lubricated.                                                                              |    |     |
| 5.4 Types of Lubrication system 6 Marks                                                                |    |     |
| • Types of lubrication system: Splash, Pressure – wet sump and dry sump (Layout of lubrication system) |    |     |
| • Components: Oil filters Pump and its drive pressure regulators oil                                   |    |     |
| pressure gauge                                                                                         |    |     |
| <ul> <li>Positive crank case ventilation</li> </ul>                                                    |    |     |
| • Classification of Lubricating Oils on the basis of Viscosity (SAE) and                               |    |     |
| Load (API) Severity rating.                                                                            |    |     |
| 06. Performance of Engine 20 Marks                                                                     |    |     |
| Specific Objectives:                                                                                   |    |     |
| Understand performance parameters, draw engine characteristic graphs.                                  |    |     |
| Perform Engine tests and measure different parameters and analyze the                                  |    |     |
| results.                                                                                               |    |     |
|                                                                                                        |    |     |
| Content:                                                                                               |    |     |
| 6.1 Performance parameters. 04 Marks                                                                   |    |     |
| • Definitions: Indicated Power, Brake Power and Frictional Power,                                      | 08 | 20  |
| Efficiencies - Air standard, Mechanical, Brake Thermal, Indicated                                      |    | -   |
| 16 Mortes                                                                                              |    |     |
| 0.2 Dynamometers and engine testing. 10 Warks                                                          |    |     |
| • working Principle and types of Dyanmometers: Rope brake, Hydraunc                                    |    |     |
| <ul> <li>Engine Testing: Morse Test Willian's line Method for finding</li> </ul>                       |    |     |
| Frictional Power                                                                                       |    |     |
| <ul> <li>Heat balance sheet and Method of calculating Volumetric Efficiency.</li> </ul>                |    |     |
| and Fuel Consumption (Simple Numerical problems)                                                       |    |     |
| Total                                                                                                  | 48 | 100 |

# Practical: Skills to be developed:

# Intellectual skill:

- > Understand working principle of S.I. / C.I. engine
- Select special tools used for engine disassembly / assembly.
- Identify engine components.
- Identify components of the engine systems.
- > Interpret results from engine power observations and calculations.

# Motor Skills:

- > Sketch engine components and engine system components.
- Measure certain parameters with the help of dynamometer, air box, fuel measuring burette, exhaust gas calorimeter, measuring tools.

# **Practicals:**

- 1. Use Special Tools In Dismantling And Assembling By Identifying Tools, Demonstrating and Arranging The Practice Of Same.
- 2. Operate Cut Section Engine Model To Understand Engine Nomenclature and Operate Engine.
- 3. Identify and Observe Location Of Various Engine Components.
- 4. Trace Induction System and Fuel Supply System Curve to Understand the Characteristics.
- 5. Dismantle Ignition System and Distributor Assembly, To Understand The Functions.
- 6. Dismantle Cooling System, Identify Components and Their Functions.
- 7. Dismantle Lubrication System, Identify Components. Draw Layout.
- 8. Prepare Heat Balance Sheet And Plot Performance Characteristics Curve of An Engine After Trial.
- 9. Conduct Morse Test On Multicylinder Engine & Calculate Frictional Power & Mechanical Efficiency.
- 10. Dismantle & Assemble An Engine.

# Notes:

- 1. Practicals may be performed in a group of 4 to 6 students.
- 2. Engine testing practicals may be performed by the batch.

# Learning Resources:

1. Books:

| Sr.<br>No. | Author            | Title                                      | Publisher / Edition               |
|------------|-------------------|--------------------------------------------|-----------------------------------|
| 1          | Dr. Kirpal Singh  | Automobile Engg. Vol2                      | Standard Publishers               |
| 2          | Anil Chhikara     | Automobile Engineering<br>Vol.1            | Satya Prakashan, New Delhi        |
| 3          | R.B. Gupta        | Automobile Engineering                     | Satya Prakashan                   |
| 4          | K.K. Ramlingam    | Automobile Engineering                     | Scitech Publications              |
| 5          | John B. Heywood   | Internal Combustion Engine<br>Fundamentals | McGraw-Hill International Edition |
| 6          | Newton and Steeds | Internal Combustion Engine                 |                                   |

# 2. Websites:

www.npkauto.com www.howstuffworks.com www.youtube.com for animations and videos of various engine system operations. Course Name : Diploma in Automobile Engineering Course Code : AE Semester : Fourth Subject Title : Automobile Systems and Body Engineering Subject Code : 17409

# **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |     | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|-----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH  | PR        | OR        | TW  | TOTAL |
| 03              |    | 02 | 03           | 100 | 25#       |           | 25@ | 150   |

NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

# **Rationale:**

This subject is Core Technology subject for Automobile Engineering course. This subject is part of Automobile systems concerning control of vehicles. Knowledge of this subject is required in the subjects like Automobile Component Design, Vehicle maintenance, vehicle testing. Conceptual knowledge of this subject is useful for understanding and improving the performance of Automobile system.

# **General Objectives:**

Students will be able to:

- 1. Understand construction, working and functions of Automobile Systems.
- 2. Understand construction, working and functions of Automobile control systems such as steering, braking and suspension.
- 3. Comp are the developments in body engineering, control systems and safety equipment

# Learning Structure:

| Application | Various control, safety and comfort systems of a Vehicle. Vehicle<br>Performance Analysis                                                                                                                                                                                  |  |  |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
|             |                                                                                                                                                                                                                                                                            |  |  |
| Procedure   | Construction and Operation of various types of steering gear boxes,<br>Steering Linkages, Suspension system components identification and<br>operation, braking systems – construction and operation, Human Comfort<br>Parameters, Aerodynamic shape, Vehicle Performance. |  |  |
|             |                                                                                                                                                                                                                                                                            |  |  |
| Principles  | Ackerman steering, Pascal Law, Law of friction, Tractive effort,<br>Traction, Performance of Vehicle                                                                                                                                                                       |  |  |
|             |                                                                                                                                                                                                                                                                            |  |  |
| Concepts    | Steering system, suspensions systems, body engineering, HVAC system                                                                                                                                                                                                        |  |  |
|             |                                                                                                                                                                                                                                                                            |  |  |
| Facts       | Axles, spring, steering gear box, Brake shoes, anti-roll bar, stabilizer, vehicle body, car air conditioning                                                                                                                                                               |  |  |

# **Theory Content:**

| Topic and Contents                                                                                                                  | Hours | Marks |
|-------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
| 1: Front Axle and Steering 22 Marks                                                                                                 |       |       |
| Specific Objectives:                                                                                                                |       |       |
| Know various types of steering linkages.                                                                                            |       |       |
| Understand working of different steering gear boxes.                                                                                |       |       |
| Know steering geometry.                                                                                                             |       |       |
| > Understand concept of power steering.                                                                                             |       |       |
| Content:                                                                                                                            |       |       |
| 1.1 Front Axle: 8 Marks                                                                                                             |       |       |
| • Types of front axle - Dead axle, live axle.                                                                                       |       |       |
| • Type of stub axle arrangements- Elliot, reverse Elliot, Lamoine, reverse Lamoine.                                                 | 12    | 22    |
| • Front wheel assembly.                                                                                                             |       |       |
| 1.2 Steering system. :14 Marks                                                                                                      |       |       |
| • Steering linkages.                                                                                                                |       |       |
| • Steering geometry and its effects – Caster, camber, king pin                                                                      |       |       |
| inclination, toe in- toe out, Correct Steering angle. Understeering                                                                 |       |       |
| and oversteering, Turning radius.                                                                                                   |       |       |
| • Construction, working and application of Steering gear box - rack                                                                 |       |       |
| and pinion type, recirculating ball type, and worm and rollertype.                                                                  |       |       |
| Ackerman Principle and linkage.                                                                                                     |       |       |
| • Power assisted steering and its types (Hydraulic and electrical)                                                                  |       |       |
| 2: Brakes 20 Marks                                                                                                                  |       |       |
| Specific Objectives:                                                                                                                |       |       |
| <ul> <li>Know various types of braking systems.</li> <li>Understand construction and working of different braking system</li> </ul> |       |       |
| components                                                                                                                          |       |       |
| <ul> <li>Know latest developments in braking system.</li> </ul>                                                                     |       |       |
| Content:                                                                                                                            |       |       |
| 2.1 Introduction 8 Marks                                                                                                            |       |       |
| • Function and necessity of brakes.                                                                                                 |       |       |
| <ul> <li>Classification of brakes and braking systems.</li> </ul>                                                                   |       |       |
| • Construction and working of -disc brake and drum brake                                                                            | 10    | 20    |
| • Friction materials used for brake shoes and pads. Characteristics of                                                              | 10    | 20    |
| friction material- brake fade, coefficient of friction, dry friction and                                                            |       |       |
| wet friction                                                                                                                        |       |       |
| 2.2 Braking systems 12 Marks                                                                                                        |       |       |
| • Construction and working of - Mechanical braking system, Hydraulic                                                                |       |       |
| Braking system, Air braking system, Hydraulic operated air                                                                          |       |       |
| braking system and vacuum assisted braking system.                                                                                  |       |       |
| • Concept and working of antilock braking system.                                                                                   |       |       |
| Parking brake                                                                                                                       |       |       |
| Properties of brake fluids and their specifications.                                                                                |       |       |
| 3: Suspension Systems 18 Marks                                                                                                      |       |       |
| Specific Objectives:                                                                                                                | 10    | 18    |
| ✓ Identify and describe various components of suspension systems.                                                                   | 10    | 10    |

|                                                                           | 1  |     |
|---------------------------------------------------------------------------|----|-----|
| Know latest developments in suspension systems.                           |    |     |
| Content:                                                                  |    |     |
| 3.1 suspension systems 10 Marks                                           |    |     |
| • Rigid and independent Suspension.                                       |    |     |
| • Types of Independent suspension system-McPherson strut, wishbone        |    |     |
| type.                                                                     |    |     |
| • Semi-elliptical Leaf spring, coil spring, torsion bar arrangement,      |    |     |
| • Construction and working of Air Suspension System.                      |    |     |
| 3.2 Construction and working of- 8 Marks                                  |    |     |
| • Shock absorbers - Telescopic and Gas filled                             |    |     |
| Anti roll bar or stabilizer bar.                                          |    |     |
| <b>4: Body Engineering and Safety Devices.</b> 16 Marks                   |    |     |
| Specific Objectives:                                                      |    |     |
| Know various types of materials used for automobile body.                 |    |     |
| Understand protective treatment of automobile body.                       |    |     |
| Know latest developments in safety devices.                               |    |     |
| Content:                                                                  | 06 | 16  |
| • Types of bodies and materials used in body construction                 |    |     |
| • Protective and anticorrosive treatments, painting and repainting        |    |     |
| procedure.                                                                |    |     |
| • Safety devices –air bags, exhaust brake, emergency brake, central       |    |     |
| locking, Collapsible steering.                                            |    |     |
| 5: Car Heating Ventilation and Air Conditioning System (HVAC)             |    |     |
| Specific Objectives:                                                      |    |     |
| > Understand the basic principles of HVAC system.                         |    |     |
| > Know the comfort conditions of the occupants.                           |    |     |
|                                                                           |    |     |
| • Fundamentals of Refrigeration and air conditioning.                     | 06 | 16  |
| • Description of vapour compression cycle with components in the          |    |     |
| circuit.                                                                  |    |     |
| • Layout and operation of HVAC.                                           |    |     |
| • Type of refrigerants used in car air conditioning and their properties. |    |     |
| Human comfort conditions.                                                 |    |     |
| Temperature control system, humidity control.                             |    |     |
| 6: Vehicle Performance : 08 Marks                                         |    |     |
| Specific Objectives:                                                      |    |     |
| Know and describe various resistances experienced by a vehicle.           |    |     |
| > Understand the effects of resistances on a vehicle.                     |    |     |
| Content:                                                                  |    |     |
| • Resistance faced by the vehicle- Air resistance, rolling resistance,    | 04 | 08  |
| gradient resistance                                                       |    |     |
| • Definitions- traction, tractive efforts, drawbar pull, gradeability and |    |     |
| acceleration, pitching, bouncing, rolling, sway and yaw.                  |    |     |
| • Stability of vehicle on turn and slopes (No mathematical treatment).    |    |     |
| Concept of Streamline shape of a vehicle body                             | 40 | 100 |
| Total                                                                     | 48 | 100 |

# **Practical:**

Skills to be developed:

# **Intellectual Skills**:

Student will be able to.

- 1. Identify parts like front axle, steering, brakes, suspension system.
- 2. Classify the system according to their application.
- 3. Select proper tools and their range.
- 4. Understand the construction and working of the system under consideration.

# **Motor Skills:**

Student will be able to.

- 1. Sketch the different systems and their components.
- 2. Handle tools, equipment and instruments.
- 3. Dismantle and assemble various system assemblies.

# **List of Practicals:**

|    | Know your Automobile Systems laboratory through, listing the systems, models, and         |  |  |  |
|----|-------------------------------------------------------------------------------------------|--|--|--|
| 01 | charts in laboratory with their purpose.                                                  |  |  |  |
| 01 | • Listing the tools used in dismantling and assembly of various Automobile                |  |  |  |
|    | Systems.                                                                                  |  |  |  |
| 02 | Observe the steering linkages, draw its layout. Dismantle the steering gear box, identify |  |  |  |
| 02 | its type, sketch its components and assemble it.                                          |  |  |  |
| 03 | Observe and sketch different types of Front Axles.                                        |  |  |  |
|    | • Observe and draw the layout of hydraulic braking system. Dismantle master               |  |  |  |
|    | cylinder, wheel cylinder and remove brake drum, identify and sketch the                   |  |  |  |
| 04 | components and assemble it.                                                               |  |  |  |
|    | Observe and draw the layout of hydraulically operated air/vacuum                          |  |  |  |
|    | assisted braking system                                                                   |  |  |  |
|    | • Observe and sketch the construction of Mc pherson and wishbone type                     |  |  |  |
|    | suspension with labels.                                                                   |  |  |  |
| 05 | • Dismantle semi elliptical leaf spring, sketch its components with labels and            |  |  |  |
| 05 | understand its working.                                                                   |  |  |  |
|    | • Dismantle telescopic shock absorber, identify components and draw sketches of           |  |  |  |
|    | components with labels and understand its working.                                        |  |  |  |
| 06 | Visit to automobile service station of heavy vehicle to observe air suspension system,    |  |  |  |
| 00 | air brakes, power steering system and draw layout. Write a report                         |  |  |  |
|    | Visit to Automobile Body Building and Body Manufacturing Industry, Prepare a report       |  |  |  |
| 07 | considering following points - Layouts, Body Construction, Body Materials, Body           |  |  |  |
|    | Repairs and Painting Procedure.                                                           |  |  |  |
| 08 | Observe and draw the layout of HVAC system. Measure the ambient temperature and           |  |  |  |
| 00 | temperature at various locations inside the car. Describe the control systems.            |  |  |  |

## Notes:

- **1.** A number of practicals may be started simultaneously.
- 2. The practicals may be performed in a group of 6 to 8 students.

# Learning Resources: 1. Books:

| Sr.<br>No. | Author           | Title                  | Publisher / Edition          |
|------------|------------------|------------------------|------------------------------|
| 1          | Ramlingam K.K.   | Automobile Engineering | Scitech Publication          |
| 2          | Kirpal Singh     | Automobile Engineering | Standard Publication         |
| 3          | Anil Chikara     | Automobile Engineering | Satya Prakashan New<br>Delhi |
| 4          | R.B. Gupta       | Automobile Engineering | Satya Prakashan New<br>Delhi |
| 5          | S. Srinivisan    | Automotive Mechanics   | Tata McGraw - Hill           |
| 6          | Crouse / Anglin. | Automobile Mechanics   | Tata McGraw - Hill           |

# 2. IS, BIS and International Codes:

3. Websites : www.npkauto.com

Course Name : Mechanical Engineering Group Course code : AE/ME/MH/MI/PG/PT Semester : Fourth Subject Title : Theory of Machines Subject Code : 17412

# **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |               |     | Examinati | on Scheme |     |       |
|-----------------|----|----|---------------|-----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS. | TH  | PR        | OR        | TW  | TOTAL |
| 03              |    | 02 | 03            | 100 |           |           | 25@ | 125   |

### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

# **Rationale:**

It is a core technology subject in Mechanical Engineering Discipline. Mechanical Engineers often come across various machines in practice. They should be able to identify and interpret various elements of machines in day to day life. In maintaining various machines, a diploma engineer should have sound knowledge of fundamentals of machine and mechanism. It will be helpful for them to understand the mechanisms from operational point of view in a better way. This subject imparts the kinematics involved in different machine elements and mechanisms like gear, cam-follower, follower, belt-pulley, flywheel, brake, dynamometer, clutch, etc.

Detailed knowledge of these aspects with deep insight into the practical applications develops a professional confidence in them to become successful Engineer.

This subject serves as a prerequisite for subjects like Machine Design to be learned in higher semester.

# **Objectives:**

# The student will be able to:

- 1. Understand different machine elements and mechanisms.
- 2. Understand Kinematics and Dynamics of different machines and mechanisms.
- 3. Draw cam profile suitable to various displacement diagram.
- 4. Select Suitable Drives and Mechanisms for a particular application
- 5. Understand the function, operation and application of flywheel and governor.
- 6. Understand the function, operation and application of brake, dynamometer, clutch and bearing

7. Find magnitude and plane of unbalanced forces.

# Theory:

| Topic and Content                                                                         | Hours | Marks |
|-------------------------------------------------------------------------------------------|-------|-------|
| 1. Fundamentals and type of Mechanisms                                                    |       |       |
| Specific objectives:                                                                      |       |       |
| Define various terms related to mechanisms.                                               |       |       |
| Explain construction and working of various mechanisms                                    |       |       |
| 1.1 Kinematics of Machines:- Definition of Kinematics, Dynamics, statics,                 |       |       |
| Kinetics, Kinematic link, Kinematic pair and its types, constrained motion                |       |       |
| and its types, Kinematic chain and its types, Mechanism, inversion, machine               |       |       |
| and structure 8 Marks                                                                     | 07    | 16    |
| 1.2 Inversion of Kinematic Chain                                                          | 07    | 10    |
| • Inversion of four bar chain, coupled wheels of Locomotive, Beam engine, Pantograph.     |       |       |
| • Inversion of single slider Crank chain –Pendulum pump, Rotary I.C.                      |       |       |
| Engine mechanism, Oscillating cylinder engine, Whitworth quick return                     |       |       |
| mechanism. Quick return mechanism of shaper.                                              |       |       |
| • Inversion of Double Slider Crank Chain- Scotch Yoke Mechanism,                          |       |       |
| Elliptical trammel, Oldham's Coupling8 Marks                                              |       |       |
| 2. Velocity and Acceleration in Mechanisms                                                |       |       |
| Specific objectives                                                                       |       |       |
| Draw velocity and acceleration diagram for given mechanism                                |       |       |
| 2.1 Concept of relative velocity and relative acceleration of a point on a link,          |       |       |
| angular acceleration, inter-relation between linear and angular velocity and              |       |       |
| acceleration.                                                                             |       |       |
| 2.2 Analytical method (No derivation) and Klein's construction to determine               | 08    | 16    |
| velocity and acceleration of different links in single slider crank mechanism.<br>8 Marks |       |       |
| 2.3 Drawing of velocity and acceleration diagram of a given configuration,                |       |       |
| diagrams of simple Mechanism. Determination of velocity and acceleration                  |       |       |
| of point on link by relative velocity method(Excluding Coriollis component                |       |       |
| of acceleration) 8 Mark                                                                   |       |       |
| 3. Cams and Followers                                                                     |       |       |
| Specific objectives                                                                       |       |       |
| Define the terms related to Cam                                                           |       |       |
| Classify Cams and Followers                                                               |       |       |
| Draw cam profile as per the given applications                                            |       |       |
| 3.1 Concept, definition and applications of Cams and Followers. Cam                       |       |       |
| terminology                                                                               | 06    | 12    |
| 3.2 Classification of Cams and Followers.                                                 |       |       |
| 3.5 Different follower motions and their displacement diagrams - Uniform                  |       |       |
| 4 Morko                                                                                   |       |       |
| 3.4 Drawing of profile of radial cam with knife adap, and rollar follower with and        |       |       |
| without offset with reciproceeting motion (graphical method)                              |       |       |
| 8 Marks                                                                                   |       |       |
| <b>A Power Transmission</b>                                                               |       | 1     |
| Specific objectives                                                                       |       |       |
| Give broad classification of Drives                                                       | 10    | 20    |
| <ul> <li>Select Suitable Drives and Mechanisms for a particular application</li> </ul>    |       |       |

| <ul> <li>Calculate various quantities like velocity ratio, belt tensions, slip, angle of contact, power transmitted in belt drives</li> <li>4.1 Belt Drives- flat belt, V-belt &amp; its applications, material for flat and V-belt. Selection of belts, angle of lap, length of belt, Slip and creep. Determination of velocity ratio of tight side and slack side tension, centrifugal tension and initial tension, condition for maximum power transmission (Simple numericals)</li> <li>4.2 Chain Drives- Types of chains and sprockets, velocity ratio. Advantages &amp; Disadvantages of chain drive over other drives, Selection of Chain &amp; Sprocket wheels, methods of lubrication 4 Marks</li> <li>4.3 Gear Drives - Classification of gears, Law of gearing, gear terminology. Types of gear trains, their selection for different applications. Train value &amp; velocity ratio for simple, compound, reverted and epicyclic gear trains</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                    |            |    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----|
| contact, power transmitted in belt drives         41 Belt Drives- flat belt, V-belt & its applications, material for flat and V-belt. Selection of belts, angle of lap, length of belt, Slip and creep. Determination of velocity ratio of tight side and slack side tension, centrifugal tension, and initial tension, condition for maximum power transmission (Simple numericals)         42. Chain Drives- Types of chains and sprockets, velocity ratio. Advantages & Disadvantages of chain drive over other drives, Selection of Chain & Sprocket wheels, methods of lubrication 4 Marks         43. Gear Drives - Classification of gears, Law of gearing, gear terminology. Types of gear trains, their selection for different applications. Train value & velocity ratio for simple, compound, reverted and epicyclic gear trains,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Calculate various quantities like velocity ratio, belt tensions, slip, angle of                                                                                                    |            |    |
| <ul> <li>4.1 Belt Drives- flat belt, V-belt &amp; its applications, material for flat and V-belt. Selection of belts, angle of lap, length of belt, Slip and creep. Determination of velocity ratio of tight side and slack side tension, centrifugal tension and initial tension, condition for maximum power transmission (Simple numericals) 8 Marks</li> <li>4.2 Chain Drives- Types of chains and sprockets, velocity ratio. Advantages &amp; Disadvantages of chain drive over other drives, Selection of Chain &amp; Sprocket wheels, methods of lubrication 4 Marks</li> <li>4.3 Gcar Drives - Classification of gears, Law of gearing, gear terminology. Types of gear trains, their selection for different applications. Train value &amp; velocity ratio for simple, compound, reverted and epicyclic gear trains</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | contact, power transmitted in belt drives                                                                                                                                          |            |    |
| Selection of belts, angle of lap, length of belt, Ship and creep. Determination<br>of velocity ratio of right side and slack side tension, centrifugal tension and<br>initial tension, condition for maximum power transmission (Simple<br>numericals)         4.2 Chain Drives- Types of chains and sprockets, velocity ratio. Advantages &<br>Disadvantages of chain drive over other drives, Selection of Chain &<br>Sprocket wheels, methods of lubrication.       8 Marks         4.3 Gear Drives - Classification of gears, Law of gearing, gear terminology.<br>Types of gear trains, their selection for different applications. Train value &<br>velocity ratio for simple, compound, reverted and epicyclic gear trains.<br>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 4.1 Belt Drives- flat belt, V-belt & its applications, material for flat and V-belt.                                                                                               |            |    |
| of velocity ratio of tgnt side and stack side tension, centrifugal tension and<br>initial tension, condition for maximum power transmission (Simple<br>numericals)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Selection of belts, angle of lap, length of belt, Slip and creep. Determination                                                                                                    |            |    |
| <ul> <li>initial tension, condition for maximum power transmission (Simple numericals)</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | of velocity ratio of tight side and slack side tension, centrifugal tension and                                                                                                    |            |    |
| numericals)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | initial tension, condition for maximum power transmission (Simple                                                                                                                  |            |    |
| <ul> <li>4.2 Chain Drives- Types of chains and sprockets, velocity ratio. Advantages &amp; Disadvantages of chain drive over other drives, Selection of Chain &amp; Sprocket wheels, methods of lubrication 4 Marks</li> <li>4.3 Gear Drives - Classification of gears, Law of gearing, gear terminology. Types of gear trains, their selection for different applications. Train value &amp; velocity ratio for simple, compound, reverted and epicyclic gear trains</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | numericals) 8 Marks                                                                                                                                                                |            |    |
| Disadvantages of chain drive over other drives, Selection of Chain & Sprocket wheels, methods of lubrication 4 Marks         4.3 Gear Drives – Classification of gears, Law of gearing, gear terminology. Types of gear trains, their selection for different applications. Train value & velocity ratio for simple, compound, reverted and epicyclic gear trains                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 4.2 Chain Drives- Types of chains and sprockets, velocity ratio. Advantages &                                                                                                      |            |    |
| Sprocket wheels, methods of lubrication.       4 Marks         4.3 Gear Drives – Classification of gears, Law of gearing, gear terminology.         Types of gear trains, their selection for different applications. Train value & velocity ratio for simple, compound, reverted and epicyclic gear trains.         5. Flywheel and Governors         > Differentiate between flywheel and governor         > Explain with neat sketch the construction and working of various governors         5.1 Flywheel –Concept, function and application of flywheel with the help of turning moment diagram for single cylinder 4-Stroke I.C Engine (no 04 Numericals)       04         Coefficient of fluctuation of energy, coefficient of fluctuation of speed and its significance.       05         5.2 Governors.       Types, concept, function and application & Terminology of Governors.         5.3 Comparison between Flywheel and Governor.       04         6. Brakes and Dynamometers.       10Marks         Specific objectives       > Explain with neat sketch the construction and working of various brakes and dynamometers         > List the differences between brakes and dynamometers       05         > Calculate braking force, braking torque and power lost in friction in shoe and band brake       05         6.1 Function of brakes and Dynamometers, Type of brakes & Dynamometers, comparison between brakes & Dynamometer.       05         6.2 Construction and working of i) Rope brake Dynamometer ii) Hydraulic Dynamometer iii) Eddy current D                                                                                                          | Disadvantages of chain drive over other drives, Selection of Chain &                                                                                                               |            |    |
| <ul> <li>4.3 Gear Drives - Classification of gears, Law of gearing, gear terminology. Types of gear trains, their selection for different applications. Train value &amp; velocity ratio for simple, compound, reverted and epicyclic gear trains</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Sprocket wheels, methods of lubrication 4 Marks                                                                                                                                    |            |    |
| Types of gear trains, their selection for different applications. Train value & velocity ratio for simple, compound, reverted and epicyclic gear trains.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 4.3 Gear Drives – Classification of gears, Law of gearing, gear terminology.                                                                                                       |            |    |
| velocity ratio for simple, compound, reverted and epicyclic gear trains.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Types of gear trains, their selection for different applications. Train value &                                                                                                    |            |    |
| S. Flywheel and Governors                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | velocity ratio for simple, compound, reverted and epicyclic gear trains.                                                                                                           |            |    |
| 5. Flywheel and Governors       8 Marks         Specific objectives       > Differentiate between flywheel and governor         > Explain with neat sketch the construction and working of various governors         5.1 FlywheelConcept, function and application of flywheel with the help of turning moment diagram for single cylinder 4-Stroke I.C Engine (no Numericals)       04       08         Coefficient of fluctuation of energy, coefficient of fluctuation of speed and its significance.       5.2 Governors- Types, concept, function and application & Terminology of Governors.       04       08         5.3 Comparison between Flywheel and Governor.       6       6. Brakes and Dynamometers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 8 Marks                                                                                                                                                                            |            |    |
| Specific objectives       > Differentiate between flywheel and governor       > Explain with neat sketch the construction and working of various governors       > Staplain with neat sketch the construction and working of various governors         5.1 Flywheel – Concept, function and application of flywheel with the help of turning moment diagram for single cylinder 4-Stroke I.C Engine (no Numericals)       04       08         Coefficient of fluctuation of energy, coefficient of fluctuation of speed and its significance.       5.2 Governors- Types, concept, function and application & Terminology of Governors.       04       08         5.3 Comparison between Flywheel and Governor.       6       6 Brakes and Dynamometers.       06       08         Specific objectives       > List the differences between brakes and dynamometers       >       05       10         Comparison between Brakes & Dynamometers, Type of brakes & Dynamometers, comparison between brakes & Dynamometer.       05       10         Construction and working of i) shoe brake, ii)Band brake iii) Internal expending shoe brake iv) Disc Brake       05       10         6.4 Construction and working of i) Rope brake Dynamometer ii) Hydraulic Dynamometer.       06       12         Specific objectives       > Explain with neat sketch, the construction and working of various clutches and Bearings.       06       12         12       Calculate torque required to over come friction and power lost in friction in clutches and footstep bearings       06 <td< td=""><td>5. Flywheel and Governors 8 Marks</td><td></td><td></td></td<>                          | 5. Flywheel and Governors 8 Marks                                                                                                                                                  |            |    |
| <ul> <li>Differentiate between flywheel and governor</li> <li>Explain with neat sketch the construction and working of various governors</li> <li>5.1 Flywheel -Concept, function and application of flywheel with the help of turning moment diagram for single cylinder 4-Stroke I.C Engine (no Numericals)</li> <li>Coefficient of fluctuation of energy, coefficient of fluctuation of speed and its significance.</li> <li>5.2 Governors- Types, concept, function and application &amp; Terminology of Governors.</li> <li>5.3 Comparison between Flywheel and Governor.</li> <li>6. Brakes and Dynamometers</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Specific objectives                                                                                                                                                                |            |    |
| <ul> <li>Explain with neat sketch the construction and working of various governors</li> <li>5.1 Flywheel -Concept, function and application of flywheel with the help of turning moment diagram for single cylinder 4-Stroke I.C Engine (no Numericals)</li> <li>Coefficient of fluctuation of energy, coefficient of fluctuation of speed and its significance.</li> <li>5.2 Governors- Types, concept, function and application &amp; Terminology of Governors.</li> <li><b>5.3</b> Comparison between Flywheel and Governor.</li> <li><b>6. Brakes and Dynamometers.</b> 10Marks</li> <li>Specific objectives</li> <li>&gt; List the differences between brakes and dynamometers</li> <li>&gt; Calculate braking force, braking torque and power lost in friction in shoe and band brake</li> <li>6.1Function of brakes and Dynamometers. Type of brakes &amp; Dynamometers, comparison between brakes &amp; Dynamometer.</li> <li>6.2 Construction and working i) shoe brake, ii)Band brake iii) Internal expending shoe brake iv) Disc Brake</li> <li>6.3 Numerical problems to find braking force and braking torque and power for shoe and band brake.</li> <li>6.4 Construction and working of i) Rope brake Dynamometer ii) Hydraulic Dynamometer iii) Eddy current Dynamometer.</li> <li>7. Clutches and Bearings.</li> <li>Specific objectives</li> <li>&gt; Explain the difference between uniform pressure and uniform wear theories</li> <li>&gt; Explain the difference between uniform pressure and uniform wear theories</li> <li>&gt; Explain the difference between uniform pressure and uniform wear theories.</li> <li>2.1 Clutches and footstep bearings</li> </ul> | Differentiate between flywheel and governor                                                                                                                                        |            |    |
| governors       04         5.1 Flywheel -Concept, function and application of flywheel with the help of turning moment diagram for single cylinder 4-Stroke I.C Engine (no Numericals)       04       08         Coefficient of fluctuation of energy, coefficient of fluctuation of speed and its significance.       05       04       08         5.2 Governors- Types, concept, function and application & Terminology of Governors.       05       04       08         5.3 Comparison between Flywheel and Governor.       06       08       08         6. Brakes and Dynamometers.       10 Marks       08       08         Specific objectives       1 List the differences between brakes and dynamometers       06       10         6. If function of brakes and Dynamometers, comparison between brakes & Dynamometer.       05       10         6.3 Numerical problems to find braking force and braking torque and power for shoe and band brake.       05       10         6.3 Numerical problems to find braking force and braking torque and power for shoe and band brake.       05       10         7. Clutches and Bearings.       Specific objectives       2       2         9       Explain the difference between uniform pressure and uniform wear theories       06       12                                                                                                                                                                                                                                                                                                                                                                                        | $\triangleright$ Explain with neat sketch the construction and working of various                                                                                                  |            |    |
| 5.1 Flywheel – Concept, function and application of flywheel with the help of turning moment diagram for single cylinder 4-Stroke I.C Engine (no Numericals)       04       08         Coefficient of fluctuation of energy, coefficient of fluctuation of speed and its significance.       05       06         5.2 Governors- Types, concept, function and application & Terminology of Governors.       5.3 Comparison between Flywheel and Governor.       06       08         6.Brakes and Dynamometers.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | governors                                                                                                                                                                          |            |    |
| turning moment diagram for single cylinder 4-Stroke I.C Engine (no       04       08         Numericals)       Coefficient of fluctuation of energy, coefficient of fluctuation of speed and its significance.       05       06         5.2 Governors- Types, concept, function and application & Terminology of Governors.       08       08         5.3 Comparison between Flywheel and Governor.       08       08         6. Brakes and Dynamometers.       09       09         > List the differences between brakes and dynamometers       05       05         > Calculate braking force, braking torque and power lost in friction in shoe and band brake       05       10         6.1Function of brakes and Dynamometers, Type of brakes & Dynamometers, comparison between brakes & Dynamometer.       05       10         6.2 Construction and working i) shoe brake, ii)Band brake iii) Internal expending shoe brake iv) Disc Brake       05       10         6.3 Numerical problems to find braking force and braking torque and power for shoe and band brake.       04       06       12         7. Clutches and Bearings.       Specific objectives       06       12         8       Explain with neat sketch, the construction and working of various clutches bear inges.       06       12                                                                                                                                                                                                                                                                                                                                                                           | 5.1 Flywheel –Concept, function and application of flywheel with the help of                                                                                                       |            |    |
| Numericals)       Coefficient of fluctuation of energy, coefficient of fluctuation of speed and its significance.         5.2 Governors- Types, concept, function and application & Terminology of Governors.         5.3 Comparison between Flywheel and Governor.         6. Brakes and Dynamometers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | turning moment diagram for single cylinder 4-Stroke I.C Engine (no                                                                                                                 | 04         | 08 |
| Coefficient of fluctuation of energy, coefficient of fluctuation of speed and its significance.<br>5.2 Governors- Types, concept, function and application & Terminology of Governors.<br>5.3 Comparison between Flywheel and Governor.<br>6. Brakes and Dynamometers 10Marks<br>Specific objectives<br>> List the differences between brakes and dynamometers<br>> Explain with neat sketch the construction and working of various brakes and dynamometers<br>> Calculate braking force, braking torque and power lost in friction in shoe and band brake<br>6.1Function of brakes and Dynamometers, Type of brakes & Dynamometers, 05 10<br>comparison between brakes & Dynamometer.<br>6.2 Construction and working i) shoe brake, ii)Band brake iii) Internal expending shoe brake iv) Disc Brake<br>6.3 Numerical problems to find braking force and braking torque and power for shoe and band brake.<br>6.4 Construction and working of i) Rope brake Dynamometer ii) Hydraulic Dynamometer iii) Eddy current Dynamometer.<br>7. Clutches and Bearings.<br>Specific objectives<br>> Explain the difference between uniform pressure and uniform wear theories<br>> Explain with neat sketch, the construction and working of various clutches between uniform pressure and uniform wear theories<br>> Calculate torque required to over come friction and power lost in friction in clutches and footstep bearings.                                                                                                                                                                                                                                                                | Numericals)                                                                                                                                                                        |            |    |
| significance.         5.2 Governors. Types, concept, function and application & Terminology of Governors.         5.3 Comparison between Flywheel and Governor.         6. Brakes and Dynamometers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Coefficient of fluctuation of energy, coefficient of fluctuation of speed and its                                                                                                  |            |    |
| <ul> <li>5.2 Governors- Types, concept, function and application &amp; Terminology of Governors.</li> <li>5.3 Comparison between Flywheel and Governor.</li> <li>6. Brakes and Dynamometers</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | significance.                                                                                                                                                                      |            |    |
| Governors.         5.3 Comparison between Flywheel and Governor.         6. Brakes and Dynamometers.         Specific objectives         > List the differences between brakes and dynamometers         > Explain with neat sketch the construction and working of various brakes and dynamometers         > Calculate braking force, braking torque and power lost in friction in shoe and band brake         6.1Function of brakes and Dynamometers, Type of brakes & Dynamometers, comparison between brakes & Dynamometer.       05         6.2 Construction and working i) shoe brake, ii)Band brake iii) Internal expending shoe brake iv) Disc Brake       05         6.3 Numerical problems to find braking force and braking torque and power for shoe and band brake.       04         6.4 Construction and working of i) Rope brake Dynamometer ii) Hydraulic Dynamometer iii) Eddy current Dynamometer.       06         7. Clutches and Bearings.       Specific objectives         > Explain with neat sketch, the construction and working of various clutches       06         > Calculate torque required to over come friction and power lost in friction in clutches and footstep bearings       06                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 5.2 Governors- Types, concept, function and application & Terminology of                                                                                                           |            |    |
| 5.3 Comparison between Flywheel and Governor.         6. Brakes and Dynamometers.         9. List the differences between brakes and dynamometers         > Explain with neat sketch the construction and working of various brakes and dynamometers         > Calculate braking force, braking torque and power lost in friction in shoe and band brake         6.1Function of brakes and Dynamometers, Type of brakes & Dynamometers, comparison between brakes & Dynamometer.       05       10         6.2 Construction and working i) shoe brake, ii)Band brake iii) Internal expending shoe brake iv) Disc Brake       05       10         6.3 Numerical problems to find braking force and braking torque and power for shoe and band brake.       04       05       10         7. Clutches and Bearings.       Specific objectives       05       10         > Explain the difference between uniform pressure and uniform wear theories       06       12         12 Clutches and footstep bearings       07       10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Governors.                                                                                                                                                                         |            |    |
| <ul> <li>6. Brakes and Dynamometers</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 5.3 Comparison between Flywheel and Governor.                                                                                                                                      |            |    |
| <ul> <li>Specific objectives</li> <li>List the differences between brakes and dynamometers</li> <li>Explain with neat sketch the construction and working of various brakes and dynamometers</li> <li>Calculate braking force, braking torque and power lost in friction in shoe and band brake</li> <li>6.1Function of brakes and Dynamometers, Type of brakes &amp; Dynamometers, comparison between brakes &amp; Dynamometer.</li> <li>6.2 Construction and working i) shoe brake, ii)Band brake iii) Internal expending shoe brake iv) Disc Brake</li> <li>6.3 Numerical problems to find braking force and braking torque and power for shoe and band brake.</li> <li>6.4 Construction and working of i) Rope brake Dynamometer ii) Hydraulic Dynamometer iii) Eddy current Dynamometer.</li> <li>7. Clutches and Bearings.</li> <li>Specific objectives</li> <li>Explain the difference between uniform pressure and uniform wear theories</li> <li>Explain with neat sketch, the construction and working of various clutches</li> <li>Calculate torque required to over come friction and power lost in friction in clutches and footstep bearings</li> <li>7.1 Clutches Uniform pressure and Uniform Wear theories Eugetion of Clutche</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                 | 6. Brakes and Dynamometers 10Marks                                                                                                                                                 |            |    |
| <ul> <li>List the differences between brakes and dynamometers</li> <li>Explain with neat sketch the construction and working of various brakes and dynamometers</li> <li>Calculate braking force, braking torque and power lost in friction in shoe and band brake</li> <li>Calculate brakes and Dynamometers, Type of brakes &amp; Dynamometers, comparison between brakes &amp; Dynamometer.</li> <li>Construction and working i) shoe brake, ii)Band brake iii) Internal expending shoe brake iv) Disc Brake</li> <li>Numerical problems to find braking force and braking torque and power for shoe and band brake.</li> <li>Construction and working of i) Rope brake Dynamometer ii) Hydraulic Dynamometer iii) Eddy current Dynamometer.</li> <li>Clutches and Bearings.</li> <li>Specific objectives</li> <li>Explain the difference between uniform pressure and uniform wear theories</li> <li>Calculate torque required to over come friction and power lost in friction in clutches and footstep bearings</li> <li>Clutches uniform pressure and Uniform Wear theories Eurotion of Clutches</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Specific objectives                                                                                                                                                                |            |    |
| <ul> <li>Explain with neat sketch the construction and working of various brakes and dynamometers</li> <li>Calculate braking force, braking torque and power lost in friction in shoe and band brake</li> <li>6.1Function of brakes and Dynamometers, Type of brakes &amp; Dynamometers, comparison between brakes &amp; Dynamometer.</li> <li>6.2 Construction and working i) shoe brake, ii)Band brake iii) Internal expending shoe brake iv) Disc Brake</li> <li>6.3 Numerical problems to find braking force and braking torque and power for shoe and band brake.</li> <li>6.4 Construction and working of i) Rope brake Dynamometer ii) Hydraulic Dynamometer iii) Eddy current Dynamometer.</li> <li>7. Clutches and Bearings.</li> <li>Specific objectives</li> <li>Explain the difference between uniform pressure and uniform wear theories</li> <li>Explain with neat sketch, the construction and working of various clutches</li> <li>Calculate torque required to over come friction and power lost in friction in clutches and footstep bearings</li> <li>7.1 Clutches Uniform pressure and Uniform Wear theories Function of Clutches</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | List the differences between brakes and dynamometers                                                                                                                               |            |    |
| <ul> <li>and dynamometers</li> <li>Calculate braking force, braking torque and power lost in friction in shoe and band brake</li> <li>6.1Function of brakes and Dynamometers, Type of brakes &amp; Dynamometers, 05</li> <li>comparison between brakes &amp; Dynamometer.</li> <li>6.2 Construction and working i) shoe brake, ii)Band brake iii) Internal expending shoe brake iv) Disc Brake</li> <li>6.3 Numerical problems to find braking force and braking torque and power for shoe and band brake.</li> <li>6.4 Construction and working of i) Rope brake Dynamometer ii) Hydraulic Dynamometer iii) Eddy current Dynamometer.</li> <li>7. Clutches and Bearings.</li> <li>Specific objectives</li> <li>Explain the difference between uniform pressure and uniform wear theories</li> <li>Explain with neat sketch, the construction and working of various clutches</li> <li>Calculate torque required to over come friction and power lost in friction in clutches and footstep bearings</li> <li>7.1 Clutches Uniform pressure and Uniform Wear theories Function of Clutche</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Explain with neat sketch the construction and working of various brakes                                                                                                            |            |    |
| <ul> <li>➢ Calculate braking force, braking torque and power lost in friction in shoe and band brake</li> <li>6.1Function of brakes and Dynamometers, Type of brakes &amp; Dynamometers, comparison between brakes &amp; Dynamometer.</li> <li>6.2 Construction and working i) shoe brake, ii)Band brake iii) Internal expending shoe brake iv) Disc Brake</li> <li>6.3 Numerical problems to find braking force and braking torque and power for shoe and band brake.</li> <li>6.4 Construction and working of i) Rope brake Dynamometer ii) Hydraulic Dynamometer iii) Eddy current Dynamometer.</li> <li>7. Clutches and Bearings.</li> <li>Specific objectives</li> <li>➢ Explain the difference between uniform pressure and uniform wear theories</li> <li>➢ Calculate torque required to over come friction and power lost in friction in clutches and footstep bearings</li> <li>7.1 Clutches Uniform pressure and Uniform Wear theories Eunction of Clutches</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | and dynamometers                                                                                                                                                                   |            |    |
| <ul> <li>and band brake</li> <li>6.1Function of brakes and Dynamometers, Type of brakes &amp; Dynamometers, comparison between brakes &amp; Dynamometer.</li> <li>6.2 Construction and working i) shoe brake, ii)Band brake iii) Internal expending shoe brake iv) Disc Brake</li> <li>6.3 Numerical problems to find braking force and braking torque and power for shoe and band brake.</li> <li>6.4 Construction and working of i) Rope brake Dynamometer ii) Hydraulic Dynamometer iii) Eddy current Dynamometer.</li> <li>7. Clutches and Bearings.</li> <li>Specific objectives</li> <li>Explain the difference between uniform pressure and uniform wear theories</li> <li>Calculate torque required to over come friction and power lost in friction in clutches and footstep bearings</li> <li>7.1 Clutches Uniform pressure and Uniform Wear theories Function of Clutche</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Calculate braking force, braking torque and power lost in friction in shoe                                                                                                         |            |    |
| <ul> <li>6.1Function of brakes and Dynamometers, Type of brakes &amp; Dynamometers, comparison between brakes &amp; Dynamometer.</li> <li>6.2 Construction and working i) shoe brake, ii)Band brake iii) Internal expending shoe brake iv) Disc Brake</li> <li>6.3 Numerical problems to find braking force and braking torque and power for shoe and band brake.</li> <li>6.4 Construction and working of i) Rope brake Dynamometer ii) Hydraulic Dynamometer iii) Eddy current Dynamometer.</li> <li>7. Clutches and Bearings.</li> <li>Specific objectives</li> <li>➤ Explain the difference between uniform pressure and uniform wear theories</li> <li>➤ Calculate torque required to over come friction and power lost in friction in clutches and footstep bearings</li> <li>7.1 Clutches. Uniform pressure and Uniform Wear theories. Function of Clutches</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | and band brake                                                                                                                                                                     | - <b>-</b> | 10 |
| <ul> <li>comparison between brakes &amp; Dynamometer.</li> <li>6.2 Construction and working i) shoe brake, ii)Band brake iii) Internal expending shoe brake iv) Disc Brake</li> <li>6.3 Numerical problems to find braking force and braking torque and power for shoe and band brake.</li> <li>6.4 Construction and working of i) Rope brake Dynamometer ii) Hydraulic Dynamometer iii) Eddy current Dynamometer.</li> <li>7. Clutches and Bearings.</li> <li>Specific objectives</li> <li>Explain the difference between uniform pressure and uniform wear theories</li> <li>Explain with neat sketch, the construction and working of various clutches</li> <li>Calculate torque required to over come friction and power lost in friction in clutches and footstep bearings</li> <li>7.1 Clutches. Uniform pressure and Uniform Wear theories. Function of Clutches</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 6.1Function of brakes and Dynamometers, Type of brakes & Dynamometers,                                                                                                             | 05         | 10 |
| <ul> <li>6.2 Construction and working i) shoe brake, ii)Band brake iii) Internal expending shoe brake iv) Disc Brake</li> <li>6.3 Numerical problems to find braking force and braking torque and power for shoe and band brake.</li> <li>6.4 Construction and working of i) Rope brake Dynamometer ii) Hydraulic Dynamometer iii) Eddy current Dynamometer.</li> <li>7. Clutches and Bearings.</li> <li>Specific objectives</li> <li>Explain the difference between uniform pressure and uniform wear theories</li> <li>Explain with neat sketch, the construction and working of various clutches</li> <li>Calculate torque required to over come friction and power lost in friction in clutches and footstep bearings</li> <li>7.1 Clutches. Uniform pressure and Uniform Wear theories. Function of Clutches</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | comparison between brakes & Dynamometer.                                                                                                                                           |            |    |
| <ul> <li>shoe brake iv) Disc Brake</li> <li>6.3 Numerical problems to find braking force and braking torque and power for shoe and band brake.</li> <li>6.4 Construction and working of i) Rope brake Dynamometer ii) Hydraulic Dynamometer iii) Eddy current Dynamometer.</li> <li>7. Clutches and Bearings.</li> <li>Specific objectives</li> <li>Explain the difference between uniform pressure and uniform wear theories</li> <li>Explain with neat sketch, the construction and working of various clutches</li> <li>Calculate torque required to over come friction and power lost in friction in clutches and footstep bearings</li> <li>7.1 Clutches. Uniform pressure and Uniform Wear theories.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 6.2 Construction and working 1) shoe brake, 11)Band brake 111) Internal expending                                                                                                  |            |    |
| <ul> <li>6.3 Numerical problems to find braking force and braking torque and power for shoe and band brake.</li> <li>6.4 Construction and working of i) Rope brake Dynamometer ii) Hydraulic Dynamometer iii) Eddy current Dynamometer.</li> <li>7. Clutches and Bearings.</li> <li>Specific objectives</li> <li>Explain the difference between uniform pressure and uniform wear theories</li> <li>Explain with neat sketch, the construction and working of various clutches</li> <li>Calculate torque required to over come friction and power lost in friction in clutches and footstep bearings</li> <li>7.1 Clutches Lipiform pressure and Uniform Wear theories Eulerication of Clutches</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | shoe brake iv) Disc Brake                                                                                                                                                          |            |    |
| <ul> <li>shoe and band brake.</li> <li>6.4 Construction and working of i) Rope brake Dynamometer ii) Hydraulic Dynamometer iii) Eddy current Dynamometer.</li> <li>7. Clutches and Bearings.</li> <li>Specific objectives</li> <li>Explain the difference between uniform pressure and uniform wear theories</li> <li>Explain with neat sketch, the construction and working of various clutches</li> <li>Calculate torque required to over come friction and power lost in friction in clutches and footstep bearings</li> <li>7.1 Clutches. Uniform pressure and Uniform Wear theories. Explain of Clutches</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 6.3 Numerical problems to find braking force and braking torque and power for                                                                                                      |            |    |
| <ul> <li>6.4 Construction and working of 1) Rope brake Dynamometer 11) Hydraulic Dynamometer iii) Eddy current Dynamometer.</li> <li>7. Clutches and Bearings.</li> <li>Specific objectives</li> <li>Explain the difference between uniform pressure and uniform wear theories</li> <li>Explain with neat sketch, the construction and working of various clutches</li> <li>Calculate torque required to over come friction and power lost in friction in clutches and footstep bearings</li> <li>7.1 Clutches Uniform pressure and Uniform Wear theories Eulerication of Clutches</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | shoe and band brake.                                                                                                                                                               |            |    |
| <ul> <li>7. Clutches and Bearings.</li> <li>Specific objectives</li> <li>Explain the difference between uniform pressure and uniform wear theories</li> <li>Explain with neat sketch, the construction and working of various clutches</li> <li>Calculate torque required to over come friction and power lost in friction in clutches and footstep bearings</li> <li>7.1 Clutches Uniform pressure and Uniform Wear theories Eulerication of Clutches</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 6.4 Construction and working of 1) Rope brake Dynamometer 11) Hydraulic                                                                                                            |            |    |
| <ul> <li>7. Clutches and Bearings.</li> <li>Specific objectives</li> <li>Explain the difference between uniform pressure and uniform wear theories</li> <li>Explain with neat sketch, the construction and working of various clutches</li> <li>Calculate torque required to over come friction and power lost in friction in clutches and footstep bearings</li> <li>7.1 Clutches Uniform pressure and Uniform Wear theories Eulerication of Clutches</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Dynamometer 111) Eddy current Dynamometer.                                                                                                                                         |            |    |
| <ul> <li>Specific objectives</li> <li>Explain the difference between uniform pressure and uniform wear theories</li> <li>Explain with neat sketch, the construction and working of various clutches</li> <li>Calculate torque required to over come friction and power lost in friction in clutches and footstep bearings</li> <li>Clutches Uniform pressure and Uniform Wear theories Eulerication of Clutches</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | /. Cluicnes and Bearings.                                                                                                                                                          |            |    |
| <ul> <li>Explain the difference between uniform pressure and uniform wear theories</li> <li>Explain with neat sketch, the construction and working of various clutches</li> <li>Calculate torque required to over come friction and power lost in friction in clutches and footstep bearings</li> <li>Clutches Uniform pressure and Uniform Wear theories Eulerication of Clutches</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Specific objectives                                                                                                                                                                |            |    |
| <ul> <li>Explain with neat sketch, the construction and working of various clutches</li> <li>Calculate torque required to over come friction and power lost in friction in clutches and footstep bearings</li> <li>Clutches Uniform pressure and Uniform Wear theories Eulection of Clutches</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | ► Explain the difference between uniform pressure and uniform wear theories                                                                                                        |            |    |
| <ul> <li>Explain with heat sketch, the construction and working of various clutches</li> <li>Calculate torque required to over come friction and power lost in friction</li> <li>12</li> <li>Clutches and footstep bearings</li> <li>Clutches Uniform pressure and Uniform Wear theories Eulerion of Clutches</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Evaluin with next skatch, the construction and working of vertices and the                                                                                                         |            |    |
| in clutches and footstep bearings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <ul> <li>Explain with heat sketch, the construction and working of various clutches</li> <li>Colculate torage required to over some friction and never lost in friction</li> </ul> | 06         | 12 |
| 7.1 Clutches Uniform pressure and Uniform Wear theories Eulerion of Clutch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <ul> <li>Calculate torque required to over come inclion and power lost in inclion<br/>in clutches and footstop hearings</li> </ul>                                                 |            |    |
| 7.1 Clutches Uniform pressure and Uniform Wear theories Eulerian of Clutch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | in clutches and toolstep beatings                                                                                                                                                  |            |    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 7.1 Clutches- Uniform pressure and Uniform Wear theories Eulerian of Clutch                                                                                                        |            |    |
| and its application, Construction and working of i) Single plate clutch. ii)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | , it enteres "entern pressure and entern wear deertes. I diedon of ender                                                                                                           | 1          |    |

| Multiplate clutch, iii) Centrifugal Clutch iv) Cone clutch v) Diaphragm clutch, (Simple numericals on single and Multiplate clutches). |    |     |
|----------------------------------------------------------------------------------------------------------------------------------------|----|-----|
| 7.2 Bearings- i) Simple Pivot, ii) Collar Bearing iii) conical pivot. Torque and                                                       |    |     |
| power lost in friction. (Simple numericals)                                                                                            |    |     |
| 8. Balancing                                                                                                                           |    |     |
| Specific objectives                                                                                                                    |    |     |
| Explain the concept of balancing                                                                                                       | 02 | 06  |
| Find balancing mass and position of plane, analytically and graphically.                                                               | 02 | 00  |
| 8.1 Concept of balancing. Balancing of single rotating mass. Analytical/Graphical                                                      |    |     |
| methods for balancing of several masses revolving in same plane.                                                                       |    |     |
| Total                                                                                                                                  | 48 | 100 |

### **Practicals:** Skills to be developed:

# **Intellectual Skills:**

- 1. Determine velocity and acceleration of links in a given mechanism.
- 2. Analyse balancing of rotating masses in a single plane.
- 3. Interpret interrelationship between components of various braking mechanisms.
- 4. Compare various power transmission devices.

# Motor Skills:

- 1. Drawing of velocity and acceleration diagrams.
- 2. Dismantle and assemble given brakes and clutches.
- 3. Draw cam profiles for a given application
- 4. Draw velocity and acceleration diagram of the given mechanisms
- 5. Draw force polygon for unbalanced masses revolving in same plane

Note - The Term work shall consist of Journal / lab manual and A-3 size sketch book.

# **List of Practical:**

- 1. Sketch and describe working of quick return mechanism for a shaper. Find the ratio of time of cutting stroke to the return stroke to understand quick return motion in shaping operation.
- 2. Sketch and describe the working of the following mechanisms with its application,
  - a) Bicycle free wheel sprocket mechanism
  - b) Geneva mechanism
  - c) Ackerman's steering gear mechanism
  - d) Foot operated air pump mechanism
- 3. Determine velocity and acceleration of various links of the given two mechanism, by relative velocity method for analysis of motion of links.
- 4. Determine velocity and acceleration in an I. C. engine's slider crank mechanism by Kleins's construction.
- 5. Draw the profile of a radial cam for the given follower type to obtain the desired follower motion.
- 6. Determine slip, length of belt, angle of contact in an open belt drive to understand its performance.
- 7. Draw a schematic diagram of centrifugal governor and describe its working. Draw a graph between radius of rotation versus speed of governor to understand its function.

- 8. Dismantle and assemble mechanically operated braking mechanism of two wheelers. Sketch the two wheeler braking system and identify the functions of various components.
- 9. Dismantle and assemble multi-plate clutch of two wheeler. Draw neat sketch and state the functions of various components.
- 10. Determine graphically counterbalance mass and its direction for complete balancing of a system of several masses rotating in a single plane.

| DOOR       | . <b>D</b> •       |                |         |                                                 |
|------------|--------------------|----------------|---------|-------------------------------------------------|
| Sr.<br>No. | Title              | Author         | Edition | Publication                                     |
| 01         | Theory of Machines | Khurmi Gupta   |         | Eurasia publishing House Pvt. Ltd. 2006 edition |
| 02         | Theory of Machines | S.S. Rattan    | Third   | McGraw Hill companies, II Edition               |
| 03         | Theory of Machines | P.L. Ballaney  |         | Khanna Publication                              |
| 04         | Theory of Machines | Jagdishlal     |         | Bombay metro-politan book limited               |
| 05         | Theory of Machines | Sadhu Singh    | Second  | Pearson                                         |
| 06         | Theory of Machines | Ghosh – Mallik |         | Affiliated East west press                      |
| 07         | Theory of Machines | Thomas Bevan   | Third   | Pearson                                         |
| 08         | Theory of Machines | J.E. Shigley   | Third   | Oxford                                          |

#### Learning Resources: Books:

Course Name : Mechanical Engineering Group Course Code : AE/ME/PG/PT/MH/MI Semester : Fourth Subject Title : Professional Practices-II Subject Code : **17035** 

# **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |    | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH | PR        | OR        | TW  | TOTAL |
|                 |    | 02 |              |    |           |           | 50@ | 50    |

# **Rational:**

The purpose of introducing Professional practices is to fulfill the need of students to stand in today's global market with knowledge and confidence. This can be achieved by arranging industrial visits, expert lectures attitude to present them-selves, get alternative solutions and validation of the selected alternatives, socially relevant activities, and modular courses. Professional Practices is helpful in broadening technology base of students beyond curriculum. Model making exercises allow students to think more creatively and innovatively and inculcating habit of working with their own hands. Modular courses are introduced with a view of learning and acquiring higher technology skills through industry experts and consultants from the respective fields.

# **Objectives:**

The student will be able to:

- 1) Acquire information from different sources.
- 2) Prepare notes for given topics
- 3) Present seminar using power projection system.
- 4) Interact with peers to share thoughts.
- 5) Work in a team and develop team spirit.

# **Intellectual Skill:**

Student will be able to-

- 1) Search information from various resources.
- 2) Prepare notes on selected topics.
- 3) Participate in group discussions.

# **Motor Skills:**

- 1) Observe industrial practices during visits.
- 2) Prepare slides / charts for presentation in seminar.
- 3) Develop a model

# **Learning Structure:**

| Applications | Gaining confidence in report writing and presentations skills in identified contents of curriculum, apply knowledge in model making. Developing self learning habbit. |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |                                                                                                                                                                       |
| Procedures   | Writing skill, expert lectures, seminars, industrial visit, material conversion processes, brain storming technique.                                                  |
|              |                                                                                                                                                                       |
| Concepts     | Industry Institute Interaction, Team work, brain storming, information search.                                                                                        |
|              |                                                                                                                                                                       |
| Facts        | Contents of identified topics, Industrial experts, models, equipments, machinery, projection system, etc.                                                             |

## **Content:**

| Topic & Content                                                                                                      | Hours |
|----------------------------------------------------------------------------------------------------------------------|-------|
| 1: Information Search –                                                                                              |       |
| Information search be made through manufacturers catalogue, Hand books, magazines                                    |       |
| journal and websites, and submit a report on any Two Topics in a group of 3 to 4                                     |       |
| students, report size shall not be more than 10 pages.                                                               |       |
| Following topics are suggested, any other equivalent topics may be selected.                                         |       |
| i) Present scenario of electric power generation in Maharashtra state /India.                                        |       |
| ii) Composite materials – Types, properties & application                                                            |       |
| iii) Material handling equipments commonly used in industries.                                                       |       |
| iv) Advances in Automobile engines.                                                                                  |       |
| v) Hydraulic steering systems of Automobile.                                                                         |       |
| vi) Mechanisms used to produce straight-line motion                                                                  |       |
| vi) Mechanisms used for generating intermittent motion                                                               |       |
| viii) Advanced surface coating techniques like chemical vapor deposition ion                                         | 10    |
| implantation physical vapor deposition                                                                               | 10    |
| ix) Types of cutting tools- specification materials and applications                                                 |       |
| x) Booking of E-Tickets for Railways/Buses/Air travel                                                                |       |
| x) Profiles of 2 multinational companies                                                                             |       |
| xi) Figure lubricants, coolants and additives                                                                        |       |
| xii) Englie fublicants, coolants and additives                                                                       |       |
| xin) ABS(anti lock braking systems)                                                                                  |       |
| xiv) ADS(alli lock blaking systems)<br>xiv) MDEI(multi point fuel injection) system                                  |       |
| xv) MPFI(multi point fuel injection) system<br>xvi) Pole of MIDC MSSIDC DIC Einensiel institutions in development of |       |
| xvi) Role of MIDC, MSSIDC, DIC, Financial institutions in development of                                             |       |
| industrial sector.                                                                                                   |       |
| xvii) Solar energy systems - Components and their functions, applications                                            |       |
| xviii)Design data book - Study and use of types of data.                                                             |       |
| 2. Lectures by professionals/Industry Experts-                                                                       |       |
| Two lectures of two hour duration be arranged on any two topics suggested below or any                               |       |
| other suitable topics to acquire practical information beyond scope of curriculum.                                   |       |
| Students shall prepare a brief report of each lecture as a part of their term work.                                  |       |
| 1) Components of project Report.                                                                                     |       |
| ii) Various loan schemes of banks, LIC and other agencies for education and                                          |       |
| other purposes.                                                                                                      |       |
| iii) Use of plastics & rubbers in Automobiles industries.                                                            |       |
| iv) Type of processes used to protect material surfaces from environmental effect.                                   |       |
| v) Product life cycle.                                                                                               | 06    |
| vi) Industrial application of mechatronics.                                                                          | 00    |
| vii) Special features of CNC machines                                                                                |       |
| viii) Gear manufacturing & gear teeth finishing processes.                                                           |       |
| ix) Gear boxes-industrial & Automobile applications.                                                                 |       |
| x) Super-finishing operation & their industrial applications.                                                        |       |
| xi) Processing methods for plastic components.                                                                       |       |
| xii) Features of modern boilers                                                                                      |       |
| xiii) Strainers and filters –Types, functions and applications                                                       |       |
| xiv) Industrial drives-Types, components, comparison and applications.                                               |       |
| xv) Introduction to Apprenticeship Training Scheme                                                                   |       |
| 3. Seminars:                                                                                                         |       |
| One seminar be arranged on the subjects related to 4 <sup>th</sup> semester. Or topics beyond                        |       |
| curriculum.                                                                                                          | 06    |
| Each student shall submit a report up to 10 pages and deliver the seminar.                                           |       |
| batch size – 2-3 students.                                                                                           |       |

| Source of information – books, magazine, Journals, Website, surveys,                       |    |
|--------------------------------------------------------------------------------------------|----|
| Topics suggested for guidance-                                                             |    |
|                                                                                            |    |
| i) Clutches- Types, Principles, working, & applications.                                   |    |
| ii) High pressure boilers.                                                                 |    |
| iii) Heat exchangers-Types, working, applications.                                         |    |
| iv) Hydraulic turbines-Types, working, & applications.                                     |    |
| v) Hydraulic pumps -Types, working, & applications.                                        |    |
| vi) Sensors -Types, principle, & applications.                                             |    |
| vii) Super conductor technology - Types, principle, & applications.                        |    |
| viii) Semi conductors Types, materials, & applications.                                    |    |
| ix) Industrial breaks- Types, construction, working, & applications.                       |    |
| 4. Industrial Visits                                                                       |    |
| Structured industrial visits be arranged and report of the same shall be submitted by each |    |
| student to form a part of the term work.                                                   |    |
| No of visits- At least one                                                                 |    |
| Scale of industry- medium scale unit, large scale unit.                                    |    |
| Group size- practical batch                                                                |    |
| Report-not exceeding 7 to 10 pages.                                                        |    |
| Purpose :                                                                                  |    |
| ➤ To study the profile of industry                                                         |    |
| ➢ To see the advanced manufacturing processes & machinery.                                 |    |
| ➢ To observe working of CNC machines, work centre's ,flexible manufacturing                |    |
| systems                                                                                    |    |
| > To observe working in foundry , forging shop, press shop, heat treatment shop etc.       |    |
| ➢ To observe chip less manufacturing machines & processes.                                 |    |
| ➤ To study process sheets , quality control charts & production drawings, metallurgical    |    |
| testing laboratory                                                                         | 08 |
| ➢ To observe Tool room, standards room etc.                                                |    |
|                                                                                            |    |
| Following types of industries may be visited in & around the institute.                    |    |
| i) Foundry                                                                                 |    |
| ii) Forging units                                                                          |    |
| iii) Sheet metal processing unit                                                           |    |
| iv) Machine/ Automobile component manufacturing unit                                       |    |
| v) Fabrication unit/ powder metallurgy component manufacturing unit.                       |    |
| vi) Machine tool manufacturing unit.                                                       |    |
| vii) Any processing industry like chemical, textile, sugar, agriculture, fertilizer        |    |
| industries.                                                                                |    |
| viii) Auto workshop / four wheeler garage.                                                 |    |
| ix) City water supply pumping station                                                      |    |
| x) Hydro electric power plant,                                                             |    |
| xi) Wind mills, Solar Park                                                                 |    |

| 5. Socially Relevant Activities                                                               |            |
|-----------------------------------------------------------------------------------------------|------------|
| Conduct any one activity through active participation of students and write the report.       |            |
| Group of students- maximum 4                                                                  |            |
| Report- Not more than 6 pages                                                                 |            |
| List of suggested activities- ( activities may be thought in terms of campus improvement)     |            |
| i) Awareness about carbon credit                                                              |            |
| ii) Anticorruption movement                                                                   | 06         |
| iii) Awareness about cyber crimes.                                                            | 00         |
| iv) Developing good citizens.                                                                 |            |
| v) Management of E- WASTE                                                                     |            |
| vi) Recycling of waste materials.                                                             |            |
| vii) Accident prevention & enforcement of safely rules.                                       |            |
| viii) Awareness about pollution and pollution control.                                        |            |
| ix) Any other relevant activity may be performed)                                             |            |
| 6. Mini Projects                                                                              |            |
| Students, in a group of 4, shall perform any one activity listed below.                       |            |
| i) Model making out of card board paper, wood thermocol, plastics, metal, clay etc            |            |
| a) Any new idea/principle converted into model                                                |            |
| b) Mechanisms                                                                                 |            |
| c) Jigs/fixtures                                                                              |            |
| d) Material handling device etc                                                               |            |
| ii) Toy making with simple operating mechanisms                                               |            |
| iii Layout of workshop/department/college                                                     |            |
| iv) Experimental set un/testing of a parameter                                                |            |
| y) Display heard indicating different type of machine components like hearing                 |            |
| fasteners couplings nine fitting valves cams & followers exploded views of                    |            |
| assemblies type of welding equipment welding rods (drawings photo graphs)                     |            |
| vi) Any relevant project which will make students to collect information & work with          |            |
| their own hands                                                                               |            |
| Students shall arrange exhibition of all mini projects in the class/hall and present the task |            |
| to the audience/ experts/examiners. The student shall submit a brief report (May 5 pages)     | 12         |
| of the mini project                                                                           | 12         |
| OR                                                                                            |            |
| Modular course:                                                                               |            |
| Modular courses on any one of the suggested or equivalent tonic be undertaken by a            |            |
| group of 15 to 20 students                                                                    |            |
| i) Advance features in CAD                                                                    |            |
| i) Mashing of solid model using any suitable software                                         |            |
| iii) Developing Unfold Sheet or Hyperblank by using Planking Software                         |            |
| iv) CAM Software                                                                              |            |
| v) Paging of DLC programming                                                                  |            |
| v) Basics of FLC programming<br>vi) Applications of machatronics                              |            |
| vi) Applications of mechanomics                                                               |            |
| vii) riping recimology                                                                        |            |
| viii) vioueni packaging technology                                                            |            |
| x) Dio proventia Dobota                                                                       |            |
| x) Dio-pheumatic Kobols<br>vi) Dio miniary                                                    |            |
|                                                                                               | 40         |
| Total                                                                                         | <b>4</b> ð |

### Note:-

The students who wish to undergo in plant training shall go through details regarding it in the syllabus of Professional Practices – III for fifth semester and complete the training in summer vacation at the end of fourth semester examination.

All such students will be assessed out of ten marks as per guidelines mentioned in the curriculum of professional practice III in the fifth semester

# **Learning Resources:**

# 1. Books:

| Sr.<br>No. | Author                       | Title                                                                         | Publisher                     |  |  |  |  |
|------------|------------------------------|-------------------------------------------------------------------------------|-------------------------------|--|--|--|--|
| 01         | NRDC, Publication Bi         | Invention Intelligence                                                        | National Research Development |  |  |  |  |
| 01         | Monthly Journal              | Journal                                                                       | Corporation, GOI.             |  |  |  |  |
| 02         | DK Publishing                | How things works                                                              | DK Publishing                 |  |  |  |  |
|            | DKTuonsning                  | encyclopedia                                                                  | DKTublishing                  |  |  |  |  |
| 03         | Trott                        | Innovation mgmt.& new                                                         | Pearson Education             |  |  |  |  |
| 05         | 1100                         | product development                                                           |                               |  |  |  |  |
| 04         | EH McGrath SI                | Basic Managerial Skills                                                       | рні                           |  |  |  |  |
| 04         | E.II. MeOraul, S.J.          | for All – Ninth Edition                                                       | 1111                          |  |  |  |  |
| 05         | Apprenticeship Training Se   | Apprenticeship Training Scheme:- Compiled By – BOAT (Western Region), Mumbai, |                               |  |  |  |  |
| 05         | Available on MSBTE Web Site. |                                                                               |                               |  |  |  |  |

# 2. Web sites

www.engineeringforchange.org www.wikipedia.com www.slideshare.com www.teachertube.com

# Course Name : All Branches of Diploma in Engineering & Technology Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG Industrial Training (Optional) after 4<sup>th</sup> semester examination.

Note:- Examination in Professional Practices of 5<sup>th</sup> Semester.

# INDUSTRIAL TRAINING (OPTIONAL)

# Rational:-

There was a common suggestion from the industry as well as other stakeholders that curriculum of Engineering and Technology courses should have Industrial training as part of the curriculum. When this issue of industrial training was discussed it was found that it will be difficult to make industrial training compulsory for all students of all courses as it will be difficult to find placement for all the students. It is therefore now proposed that this training can be included in the curriculum as optional training for student who is willing to undertake such training on their own. The institutes will help them in getting placement or also providing them requisite documents which the student may need to get the placement.

Details:- Student can undergo training in related industries as guided by subject teachers / HOD.

- The training will be for four weeks duration in the summer vacation after the fourth semester examination is over.
- The student undergoing such training will have to submit a report of the training duly certified by the competent authority from the industry clearly indicating the achievements of the student during training. This submission is to be made after joining the institute for Fifth semester.
- The student completing this training will have to deliver a seminar on the training activities based on the report in the subject Professional Practices at Fifth Semester.
- The student undergoing this training will be exempted from attending activities under Professional Practices at Fifth semester except the seminar.
- The students who will not undergo such training will have to attend Professional Practices Classes/activities of fifth semester and will have to complete the tasks given during the semester under this head.
- There work will be evaluated on their submissions as per requirement and will be given marks out of 50. Or student may have to give seminar on training in Industry he attended.
- Institute shall encourage and guide students for Industry training.
- Evaluation:- Report of Training attended and delivery of seminar and actual experience in Industry will be evaluated in fifth semester under Profession Practices-III and marks will be given accordingly out of 50.

'G' Scheme

WITH EFFECT FROM 2012-13

**DURATION: 16 WEEKS** 

### MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI UD

# TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES

# **COURSE NAME : DIPLOMA IN AGRICULTURE ENGINEERING**

### **COURSE CODE : AU**

# **DURATION OF COURSE : 6 SEMESTERS**

# **SEMESTER : FOURTH**

# **PATTERN : FULL TIME - SEMESTER**

#### **SCHEME : G** TEACHING **EXAMINATION SCHEME** SR. Abbrev SUB SW SCHEME SUBJECT TITLE **TH**(1) **PR (4)** OR (8) TW (9) PAPER CODE NO (17400)iation ΤН TU PR HRS. Min Min Max Min Max Max Min Max Environmental Studies \$ EST 17401 01 --02 01 50\*# 20 --25@ 10 ------02 2 Soil Mechanics SME 17450 02 --02 50 20 25# 10 25@ 10 ----Surveying & Levelling SLE 04 3 17451 03 03 100 40 50# 20 25@ 10 ------17452 02 Hydraulics HYC 03 03 100 40 50# 20 25@ 10 4 --\_\_\_ --50 Farm Power & Tractor FTS 17453 03 02 03 40 5 100 25@ 10 -----------Systems Agricultural Economics and AEM 17454 03 03 100 40 6 --------------**Business Management** 7 Manufacturing Technology MTG 17047 ----04 ------50# 20 ----50@ 20 TOTAL 15 16 500 175 175 50 ---------------

# Student Contact Hours Per Week: 31 Hrs.

# THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.

Total Marks: 900

No Theory Examination, \$ - Common to all branches,  $\beta$  - Common to Mechanical & @ - Internal Assessment, # - External Assessment, Chemical Engineering Groups, \*# - On Line Theory Examination.

Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work

> Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subjects is to be converted out of 50 marks as sessional work (SW).

> Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

Code number for TH, PR, OR, TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.

**Course Name : All Branches of Diploma in Engineering & Technology** 

# Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG/AU

Semester : Fourth

Subject Title : Environmental Studies

Subject Code : 17401

**Teaching and Examination Scheme:** 

| Teaching Scheme |    |    |              |      | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|------|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH   | PR        | OR        | TW  | TOTAL |
| 01              |    | 02 | 01           | 50#* |           |           | 25@ | 75    |

# **\*# Online Theory Examination**

NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

# **Rationale:**

Environment essentially comprises of our living ambience, which gives us the zest and verve in all our activities. The turn of the twentieth century saw the gradual onset of its degradation by our callous deeds without any concern for the well being of our surrounding we are today facing a grave environmental crisis. The unceasing industrial growth and economic development of the last 300 years or so have resulted in huge ecological problems such as overexploitation of natural resources, degraded land, disappearing forests, endangered species, dangerous toxins, global warming etc.

It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

The curriculum covers the aspects about environment such as Environment and Ecology, Environmental impacts on human activities, Water resources and water quality, Mineral resources and mining, Forests, etc.

General Objectives: The student will be able to,

- 1. Understand importance of environment
- 2. Know key issues about environment
- 3. Understands the reasons for environment degradation
- 4. Know aspects about improvement methods
- 5. Know initiatives taken by the world bodies to restrict and reduce degradation

# **Learning Structure:**



# Theory:

| Topic and Contents                                                                                                                       | Hours | Marks |
|------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
| Topic 1: Nature of Environmental Studies                                                                                                 |       |       |
| Specific Objectives:                                                                                                                     |       |       |
| Define the terms related to Environmental Studies                                                                                        |       |       |
| State importance of awareness about environment in general public                                                                        | 01    | 04    |
| Contents:                                                                                                                                | 01    | 04    |
| • Definition, Scope and Importance of the environmental studies                                                                          |       |       |
| <ul> <li>Importance of the studies irrespective of course</li> </ul>                                                                     |       |       |
| • Need for creating public awareness about environmental issues                                                                          |       |       |
| Topic 2: Natural Resources and Associated Problems                                                                                       |       |       |
| Specific Objectives:                                                                                                                     |       |       |
| Define natural resources and identify problems associated with<br>them                                                                   |       |       |
| Lightifu uses and their eventual situation                                                                                               |       |       |
| <ul> <li>Identify uses and their overexploitation</li> <li>Identify alternate resources and their importance for environment.</li> </ul> |       |       |
| Contents:                                                                                                                                |       |       |
| 2.1 Benewable and Non renewable resources                                                                                                |       |       |
| Definition                                                                                                                               |       |       |
| Associated problems                                                                                                                      |       |       |
| • Associated problems                                                                                                                    |       |       |
| Conoral description of forest resources                                                                                                  |       |       |
| <ul> <li>General description of forest resources</li> <li>Eunstions and henefits of forest resources</li> </ul>                          |       |       |
| <ul> <li>Functions and benefits of forest fesources</li> <li>Effects on environment due to deforestation. Timber extraction</li> </ul>   |       |       |
| Effects on environment due to deforestation, Timber extraction,     Building of dams, waterways etc.                                     | 0.4   | 10    |
| 2 3 Water Resources                                                                                                                      | 04    | 10    |
| Hydrosphere: Different sources of water                                                                                                  |       |       |
| <ul> <li>Hydrosphere. Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> </ul>                |       |       |
| Effect of floods, draught, dams atc, on water resources and                                                                              |       |       |
| community                                                                                                                                |       |       |
| 2.4 Mineral Resources:                                                                                                                   |       |       |
| Categories of mineral resources                                                                                                          |       |       |
| <ul> <li>Basics of mining activities</li> </ul>                                                                                          |       |       |
| <ul> <li>Mine safety</li> </ul>                                                                                                          |       |       |
| <ul> <li>Effect of mining on environment</li> </ul>                                                                                      |       |       |
| 2.5 Food Resources:                                                                                                                      |       |       |
| • Food for all                                                                                                                           |       |       |
| Effects of modern agriculture                                                                                                            |       |       |
| World food problem                                                                                                                       |       |       |
| Topic 3. Ecosystems                                                                                                                      |       |       |
| Concept of Ecosystem                                                                                                                     |       |       |
| Structure and functions of ecosystem                                                                                                     | 01    | 04    |
| <ul> <li>Energy flow in ecosystem</li> </ul>                                                                                             | 01    | 01    |
| <ul> <li>Major ecosystems in the world</li> </ul>                                                                                        |       |       |
| Topic 4. Biodiversity and Its Conservation                                                                                               |       |       |
| Definition of Biodiversity                                                                                                               |       |       |
| Levels of biodiversity                                                                                                                   | 02    | 06    |
| Value of biodiversity                                                                                                                    |       |       |

| Threats to biodiversity                                          |    |     |
|------------------------------------------------------------------|----|-----|
| Conservation of biodiversity                                     |    |     |
| Topic 5. Environmental Pollution                                 |    |     |
| Definition                                                       |    |     |
| • Air pollution: Definition, Classification, sources, effects,   | 02 | 0.9 |
| prevention                                                       |    |     |
| • Water Pollution: Definition, Classification, sources, effects, | 05 | 08  |
| prevention                                                       |    |     |
| • Soil Pollution: Definition, sources, effects, prevention       |    |     |
| Noise Pollution: Definition, sources, effects, prevention        |    |     |
| Topic 6. Social Issues and Environment                           |    |     |
| Concept of development, sustainable development                  |    | 10  |
| • Water conservation, Watershed management, Rain water           |    |     |
| harvesting: Definition, Methods and Benefits                     | 03 |     |
| Climate Change, Global warming, Acid rain, Ozone Layer           | 03 |     |
| Depletion, Nuclear Accidents and Holocaust: Basic concepts       |    |     |
| and their effect on climate                                      |    |     |
| Concept of Carbon Credits and its advantages                     |    |     |
| Topic 7. Environmental Protection                                |    |     |
| Brief description of the following acts and their provisions:    |    |     |
| Environmental Protection Act                                     |    |     |
| Air (Prevention and Control of Pollution) Act                    |    |     |
| Water (Prevention and Control of Pollution) Act                  | 02 | 08  |
| Wildlife Protection Act                                          | 02 | 00  |
| Forest Conservation Act                                          |    |     |
| Population Growth: Aspects, importance and effect on             |    |     |
| environment                                                      |    |     |
| Human Health and Human Rights                                    |    |     |
| Total                                                            | 16 | 50  |

# **Practical:** Skills to be developed:

# Intellectual Skills:

- 1. Collection of information, data
- 2. Analysis of data
- 3. Report writing

# Motor Skills:

- 1. Presentation Skills
- 2. Use of multi media

# **List of Projects:**

**Note:** Any one project of the following:

- 1. Visit to a local area to document environmental assets such as river / forest / grassland / hill / mountain
- 2. Visit to a local polluted site: Urban/Rural/Industrial/Agricultural
- 3. Study of common plants, insects, birds
- 4. Study of simple ecosystems of ponds, river, hill slopes etc

Prepare a project report on the findings of the visit illustrating environment related facts, analysis and conclusion. Also suggest remedies to improve environment.

Learning Resources: Books:

| Sr.<br>No. | Author                                                | Title                                        | Publisher               |  |
|------------|-------------------------------------------------------|----------------------------------------------|-------------------------|--|
| 01         | Anindita Basak                                        | Environmental Studies                        | Pearson Education       |  |
| 02         | R. Rajgopalan                                         | Environmental Studies<br>from Crises to Cure | Oxford University Press |  |
| 03         | Dr. R. J. Ranjit Daniels, Dr.<br>Jagdish Krishnaswamy | Environmental Studies                        | Wiley India             |  |

Course Name : Diploma in Agriculture EngineeringCourse code : AUSemester : FourthSubject Title : Soil MechanicsSubject Code : 17450

# **Teaching and Examination Scheme:**

| Teac | ching Sch | neme |               |    | Examinati | on Scheme |      |       |
|------|-----------|------|---------------|----|-----------|-----------|------|-------|
| TH   | TU        | PR   | PAPER<br>HRS. | TH | PR        | OR        | TW   | TOTAL |
| 02   |           | 02   | 02            | 50 | 25 #      |           | 25 @ | 100   |

# NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

# **Rationale:**

Every engineering structure such as building, bridges, dams, towers, monuments etc. are supported by soil and rock the stability of these structures depends upon behaviors of soil and capacity of soil to carry loads under different environmental conditions. The soil and rocks are also used as construction materials for embankments, roads, dams, mud walls etc.

Thus it becomes mandatory to learn this subject which includes knowledge of physical properties, classification of soil, its behavior and various techniques to improve soil properties as well as agricultural structures viz. farm stead's, poultry houses, dairy barns, water supply system and sanitations, grain storage structures and silos.

# **Objectives:**

The student will be able to,

- 1. Explain soil as three phase system and establish relationships between soil properties.
- 2. To determine properties of soil by standard tests, procedures and plot particle size distribution curves.
- 3. Determine permeability by constant head and falling head tests by using Darcy's law.
- 4. Obtained Optimum Moisture Content and Maximum Dry Density for any soil samples by performing Proctor compaction tests.

# **Learning Structure:**



# Theory:

| Chapter | Name of the topic                                                    | Hours | Marks |
|---------|----------------------------------------------------------------------|-------|-------|
|         | Overview of Soil Mechanics                                           |       |       |
|         | 1.1 Definition of soil and introduction to soil formation.           |       |       |
|         | 1.2 Importance of soil in Civil Engineering as construction          |       |       |
|         | material and as Foundation material.                                 |       |       |
| 01      | 1.3 Field applications of soil mechanics-for foundation design,      | 04    | 06    |
|         | pavement design, design of earth retaining structures, design of     |       |       |
|         | earthen dams.                                                        |       |       |
|         | 1.4 Various constituents of soil and their importance, soil as       |       |       |
|         | medium of plant growth. Major soils of India.                        |       |       |
|         | Basic soil properties                                                |       |       |
|         | 2.1 Composition of soil, soil as three phase system, weight          |       |       |
|         | relationships, volume relationship, soil structure, factors          |       |       |
|         | affecting soil structure, bulk density, particle density of soil,    |       |       |
|         | soil consistency, Porosity, voids ratio, inter relationships,        |       |       |
|         | Water content, Degree of saturation, specific gravity,               |       |       |
|         | Available soil moisture, Field capacity, Permanent wilting           |       |       |
|         | percentage, Drainable porosity. Wilting point, ultimate wilting      |       |       |
| 02      | and wilting range. Relationships between soil properties.            | 12    | 16    |
| 02      | 2.2 Soil moisture content, methods of soil moisture content          | 12    | 10    |
|         | determinations.                                                      |       |       |
|         | 2.3 Retention of soil moisture, maximum retentive capacity,          |       |       |
|         | 2.4 Experimental determination of water content, unit weight,        |       |       |
|         | specific gravity.                                                    |       |       |
|         | 2.5 Consistency of clay soils, stages of consistency, Atterbergs     |       |       |
|         | limit of consistency, plasticity index, determination of liquid      |       |       |
|         | limit, plastic limit, shrinkage limit.                               |       |       |
|         | 2.6 Numerical problems on above topic                                |       |       |
|         | Soil classification                                                  |       |       |
|         | 3.1 Need for soil classification, Criteria for classification, Grain |       |       |
|         | size classification, classification based on plasticity, symbols     |       |       |
| 03      | and graphical representation.                                        | 04    | 06    |
|         | 3.2 Textural classification of soils.                                | -     |       |
|         | 3.3 Mechanical analysis, Particle size distribution curve, Effective |       |       |
|         | diameter of soil, Uniformity coefficient, coefficient of             |       |       |
|         | curvature.                                                           |       |       |
|         | Permeability, seepage and capillarity                                |       |       |
|         | 4.1 Soli moisture - Modes of soli moisture occurrence, adsorbed      |       |       |
|         | water, capillary water and free water. Darcy's law, Coefficient      |       |       |
|         | of permeability, inflitration and inflitration rate, soil air and    |       |       |
|         | aeration. Soil temperature, Soil tilth and its importance.           |       |       |
|         | 4.2 Flow of water through soil - permeability, factors affecting     |       |       |
| 04      | and falling head) test values of normaphility for different          | 08    | 14    |
|         | and faming nead) test, values of permeability for different          |       |       |
|         | SUIIS.                                                               |       |       |
|         | 4.5 Capitally phenomenon in soils.                                   |       |       |
|         | 4.4 Similikage and Swenning III Solls.                               |       |       |
|         | 4.5 Seepage unough carmen suucines, seepage forces, phreatic         |       |       |
|         | flow net quick sand application of flow net (no numerical)           |       |       |
|         | now net, quick sand, application of now net. (no numerical.)         |       |       |

| 05 | <ul> <li>Soil Compaction and stabilization</li> <li>5.1 Compaction phenomenon, Purpose, field application, standard<br/>Proctor test, modified Procter test, compaction curve and<br/>factors affecting compaction, Field methods of compaction.</li> <li>5.2 Soil stabilization concept, necessity, Introduction to methods</li> </ul> | 04 | 08 |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|
|    | of stabilization, CBR test.                                                                                                                                                                                                                                                                                                             |    |    |
|    | Total                                                                                                                                                                                                                                                                                                                                   | 32 | 50 |

# **Practical:**

# Skills to be developed:

# **Intellectual Skills:**

- 1. Select appropriate method for determining field capacity
- 2. Use various methods to to decide quality of soil

# **Motor Skills:**

- 1. Ability to perform various tests on soil accurately
- 2. Ability to measure various quantities like Specific gravity, Soil permeability etc.

# List of Experiments

- 1. Determination of water content by oven drying method.
- 2. Determination of specific gravity by pycnometer method.
- 3. Mechanical analysis of soil for particle distribution.
- 4. Determination of liquid limit and plastic limit.
- 5. Determination of field capacity and unit weight by core cutter method.
- 6. Determination of field capacity, voids ratio and unit weight by sand replacement method.
- 7. Determination of soil permeability by constant head permeameter.
- 8. Determination of soil permeability by falling head permeameter.
- 9. Determination of Optimum Moisture Content and Maximum Dry Density by standard proctor test.

#### Reference: Books:

| Sr.<br>No | Title                    | Title Author     |                                    |  |  |
|-----------|--------------------------|------------------|------------------------------------|--|--|
| 1         | Basic and Applied Soil   | Gopal Ranjan and | New Age International              |  |  |
| 1         | Mechanics                | A.S.R. Rao       | Publisher                          |  |  |
| 2         | Geotechnical Engineering | C. Venkatramaiah | New Age International<br>Publisher |  |  |
| 3         | Soil Mechanics           | B. C. Punmia     | C. Jamanadas and Company           |  |  |
| 4         | Soil Mechanics           | Dr. S. B. Sehgal | CBS Publisher and Distributor      |  |  |

Course Name : Diploma in Agriculture Engineering Course Code : AU Semester : Fourth Subject Title : Surveying & Levelling Subject Code : 17451

# **Teaching and Examination Scheme**

| Teac | ching Sch | neme | Examination Scheme |     |     |    |     |       |
|------|-----------|------|--------------------|-----|-----|----|-----|-------|
| TH   | TU        | PR   | PAPER<br>HRS       | TH  | PR  | OR | TW  | TOTAL |
| 03   |           | 04   | 03                 | 100 | 50# |    | 25@ | 175   |

# NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

# **Rationale:**

Diploma holders in Agricultural Engineering are vitally engaged in the field work rather than administration and management. In order to take up this job satisfactorily and skill fully, he must study the subject of basic importance like surveying. In the field he has to handle the surveying equipments like compass, plane table, optical squares, cross staff and dumpy level etc. and take readings, make the calculations and prepare the drawings.

For doing so he should be equipped with the knowledge of handling the surveying equipments and prepare the drawings and reports.

# **Objectives:**

The student will be able to,

- 1. Understand the principles and methods of different types of surveys.
- 2. Use the equipments on the field, note the readings
- 3. To make the calculations using the data collected
- 4. Prepare the drawings and reports

# **LEARNING STRUCTURE:**


## Theory:

| Chapter | Name of the topic                                                      | Hours | Marks |
|---------|------------------------------------------------------------------------|-------|-------|
|         | Basics of Surveying                                                    |       |       |
|         | 1.1 Definition of surveying                                            |       |       |
|         | 1.2 Object of surveying                                                |       |       |
| 01      | 1.3 Types of survey                                                    | 03    | 08    |
|         | 1.4 Classification of surveying-plane and Geodetic                     |       |       |
|         | 1.5 Principles of surveying.                                           |       |       |
|         | 1.6 Uses of surveying.                                                 |       |       |
|         | Linear Measurements                                                    |       |       |
|         | 2.1 Study of metric chain: 20m &30m, its components                    |       |       |
|         | 2.2 Study of tape-Types of tapes - linen, metallic, steel and invar.   |       |       |
|         | 2.3 Instruments for marking stations- pegs, arrows, ranging rods       |       |       |
| 02      | viz. specifications, material used for construction and                | 06    | 10    |
| 02      | applications.                                                          | 00    | 12    |
|         | 2.4 Chaining- chaining on plain and on sloping ground.                 |       |       |
|         | 2.5 Errors in chaining errors due to incorrect length of chain,        |       |       |
|         | correction in length and area                                          |       |       |
|         | 2.6 Study of scales-plain, vernier and diagonal.                       |       |       |
|         | Chain and Cross Staff Survey                                           |       |       |
|         | 3.1 Chain triangulation, Definitions of survey stations, Base line,    |       |       |
|         | Check line, Tie line, Well-conditioned triangle, Selection of          |       |       |
|         | survey stations.                                                       |       |       |
|         | 3.2 Offsets- Perpendicular and Oblique offsets. Instruments used       |       |       |
|         | for setting out right angles - Open cross staff and Optical            |       |       |
| 03      | square.                                                                | 06    | 14    |
|         | 3.3 Chain and Cross staff survey - Calculation of area from            |       |       |
|         | recorded observations in field books and plan.                         |       |       |
|         | 3.4 Obstacles in chaining and methods to overcome obstacles.           |       |       |
|         | 3.5 Conventional signs on survey maps for- Cutting, Embankment,        |       |       |
|         | Marshy land, Road, Railway, River, Bridge, Tunnel, Fencing,            |       |       |
|         | Transmission line, Cultivated land, Orchard, Places of worship         |       |       |
|         | Chain and Compass Survey                                               |       |       |
|         | 4.1 Prismatic Compass - Principle, components, construction and        |       |       |
|         | use.                                                                   |       |       |
|         | 4.2 Bearing of a line - True meridian, arbitrary meridian and          |       |       |
|         | magnetic meridian. Whole circle and quadrantal system,                 |       |       |
| 04      | reduced bearings, fore bearing and back bearing. Conversion            |       |       |
|         | of bearings, calculations of included angles from bearings.            | 08    | 16    |
|         | 4.3 Local attraction-errors due to local attraction, precautions to be |       |       |
|         | taken to avoid local attraction, corrections of bearings affected      |       |       |
|         | by local attraction, numerical problems, magnetic declination,         |       |       |
|         | dip of needle.                                                         |       |       |
|         | 4.4 Traversing with chain and compass, different methods of            |       |       |
|         | plotting the traverse, closing error, graphical adjustment of          |       |       |
|         | closing error by Bow ditch's rule.                                     |       |       |
|         | Leveling                                                               |       |       |
| 05      | 5.1 Definitions - Level surface, norizontal line, vertical line, datum | 10    | 24    |
| 05      | surface, reduced level, bench mark, and its types-GIS,                 | 12    | 24    |
|         | permanent, aronrary, and temporary.                                    |       |       |
|         | 1 J.2 Dumpy level - components, temporary adjustments of level,        |       |       |

|    | line of sight, line of collimation, axis of bubble tube, fore sight,  |    |     |
|----|-----------------------------------------------------------------------|----|-----|
|    | back sight, intermediate sight, change point, height of               |    |     |
|    | collimation, fundamental axis and their relationships.                |    |     |
|    | 5.3 Study and use of auto level.                                      |    |     |
|    | 5.4 Levelling staff-telescope and folding type.                       |    |     |
|    | 5.5 Calculation of reduced levels, arithmetic check, examples by      |    |     |
|    | plane of collimation method and rise and fall method,                 |    |     |
|    | computations of missing reading, obstacles in leveling,               |    |     |
|    | numerical problems.                                                   |    |     |
|    | 5.6 Classification of leveling - Simple leveling, differential        |    |     |
|    | aback levelling. Sources of errors in levelling presentions to be     |    |     |
|    | taken to eliminate the same                                           |    |     |
|    | Contouring                                                            |    |     |
|    | 6.1 Definitions Contour contour interval horizontal equivalent        |    |     |
|    | 6.2 Characteristics of contour lines                                  |    |     |
| 06 | 6.3 Interpolation of contours – Direct and Indirect method of         | 04 | 08  |
|    | locating contours                                                     |    |     |
|    | 6.4 Uses of contour man establishing grade contours                   |    |     |
|    | Plane table survey                                                    |    |     |
|    | 7.1 Principles of plane table survey, accessories used in plane table |    |     |
|    | survey.                                                               |    |     |
|    | 7.2 Setting up of plane table- centering, levelling, orientation by   |    |     |
| 07 | magnetic needle and back sighting.                                    | 05 | 12  |
|    | 7.3 Methods of plane table surveying-radiation, intersection and      |    |     |
|    | traversing.                                                           |    |     |
|    | 7.4 Merits and demerits of plane table surveying, situations where    |    |     |
|    | plane table survey is preferred.                                      |    |     |
|    | Minor Instruments                                                     |    |     |
|    | 8.1 Polar planimeter- construction and use, Numerical problems on     |    |     |
| 08 | calculation of area.                                                  | 04 | 06  |
|    | 8.2 Digital planimeter, study and use.                                |    |     |
| 1  | <b>8.3</b> Total Station study and Use                                |    |     |
|    | TOTAL                                                                 | 48 | 100 |

## Practical: Skills to be developed: Intellectual Skills:

- Identify the different instruments for linear measurement and leveling.
- Record and observe necessary observations with the survey instruments.
- Select various types of survey instruments.
- Identify the errors of the survey instruments.
- Reading and Interpretation of drawing (plans/maps)

## **Motor Skills:**

- Measure distances, Bearings and finding Reduced Levels with survey instruments.
- Recording of survey field data collected in Field Book and Leveling Book.
- Prepare drawing (plans/maps) using survey data.

## List of Practicals:

## (All practicals to be booking in field book.)

- 1. Study and use of chain (20 m, 30m) Metallic and steel tapes, Ranging rods, pegs and arrows.
- 2. Direct and Indirect ranging, study and use of line ranger, Measurement of distances with chain and tape.
- 3. Study and use of open cross staff and optical square, measurement of area of five sided traverse by chain and cross staff survey.
- 4. Running a survey line to locate adjacent objects such building, road, trees, electric poles etc. by taking offsets with open cross staff / optical square. Booking field notes.
- 5. Study and use of Prismatic compass components, their functions, adjustments, Observing fore bearings and back bearing of lines, calculation of included angles.
- 6. Observing fore bearing and back bearing of a Five sided closed traverse, identifying the stations affected by local attraction and calculation of corrected bearings.
- 7. Study and use of Dumpy level, components, temporary adjustments and study of leveling staff.
- 8. Carrying out differential leveling, recording the reading in a level field book and calculation of Reduced Levels, (H. I. Method) also applying arithmetic check.
- 9. Carrying out differential levelling, Calculation of reduced Levels (rise and fall method) also applying arithmetic checks.
- 10. Fly levelling carrying bench mark from one point to another point.
- 11. Study and use of auto level temporary adjustments, taking staff readings.
- 12. Contouring by direct / indirect method.
- 13. Setting of contours by level and tube and 'A'frame in the field.
- 14. Measurement of area irregular figure by polar planimeter
- 15. Measurement of area irregular figure by Digital planimeter.
- 16. Study and use of plane table and its accessories, temporary adjustments of plane table. Locating points by method of radiation.
- 17. Locating details by the method of intersection and traversing. Orientation of plane table by back sighting and magnetic meridian.

## List of Projects

- 1. Chain and compass traverse survey- a closed traverse of minimum 5 sides enclosing a building, calculation of included angles and corrected bearings, locating details and plotting on A1 size imperial drawing sheet.
- Profile levelling and cross-sectioning- Running a base line 300M. Length with cross section at every 30m. Length of crossing may be 20m on either side with staff reading @ 10m.interval. Spot levels should be taken at every 10m along the base line. Plotting of L-section and minimum of 3 cross-sections on A1 size imperial drawing sheet.
- 3. Block contouring A block of 100 m X 100 m with spot levels @ 10 m X 10 m and plotting the contours with suitable contour interval by interpolation on A1 size imperial drawing sheet.
- 4. Plane table traversing- running a minimum Five sided traverse enclosing a building using method of traversing. Locating details of building, poles etc. by radiation and intersection method. Plotting the traverse with details on A1 size imperial drawing sheet.

## Reference: Books:

| Sr.<br>No | Title                                   | Author                              | Publisher                         |
|-----------|-----------------------------------------|-------------------------------------|-----------------------------------|
| 1         | Surveying and Levelling Vol. 1 & Vol. 2 | T. P. Kanetkar and S.V.<br>Kulkarni | Pune Vidyarthi Griha<br>Prakashan |
| 2         | Surveying and Levelling Vol. 1 & Vol. 2 | Dr. B.C. Punmia                     | Laxmi Publication<br>New Delhi.   |
| 3         | Surveying and Levelling Vol. 1 & Vol. 2 | S. K. Duggal                        | Tata McGraw Hill                  |
| 4         | Surveying and Levelling                 | N. N. Basak                         | Tata McGraw Hill                  |

Course Name : Diploma in Agriculture EngineeringCourse Code : AUSemester : FourthSubject Title : HydraulicsSubject Code : 17452

## **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |     | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|-----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH  | PR        | OR        | TW  | TOTAL |
| 03              |    | 02 | 03           | 100 | 50#       |           | 25@ | 175   |

## NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

## **Rationale:**

Now a days the fluid mechanics find wide applications in many situations directly or indirectly. Agricultural engineers are expected to have the knowledge and the understanding of the basic principles and concepts of fluid mechanics both in static and dynamic conditions. This is to enable them to analyse and design systems in which fluid is the working medium.

**Objectives:** The student will be able to,

- 1. Explain the working of mechanical gauges.
- 2. Explain continuity equation and Bernoulli's equation.
- 3. Know types of flow of fluids and practical applications.
- 4. Estimate the discharge through orifices, mouth pieces, notches & weirs.
- 5. Definition of flow through pipes, losses of head due to friction.
- 6. Flow through open channel, velocity of flow in open channel.
- 7. Select the type and size of the pump as per the requirements

## **Learning Structure:**



## Theory:

| Topic 1: Properties of Fluids051.1 Introduction:<br>Fluid; Real Fluid, Ideal Fluid, Fluid Mechanics, Hydraulics,<br>Hydrostatics, Hydro kinematics and Hydrodynamics05101.2 Properties of Fluids0510Properties of Fluids, mass density, weight density, specific volume,<br>specific gravity, compressibility, vapour pressure, cohesion and adhesion,<br>surface tension, capillarity, viscosity, types of viscosity, classification of<br>fluids, Problems.0510Topics 2: Pressure and Its Measurement<br>Pressure units, atmospheric pressure, gauge pressure, vacuum pressure,<br>absolute pressure, pressure vary with depth and pressure head, pressure head<br>in terms of equivalent liquid column, Pascal's law of transmissibility, proof,<br>applications, hydraulic press, hydraulic jack, Pressure device, Piezometer<br>tubes, U-tube manometers (simple and differential) problems.0614Mechanical pressure gauges: Bourdon's tube, diaphragm and dead weight<br>pressure gauges. Pressure on plane surfaces, Total pressure, centre of<br>pressure, depth of centre of pressure, fluid pressure on plane surfaces<br>immerse in liquid, vertically and inclined simple problems.06142.1 Flow of Fluids2.1 Flow of Fluids10202.2 Orifice, Mouth Pieces, Notches & Weirs<br>Orifice , definition, types of orifices , Flow through small orifice, head<br>causing flow, Vena-contracta, velocity and discharge, hydraulic<br>coefficients and its relationship, problems, Mouth piece - definition,<br>types, discharge through rectangular & triangular notches, Advantages of V-<br>notch over rectangular motch, Weir, classification, difference between<br>notch over rectangular motch, Weir, classification, difference between10                                                                                                                                                                                  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.1 Introduction:       Fluid; Real Fluid, Ideal Fluid, Fluid Mechanics, Hydraulics, Hydroxlics, Hydroxlics, Hydrokinematics and Hydrodynamics       05       10         1.2 Properties of Fluids       05       10         Properties of fluids, mass density, weight density, specific volume, specific gravity, compressibility, vapour pressure, cohesion and adhesion, surface tension, capillarity, viscosity, types of viscosity, classification of fluids, Problems.       05       10 <b>Topics 2: Pressure and Its Measurement</b> Pressure units, atmospheric pressure, gauge pressure, vacuum pressure, absolute pressure, pressure vary with depth and pressure head, pressure head in terms of equivalent liquid column, Pascal's law of transmissibility, proof, applications, hydraulic jack, Pressure device, Piezometer tubes, U-tube manometers (simple and differential) problems.       06       14         Mechanical pressure gauges: Bourdon's tube, diaphragm and dead weight pressure gauges. Pressure on plane surfaces, Total pressure, centre of pressure, depth of centre of pressure, fluid pressure on plane surfaces immerse in liquid, vertically and inclined simple problems.       06       14         Z1 Flow of Fluids       2.1 Flow of Fluids       10       20         2.2 Orifices, Mouth Pieces, Notches & Weirs Orifice meter, comparison with Venturimeter, pitot, simple problems, Orifice meter, comparison with Venturimeter, simple problems, Orifice meter, comparison with Venturimeter, pitot, simple problems.       10       20         2.2 Orifices, Mouth Pieces, Notches & Weirs Orifice, head causing flow, Vena-contracta, velocity and discharge, hydraulic coefficients a                                                                                                                                                                                               |
| Fluid; Real Fluid, Ideal Fluid, Fluid Mechanics, Hydraulics,<br>Hydrostatics, Hydro kinematics and Hydrodynamics051.2 Properties of Fluids05Properties of Fluids, mass density, weight density, specific volume,<br>specific gravity, compressibility, vapour pressure, cohesion and adhesion,<br>surface tension, capillarity, viscosity, types of viscosity, classification of<br>fluids, Problems.05 <b>Topics 2: Pressure and Its Measurement</b><br>Pressure units, atmospheric pressure, gauge pressure, vacuum pressure,<br>absolute pressure, pressure vary with depth and pressure head, pressure head<br>in terms of equivalent liquid column, Pascal's law of transmissibility, proof,<br>applications, hydraulic press, hydraulic jack, Pressure device, Piezometer<br>tubes, U-tube manometers (simple and differential) problems.0614Mechanical pressure gauges: Bourdon's tube, diaphragm and dead weight<br>pressure gauges. Pressure on plane surfaces, Total pressure, centre of<br>pressure, depth of centre of pressure, fluid pressure on plane surfaces<br>immerse in liquid, vertically and inclined simple problems.0614 <b>Topics 3: Flow of Fluids</b><br>2.1 Flow of Fluids<br>2.1 Flow of Fluids<br>2.2 Orifices, Mouth Pieces, Notches & Weirs<br>Orifice , definition, types of orifices , Flow through small orifice, head<br>causing flow, Vena-contracta, velocity and discharge, hydraulic<br>coefficients and its relationship, problems, Mouth piece - definition,<br>types, discharge through mouth piece, Notches, Advantages of V-<br>notch over rectangular notch, Weir, classification, difference between<br>notch and wair meter10                                                                                                                                                                                                                                                         |
| Hydrostatics, Hydro kinematics and Hydrodynamics051.2 Properties of Fluids05Properties of fluids, mass density, weight density, specific volume,<br>specific gravity, compressibility, vapour pressure, cohesion and adhesion,<br>surface tension, capillarity, viscosity, types of viscosity, classification of<br>fluids, Problems.05 <b>Topics 2: Pressure and Its Measurement</b><br>Pressure units , atmospheric pressure, gauge pressure, vacuum pressure,<br>absolute pressure, pressure vary with depth and pressure head, pressure head<br>in terms of equivalent liquid column, Pascal's law of transmissibility, proof,<br>applications, hydraulic press, hydraulic jack, Pressure device, Piezometer<br>tubes, U-tube manometers (simple and differential) problems.0614Mechanical pressure gauges: Bourdon's tube, diaphragm and dead weight<br>pressure gauges. Pressure on plane surfaces, Total pressure, centre of<br>pressure, depth of centre of pressure, fluid pressure on plane surfaces<br>immerse in liquid, vertically and inclined simple problems.06142.1 Flow of Fluids<br>2.1 Flow of Fluids<br>2.1 Flow of Fluids<br>2.2 Orifices, Mouth Pieces, Notches & Weirs<br>Orifice , definition, simple problems.10202.2 Orifices, Mouth Pieces, Notches & Weirs<br>Orifice , definition, types of orifices , Flow through small orifice, head<br>causing flow, Vena-contracta, velocity and discharge, hydraulic<br>coefficients and its relationship, problems, Mouth piece - definition,<br>types, discharge through mouth piece, Notches, definition, types,<br>discharge through rectangular triangular notches, Advantages of V-<br>notch over rectangular notch, Weir, classification, difference between<br>notch and wair triangular notches, Advantages of V-<br>notch over rectangular notch, Weir, classification, difference between<br>notch and wair tria                                       |
| 1.2 Properties of Fluids       05       10         Properties of fluids, mass density, weight density, specific volume, specific gravity, compressibility, vapour pressure, cohesion and adhesion, surface tension, capillarity, viscosity, types of viscosity, classification of fluids, Problems.       05       10 <b>Topics 2: Pressure and Its Measurement</b> Pressure units , atmospheric pressure, gauge pressure, vacuum pressure, absolute pressure, pressure vary with depth and pressure head, pressure head in terms of equivalent liquid column, Pascal's law of transmissibility, proof, applications, hydraulic press, hydraulic jack, Pressure device, Piezometer tubes, U-tube manometers (simple and differential) problems.       06       14         Mechanical pressure gauges: Bourdon's tube, diaphragm and dead weight pressure gauges. Pressure on plane surfaces, Total pressure, centre of pressure, depth of centre of pressure, fluid pressure on plane surfaces immerse in liquid, vertically and inclined simple problems.       06       14         Topics 3: Flow of Fluids       10       20         2.1 Flow of Fluids       10       20         2.2 Orifices, Mouth Pieces, Notches & Weirs       01       20         Orifice , definition, types of orifices , Flow through small orifice, head causing flow, Vena-contracta, velocity and discharge, hydraulic coefficients and its relationship, problems, Orifice meter, comparison with Venturimeter, Simple problems.       10       20         20       Orifice , definition, types of orifices , Flow through small orifice, head causing flow, Vena-contracta, velocity and discharge, hydraulic coeff                                                                                                                                                                                                                                  |
| Properties of fluids, mass density, weight density, specific volume,<br>specific gravity, compressibility, vapour pressure, cohesion and adhesion,<br>surface tension, capillarity, viscosity, types of viscosity, classification of<br>fluids, Problems.<br><b>Topics 2: Pressure and Its Measurement</b><br>Pressure units , atmospheric pressure, gauge pressure, vacuum pressure,<br>absolute pressure, pressure vary with depth and pressure head, pressure head<br>in terms of equivalent liquid column, Pascal's law of transmissibility, proof,<br>applications, hydraulic press, hydraulic jack, Pressure device, Piezometer<br>tubes, U-tube manometers (simple and differential) problems.<br>Mechanical pressure gauges: Bourdon's tube, diaphragm and dead weight<br>pressure gauges. Pressure on plane surfaces, Total pressure, centre of<br>pressure, depth of centre of pressure, fluid pressure on plane surfaces<br>immerse in liquid, vertically and inclined simple problems.<br><b>Topics 3: Flow of Fluids</b><br>2.1 Flow of Fluids<br>Types of fluid flow, steady, unsteady , uniform and nonuniform, laminar,<br>turbulent, definitions only, mean velocity of flow and discharge, units,<br>Equation of continuity of flow, Hydraulic energy and total head,<br>Bernoulli's theorem (statement only), limitations , practical applications,<br>problems, Venturimeter, simple problems.<br>2.2 Orifices, Mouth Pieces, Notches & Weirs<br>Orifice , definition, types of orifices , Flow through small orifice, head<br>causing flow, Vena-contracta, velocity and discharge, hydraulic<br>coefficients and its relationship, problems, Mouth piece - definition,<br>types, discharge through mouth piece, Notches, definition, types,<br>discharge through rectangular & triangular notches, Advantages of V-<br>notch over rectangular notch, Weir, classification, difference between<br>notch and wair |
| specific gravity, compressibility, vapour pressure, cohesion and adhesion,<br>surface tension, capillarity, viscosity, types of viscosity, classification of<br>fluids, Problems.<br><b>Topics 2: Pressure and Its Measurement</b><br>Pressure units , atmospheric pressure, gauge pressure, vacuum pressure,<br>absolute pressure, pressure vary with depth and pressure head, pressure head<br>in terms of equivalent liquid column, Pascal's law of transmissibility, proof,<br>applications, hydraulic press, hydraulic jack, Pressure device, Piezometer<br>tubes, U-tube manometers (simple and differential) problems.<br>Mechanical pressure gauges: Bourdon's tube, diaphragm and dead weight<br>pressure, depth of centre of pressure, fluid pressure on plane surfaces<br>immerse in liquid, vertically and inclined simple problems.<br><b>Topics 3: Flow of Fluids</b><br>2.1 Flow of Fluids<br>2.1 Flow of Fluids<br>2.1 Flow of Fluids<br>2.1 Flow of fluid flow, steady, unsteady , uniform and nonuniform, laminar,<br>turbulent, definitions only, mean velocity of flow and discharge, units,<br>Equation of continuity of flow, Hydraulic energy and total head,<br>Bernoulli's theorem (statement only), limitations , practical applications,<br>problems, Venturimeter, simple problems.<br>2.2 Orifices, Mouth Pieces, Notches & Weirs<br>Orifice , definition, types of orifices , Flow through small orifice, head<br>causing flow, Vena-contracta, velocity and discharge, hydraulic<br>coefficients and its relationship, problems, Mouth piece - definition,<br>types, discharge through mouth piece, Notches, definition, types,<br>discharge through rectangular & triangular notches, Advantages of V-<br>notch over rectangular notch, Weir, classification, difference between<br>notch and weir                                                                                                    |
| surface tension, capillarity, viscosity, types of viscosity, classification of fluids, Problems.       10 <b>Topics 2: Pressure and Its Measurement</b> 14         Pressure units , atmospheric pressure, gauge pressure, vacuum pressure, absolute pressure, pressure vary with depth and pressure head, pressure head in terms of equivalent liquid column, Pascal's law of transmissibility, proof, applications, hydraulic press, hydraulic jack, Pressure device, Piezometer tubes, U-tube manometers (simple and differential) problems.       06       14         Mechanical pressure gauges: Bourdon's tube, diaphragm and dead weight pressure gauges. Pressure on plane surfaces, Total pressure, centre of pressure, depth of centre of pressure, fluid pressure on plane surfaces immerse in liquid, vertically and inclined simple problems.       06       14 <b>Zopics 3: Flow of Fluids</b> 2.1 Flow of Fluids       10       20         2.1 Flow of fluid flow, steady, unsteady , uniform and nonuniform, laminar, turbulent, definitions only, mean velocity of flow and discharge, units, Equation of continuity of flow, Hydraulic energy and total head, Bernoulli's theorem (statement only), limitations , practical applications, problems, Venturimeter, Simple problems.       10       20         2.2 Orifices, Mouth Pieces, Notches & Weirs       10       20         Orifice , definition, types of orifices , Flow through small orifice, head causing flow, Vena-contracta, velocity and discharge, hydraulic coefficients and its relationship, problems, Mouth piece - definition, types, discharge through mouth piece, Notches, definition, types, discharge through mouth piece, Notches, definition, types, discharge throu                                                                                                                                                                    |
| fluids, Problems.       10         Topics 2: Pressure and Its Measurement         Pressure units , atmospheric pressure, gauge pressure, vacuum pressure, absolute pressure, pressure vary with depth and pressure head, pressure head in terms of equivalent liquid column, Pascal's law of transmissibility, proof, applications, hydraulic press, hydraulic jack, Pressure device, Piezometer tubes, U-tube manometers (simple and differential) problems.       06       14         Mechanical pressure gauges: Bourdon's tube, diaphragm and dead weight pressure gauges. Pressure on plane surfaces, Total pressure, centre of pressure, depth of centre of pressure, fluid pressure on plane surfaces immerse in liquid, vertically and inclined simple problems.       06       14         Constant of Fluids         17 pices 3: Flow of Fluids         2.1 Flow of Fluids       problems, whydraulic energy and total head, Bernoulli's theorem (statement only), limitations , practical applications, problems, Venturimeter, simple problems.       10       20         20         07ifice, definition, types of orifices, Flow through small orifice, head causing flow, Vena-contracta, velocity and discharge, hydraulic coefficients and its relationship, problems, Mouth piece - definition, types, discharge through mouth piece, Notches, definition, types, discharge through mouth piece, Notches, Advantages of V-notch over rectangular notch, Weir, classification, difference between notch and weir.       10                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Topics 2: Pressure and Its Measurement</b><br>Pressure units , atmospheric pressure, gauge pressure, vacuum pressure,<br>absolute pressure, pressure vary with depth and pressure head, pressure head<br>in terms of equivalent liquid column, Pascal's law of transmissibility, proof,<br>applications, hydraulic press, hydraulic jack, Pressure device, Piezometer<br>tubes, U-tube manometers (simple and differential) problems.0614Mechanical pressure gauges: Bourdon's tube, diaphragm and dead weight<br>pressure gauges. Pressure on plane surfaces, Total pressure, centre of<br>pressure, depth of centre of pressure, fluid pressure on plane surfaces<br>immerse in liquid, vertically and inclined simple problems.0614 <b>Topics 3: Flow of Fluids</b><br>2.1 Flow of Fluids<br>mean velocity of flow and discharge, units,<br>Equation of continuity of flow, Hydraulic energy and total head,<br>Bernoulli's theorem (statement only), limitations , practical applications,<br>problems, Venturimeter, simple problems.10202.2 Orifices, Mouth Pieces, Notches & Weirs<br>Orifice , definition, types of orifices , Flow through small orifice, head<br>causing flow, Vena-contracta, velocity and discharge, hydraulic<br>coefficients and its relationship, problems, Mouth piece - definition,<br>types, discharge through mouth piece, Notches, definition, types,<br>discharge through meouth piece, Notches, Advantages of V-<br>notch over rectangular motch, Weir, classification, difference between<br>notch and weir20                                                                                                                                                                                                                                                                                                                                                                               |
| Pressure units , atmospheric pressure, gauge pressure, vacuum pressure,<br>absolute pressure, pressure vary with depth and pressure head, pressure head<br>in terms of equivalent liquid column, Pascal's law of transmissibility, proof,<br>applications, hydraulic press, hydraulic jack, Pressure device, Piezometer<br>tubes, U-tube manometers (simple and differential) problems.0614Mechanical pressure gauges: Bourdon's tube, diaphragm and dead weight<br>pressure, depth of centre of pressure, fluid pressure on plane surfaces<br>immerse in liquid, vertically and inclined simple problems.0614Topics 3: Flow of Fluids<br>2.1 Flow of Fluids<br>merse of continuity of flow, Hydraulic energy and total head,<br>Bernoulli's theorem (statement only), limitations, practical applications,<br>problems, Venturimeter, simple problems.10202.2 Orifices, Mouth Pieces, Notches & Weirs<br>Orifice , definition, types of orifices , Flow through small orifice, head<br>causing flow, Vena-contracta, velocity and discharge, hydraulic<br>coefficients and its relationship, problems, Mouth piece - definition,<br>types, discharge through mouth piece, Notches, Advantages of V-<br>notch over rectangular notch, Weir, classification, difference between<br>notch and weir1020                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| absolute pressure, pressure vary with depth and pressure head, pressure head<br>in terms of equivalent liquid column, Pascal's law of transmissibility, proof,<br>applications, hydraulic press, hydraulic jack, Pressure device, Piezometer<br>tubes, U-tube manometers (simple and differential) problems.0614Mechanical pressure gauges: Bourdon's tube, diaphragm and dead weight<br>pressure gauges. Pressure on plane surfaces, Total pressure, centre of<br>pressure, depth of centre of pressure, fluid pressure on plane surfaces<br>immerse in liquid, vertically and inclined simple problems.0614Topics 3: Flow of Fluids<br>2.1 Flow of Fluids<br>Types of fluid flow, steady, unsteady , uniform and nonuniform, laminar,<br>turbulent, definitions only, mean velocity of flow and discharge, units,<br>Equation of continuity of flow, Hydraulic energy and total head,<br>Bernoulli's theorem (statement only), limitations , practical applications,<br>problems, Venturimeter, simple problems.10202.2 Orifice, definition, types of orifices , Flow through small orifice, head<br>causing flow, Vena-contracta, velocity and discharge, hydraulic<br>coefficients and its relationship, problems, Mouth piece - definition,<br>types, discharge through mouth piece, Notches, definition, types,<br>discharge through mouth piece, Notches, Advantages of V-<br>notch over rectangular notch, Weir, classification, difference between<br>notch and weir1020                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| in terms of equivalent liquid column, Pascal's law of transmissibility, proof,<br>applications, hydraulic press, hydraulic jack, Pressure device, Piezometer<br>tubes, U-tube manometers (simple and differential) problems.<br>Mechanical pressure gauges: Bourdon's tube, diaphragm and dead weight<br>pressure gauges. Pressure on plane surfaces, Total pressure, centre of<br>pressure, depth of centre of pressure, fluid pressure on plane surfaces<br>immerse in liquid, vertically and inclined simple problems.<br><b>Topics 3: Flow of Fluids</b><br>2.1 Flow of Fluids<br>Types of fluid flow, steady, unsteady , uniform and nonuniform, laminar,<br>turbulent, definitions only, mean velocity of flow and discharge, units,<br>Equation of continuity of flow, Hydraulic energy and total head,<br>Bernoulli's theorem (statement only), limitations , practical applications,<br>problems, Venturimeter, simple problems.<br>2.2 Orifices, Mouth Pieces, Notches & Weirs<br>Orifice , definition, types of orifices , Flow through small orifice, head<br>causing flow, Vena-contracta, velocity and discharge, hydraulic<br>coefficients and its relationship, problems, Mouth piece - definition,<br>types, discharge through mouth piece, Notches, definition, types,<br>discharge through rectangular & triangular notches, Advantages of V-<br>notch over rectangular notch, Weir, classification, difference between<br>notch and weir                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| applications, hydraulic press, hydraulic jack, Pressure device, Piezometer<br>tubes, U-tube manometers (simple and differential) problems.0614Mechanical pressure gauges: Bourdon's tube, diaphragm and dead weight<br>pressure gauges. Pressure on plane surfaces, Total pressure, centre of<br>pressure, depth of centre of pressure, fluid pressure on plane surfaces<br>immerse in liquid, vertically and inclined simple problems.0614 <b>Topics 3: Flow of Fluids</b><br>2.1 Flow of Fluids<br>Types of fluid flow, steady, unsteady , uniform and nonuniform, laminar,<br>turbulent, definitions only, mean velocity of flow and discharge, units,<br>Equation of continuity of flow, Hydraulic energy and total head,<br>Bernoulli's theorem (statement only), limitations , practical applications,<br>problems, Venturimeter, simple problems.10202.2 Orifices, Mouth Pieces, Notches & Weirs<br>Orifice , definition, types of orifices , Flow through small orifice, head<br>causing flow, Vena-contracta, velocity and discharge, hydraulic<br>coefficients and its relationship, problems, Mouth piece - definition,<br>types, discharge through mouth piece, Notches, Advantages of V-<br>notch over rectangular notch, Weir, classification, difference between<br>notch and weir1020                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| tubes, U-tube manometers (simple and differential) problems.00014Mechanical pressure gauges: Bourdon's tube, diaphragm and dead weight<br>pressure gauges. Pressure on plane surfaces, Total pressure, centre of<br>pressure, depth of centre of pressure, fluid pressure on plane surfaces<br>immerse in liquid, vertically and inclined simple problems.00014 <b>Topics 3: Flow of Fluids</b><br>2.1 Flow of Fluids<br>Types of fluid flow, steady, unsteady , uniform and nonuniform, laminar,<br>turbulent, definitions only, mean velocity of flow and discharge, units,<br>Equation of continuity of flow, Hydraulic energy and total head,<br>Bernoulli's theorem (statement only), limitations , practical applications,<br>problems, Venturimeter, simple problems.10202.2 Orifices, Mouth Pieces, Notches & Weirs<br>Orifice , definition, types of orifices , Flow through small orifice, head<br>causing flow, Vena-contracta, velocity and discharge, hydraulic<br>coefficients and its relationship, problems, Mouth piece - definition,<br>types, discharge through mouth piece, Notches, definition, types,<br>discharge through rectangular & triangular notches, Advantages of V-<br>notch over rectangular notch, Weir, classification, difference between<br>notch and weir1020                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Mechanical pressure gauges: Bourdon's tube, diaphragm and dead weight<br>pressure gauges. Pressure on plane surfaces, Total pressure, centre of<br>pressure, depth of centre of pressure, fluid pressure on plane surfaces<br>immerse in liquid, vertically and inclined simple problems. <b>Topics 3: Flow of Fluids</b><br>2.1 Flow of Fluids<br>Equation of continuity of flow, unsteady, uniform and nonuniform, laminar,<br>turbulent, definitions only, mean velocity of flow and discharge, units,<br>Equation of continuity of flow, Hydraulic energy and total head,<br>Bernoulli's theorem (statement only), limitations , practical applications,<br>problems, Venturimeter, simple problems.10202.2 Orifices, Mouth Pieces, Notches & Weirs<br>Orifice , definition, types of orifices , Flow through small orifice, head<br>causing flow, Vena-contracta, velocity and discharge, hydraulic<br>coefficients and its relationship, problems, Mouth piece - definition,<br>types, discharge through mouth piece, Notches, definition, types,<br>discharge through rectangular & triangular notches, Advantages of V-<br>notch over rectangular notch, Weir, classification, difference between<br>notch and weir10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| pressure gauges. Pressure on plane surfaces, Total pressure, centre of<br>pressure, depth of centre of pressure, fluid pressure on plane surfaces<br>immerse in liquid, vertically and inclined simple problems.Topics 3: Flow of Fluids<br>2.1 Flow of Fluids<br>Types of fluid flow, steady, unsteady , uniform and nonuniform, laminar,<br>turbulent, definitions only, mean velocity of flow and discharge, units,<br>Equation of continuity of flow, Hydraulic energy and total head,<br>Bernoulli's theorem (statement only), limitations , practical applications,<br>problems, Venturimeter, simple problems.10202.2 Orifice, Mouth Pieces, Notches & Weirs<br>Orifice , definition, types of orifices , Flow through small orifice, head<br>causing flow, Vena-contracta, velocity and discharge, hydraulic<br>coefficients and its relationship, problems, Mouth piece - definition,<br>types, discharge through mouth piece, Notches, definition, types,<br>discharge through rectangular weir, classification, difference between<br>notch over rectangular notch, Weir, classification, difference between<br>notch and weir20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| pressure, depth of centre of pressure, fluid pressure on plane surfaces<br>immerse in liquid, vertically and inclined simple problems.Topics 3: Flow of Fluids2.1 Flow of FluidsTypes of fluid flow, steady, unsteady , uniform and nonuniform, laminar,<br>turbulent, definitions only, mean velocity of flow and discharge, units,<br>Equation of continuity of flow, Hydraulic energy and total head,<br>Bernoulli's theorem (statement only), limitations , practical applications,<br>problems, Venturimeter, simple problems, Orifice meter, comparison<br>with Venturimeter, Pitot, simple problems.10202.2 Orifice, definition, types of orifices , Flow through small orifice, head<br>causing flow, Vena-contracta, velocity and discharge, hydraulic<br>coefficients and its relationship, problems, Mouth piece - definition,<br>types, discharge through mouth piece, Notches, definition, types,<br>discharge through rectangular & triangular notches, Advantages of V-<br>notch over rectangular notch, Weir, classification, difference between<br>notch and weir20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| immerse in liquid, vertically and inclined simple problems.Topics 3: Flow of Fluids2.1 Flow of FluidsTypes of fluid flow, steady, unsteady , uniform and nonuniform, laminar,<br>turbulent, definitions only, mean velocity of flow and discharge, units,<br>Equation of continuity of flow, Hydraulic energy and total head,<br>Bernoulli's theorem (statement only), limitations , practical applications,<br>problems, Venturimeter, simple problems, Orifice meter, comparison<br>with Venturimeter, Pitot, simple problems.102.2 Orifices, Mouth Pieces, Notches & Weirs<br>Orifice , definition, types of orifices , Flow through small orifice, head<br>causing flow, Vena-contracta, velocity and discharge, hydraulic<br>coefficients and its relationship, problems, Mouth piece - definition,<br>types, discharge through mouth piece, Notches, definition, types,<br>discharge through rectangular & triangular notches, Advantages of V-<br>notch over rectangular notch, Weir, classification, difference between<br>notch and weir                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <ul> <li>Topics 3: Flow of Fluids <ol> <li>I Flow of Fluids</li> <li>I Flow of Fluids</li> <li>Types of fluid flow, steady, unsteady, uniform and nonuniform, laminar, turbulent, definitions only, mean velocity of flow and discharge, units, Equation of continuity of flow, Hydraulic energy and total head, Bernoulli's theorem (statement only), limitations, practical applications, problems, Venturimeter, simple problems, Orifice meter, comparison with Venturimeter, Pitot, simple problems.</li> <li>Orifice, Mouth Pieces, Notches &amp; Weirs</li> <li>Orifice, definition, types of orifices, Flow through small orifice, head causing flow, Vena-contracta, velocity and discharge, hydraulic coefficients and its relationship, problems, Mouth piece - definition, types, discharge through mouth piece, Notches, definition, types, discharge through mouth piece, Notches, Advantages of V-notch over rectangular notch, Weir, classification, difference between notch and weir</li> </ol> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <ul> <li>2.1 Flow of Fluids Types of fluid flow, steady, unsteady, uniform and nonuniform, laminar, turbulent, definitions only, mean velocity of flow and discharge, units, Equation of continuity of flow, Hydraulic energy and total head, Bernoulli's theorem (statement only), limitations, practical applications, problems, Venturimeter, simple problems, Orifice meter, comparison with Venturimeter, Pitot, simple problems.</li> <li>2.2 Orifices, Mouth Pieces, Notches &amp; Weirs Orifice, definition, types of orifices, Flow through small orifice, head causing flow, Vena-contracta, velocity and discharge, hydraulic coefficients and its relationship, problems, Mouth piece - definition, types, discharge through mouth piece, Notches, definition, types, discharge through rectangular &amp; triangular notches, Advantages of V- notch over rectangular notch, Weir, classification, difference between notch and weir</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <ul> <li>Types of fluid flow, steady, unsteady, uniform and nonuniform, laminar, turbulent, definitions only, mean velocity of flow and discharge, units, Equation of continuity of flow, Hydraulic energy and total head, Bernoulli's theorem (statement only), limitations, practical applications, problems, Venturimeter, simple problems, Orifice meter, comparison with Venturimeter, Pitot, simple problems.</li> <li>2.2 Orifices, Mouth Pieces, Notches &amp; Weirs Orifice, definition, types of orifices, Flow through small orifice, head causing flow, Vena-contracta, velocity and discharge, hydraulic coefficients and its relationship, problems, Mouth piece - definition, types, discharge through mouth piece, Notches, definition, types, discharge through rectangular &amp; triangular notches, Advantages of V-notch over rectangular notch, Weir, classification, difference between notch and weir</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <ul> <li>turbulent, definitions only, mean velocity of flow and discharge, units,<br/>Equation of continuity of flow, Hydraulic energy and total head,<br/>Bernoulli's theorem (statement only), limitations, practical applications,<br/>problems, Venturimeter, simple problems, Orifice meter, comparison<br/>with Venturimeter, Pitot, simple problems.</li> <li>2.2 Orifices, Mouth Pieces, Notches &amp; Weirs<br/>Orifice , definition, types of orifices , Flow through small orifice, head<br/>causing flow, Vena-contracta, velocity and discharge, hydraulic<br/>coefficients and its relationship, problems, Mouth piece - definition,<br/>types, discharge through mouth piece, Notches, definition, types,<br/>discharge through rectangular &amp; triangular notches, Advantages of V-<br/>notch over rectangular notch, Weir, classification, difference between<br/>notch and weir</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Equation of continuity of flow, Hydraulic energy and total head,<br>Bernoulli's theorem (statement only), limitations , practical applications,<br>problems, Venturimeter, simple problems, Orifice meter, comparison<br>with Venturimeter, Pitot, simple problems.<br>2.2 Orifices, Mouth Pieces, Notches & Weirs<br>Orifice , definition, types of orifices , Flow through small orifice, head<br>causing flow, Vena-contracta, velocity and discharge, hydraulic<br>coefficients and its relationship, problems, Mouth piece - definition,<br>types, discharge through mouth piece, Notches, definition, types,<br>discharge through rectangular & triangular notches, Advantages of V-<br>notch over rectangular notch, Weir, classification, difference between<br>notch and weir                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <ul> <li>Bernoulli's theorem (statement only), limitations, practical applications, problems, Venturimeter, simple problems, Orifice meter, comparison with Venturimeter, Pitot, simple problems.</li> <li>2.2 Orifices, Mouth Pieces, Notches &amp; Weirs Orifice , definition, types of orifices , Flow through small orifice, head causing flow, Vena-contracta, velocity and discharge, hydraulic coefficients and its relationship, problems, Mouth piece - definition, types, discharge through mouth piece, Notches, definition, types, discharge through rectangular &amp; triangular notches, Advantages of V-notch over rectangular notch, Weir, classification, difference between notch and weir</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| problems, Venturimeter, simple problems, Orifice meter, comparison<br>with Venturimeter, Pitot, simple problems.10202.2 Orifices, Mouth Pieces, Notches & Weirs<br>Orifice , definition, types of orifices , Flow through small orifice, head<br>causing flow, Vena-contracta, velocity and discharge, hydraulic<br>coefficients and its relationship, problems, Mouth piece - definition,<br>types, discharge through mouth piece, Notches, definition, types,<br>discharge through rectangular & triangular notches, Advantages of V-<br>notch over rectangular notch, Weir, classification, difference between<br>notch and weir1020                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| with Venturimeter, Pitot, simple problems.10202.2 Orifices, Mouth Pieces, Notches & Weirs<br>Orifice , definition, types of orifices , Flow through small orifice, head<br>causing flow, Vena-contracta, velocity and discharge, hydraulic<br>coefficients and its relationship, problems, Mouth piece - definition,<br>types, discharge through mouth piece, Notches, definition, types,<br>discharge through rectangular & triangular notches, Advantages of V-<br>notch over rectangular notch, Weir, classification, difference between<br>notch and weir1020                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 2.2 Orifices, Mouth Pieces, Notches & Weirs<br>Orifice, definition, types of orifices, Flow through small orifice, head<br>causing flow, Vena-contracta, velocity and discharge, hydraulic<br>coefficients and its relationship, problems, Mouth piece - definition,<br>types, discharge through mouth piece, Notches, definition, types,<br>discharge through rectangular & triangular notches, Advantages of V-<br>notch over rectangular notch, Weir, classification, difference between<br>notch and weir                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Orifice , definition, types of orifices , Flow through small orifice, head<br>causing flow, Vena-contracta, velocity and discharge, hydraulic<br>coefficients and its relationship, problems, Mouth piece - definition,<br>types, discharge through mouth piece, Notches, definition, types,<br>discharge through rectangular & triangular notches, Advantages of V-<br>notch over rectangular notch, Weir, classification, difference between<br>notch and weir                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| causing flow, Vena-contracta, velocity and discharge, hydraulic<br>coefficients and its relationship, problems, Mouth piece - definition,<br>types, discharge through mouth piece, Notches, definition, types,<br>discharge through rectangular & triangular notches, Advantages of V-<br>notch over rectangular notch, Weir, classification, difference between<br>notch and weir                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| coefficients and its relationship, problems, Mouth piece - definition,<br>types, discharge through mouth piece, Notches, definition, types,<br>discharge through rectangular & triangular notches, Advantages of V-<br>notch over rectangular notch, Weir, classification, difference between<br>notch and weir                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| types, discharge through mouth piece, Notches, definition, types,<br>discharge through rectangular & triangular notches, Advantages of V-<br>notch over rectangular notch, Weir, classification, difference between<br>notch and weir                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| discharge through rectangular & triangular notches, Advantages of V-<br>notch over rectangular notch, Weir, classification, difference between<br>notch and weir                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| notch over rectangular notch, Weir, classification, difference between                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| notch and weir                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Topics 4: Flow Through Pipes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 4.1 Loss of head due to friction, Darcy-Weisbach Equation Friction factor,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| relative roughness. Moody's diagram and its use. Common range of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| friction factor for different types of pipe material.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 4.2 Minor loss of head in pipe flow- loss of head due to sudden Contraction,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| sudden expansion, gradual contraction & expansion, at entrance and exit 08 16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| of pipe in various pipe fittings. Pipes in series and parallel Equivalent                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| pipe – Dupuit s'equation<br>4.2 Hydrophia gradient line and Energy and dient line. Sinh on give Weter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 4.5 right and gradient line and Energy gradient line, Siphon pipe. Water                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Nomograms for design of water distribution system. Numerical                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Problems                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Topics 5: Flow Through Open Channels                                         |    |     |
|------------------------------------------------------------------------------|----|-----|
| 5.1 Types of channels- artificial & natural, purposes of artificial channel, |    |     |
| Different shapes of artificial channels Geometrical properties of channel    |    |     |
| section - wetted area, wetted Perimeter, hydraulics radius Prismatic         |    |     |
| channel sections, steady- uniform flow through prismatic channel section.    |    |     |
| 5.2 Chezy's equation and Manning's equation for calculation of discharge     |    |     |
| through an open channel, common range of values of Chezy's constants         | 08 | 16  |
| and Manning's constant of different types of channel surfaces. Most          |    |     |
| economical channel section, conditions for most economical channel           |    |     |
| sections.                                                                    |    |     |
| 5.3 Froud's number and its significance. Critical, sub-critical and          |    |     |
| supercritical flow in channel Hydraulic jump and its occurrence in field,    |    |     |
| uses of hydraulic jump. Numerical Problems.                                  |    |     |
| Topics 6: Agricultural Pumps                                                 |    |     |
| 6.1 Centrifugal Pumps                                                        |    |     |
| Centrifugal pumps, description and working, Types of casings and             |    |     |
| impellers, Bearing housing, Stuffing boxes and glands, Drives for            |    |     |
| centrifugal pumps, operation of centrifugal pumps, priming, use of foot      |    |     |
| valve and strainers, Layout and accessories, Maximum height of suction,      |    |     |
| Multistage pumps, Maintenance and repair of centrifugal pumps, causes        |    |     |
| of vibration trouble and remedies, Problems on discharge power and           |    |     |
| efficiency, Selection of pump for given speed and discharge                  |    |     |
| specifications, no problems.                                                 | 11 | 24  |
| 6.2 Reciprocating Pumps                                                      | 11 | 24  |
| Reciprocating pumps, classifications, working of single acting and           |    |     |
| double acting reciprocating pump, plunger and piston pumps, discharge        |    |     |
| of reciprocating pump, theoretical power required, coefficient of            |    |     |
| discharge, slip, negative slip, indicator diagram, separation or             |    |     |
| cavitations, air vessel, simple problems.                                    |    |     |
| Special pumps, jet pumps, Turbine pumps, Submersible pumps,                  |    |     |
| Working principles, no problems                                              |    |     |
| 6.3 Submersible Pumps: description and working, Types of casings and         |    |     |
| impellers                                                                    |    |     |
| Total                                                                        | 48 | 100 |

## Practical: Skills to be developed:

## **Intellectual Skills**:

- a. Interpret test results
- b. Calculate quantities of parameters
- c. Draw graphs

## **Motor Skills:**

- a. Measure different parameters accurately
- b. Adjust levels by operating valves

## **List of Practicals:**

- 1. Measurements of pressure and pressure head by Piezometer, U-tube manometer
- 2. Verification of Bernoulli's theorem
- 3. Reynolds experiment to study types of flow

- 4. Determination of Minor losses in pipes (any two)
- 5. Demonstration of Hydraulic jump
- 7. Determination of coefficient of discharge for given rectangular or triangular notch.
- 8. Determination of coefficient of discharge for a given Venturimeter.
- 9. Determination of hydraulic coefficients for sharp edge orifice
- 10. Study of a model of centrifugal and reciprocating pump.
- 11. Use of characteristic curves/ nomograms /charts / catalogs from manufactures for selection of pump for the designed discharge and head (Refer IS: 9694)

## **Learning Resources:**

1. Books:

| Sr.<br>No. | Author                             | Title                                                              | Publisher                                       |
|------------|------------------------------------|--------------------------------------------------------------------|-------------------------------------------------|
| 01         | Dr. P. N. Modi &<br>Dr. S. M. Seth | Hydraulics & Fluids Mechanics                                      | Standard Book House,<br>Dehli                   |
| 02         | R. S. Khurmi                       | A Text Book of Hydraulics, Fluids<br>Mechanics Hydraulics Machines | S. Chand & Company<br>Ltd. New Delhi            |
| 03         | Dr. Jagdish Lal                    | Fluids Mechanics Hydraulics                                        | Metropolitan Book Co.<br>Private Ltd. New Delhi |
| 04         | Dr. R. K. Bansal                   | Fluids Mechanics & hydraulic structures                            | Laxmi Publcation                                |
| 05         | A.M. Michael & S.D.<br>Khepar      | Water wells & pump Engineering                                     | Tata McGraw Hill, Delhi                         |
| 06         | S. K. Likhi                        | Hydarulics Laboratory<br>Manual                                    | T.T.T.I. Chandhigrah                            |

## 2. IS, BIS and International Codes:

A) Refer IS: 9694 for selection pumps

Course Name : Diploma in Agriculture Engineering Course Code : AU Semester : Fourth Subject Title : Farm Power and Tractor Systems Subject Code : 17453

## **Teaching and Examination Scheme:**

| Teac | ching Scl | neme | Examination Scheme |     |    |    |     |       |
|------|-----------|------|--------------------|-----|----|----|-----|-------|
| TH   | TU        | PR   | PAPER<br>HRS       | TH  | PR | OR | TW  | TOTAL |
| 03   |           | 02   | 03                 | 100 |    |    | 25@ | 125   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

## **Rationale:**

Diploma holders in agricultural Engineering should have the knowledge of different sources of power available at farms for driving the farm machinery and equipment. I.C. Engines and tractors are the primary sources of power available on farms.

The aim of introducing this subject is to equip them with the knowledge of both conventional and non-conventional sources of Power. The contents of this subject have been developed to cater above mentioned needs.

## **Objectives:** The students should be able to:

- 1. Know the Sources of farm power
- 2. Able to classify of IC engines,
- 3. Knows function of the engine, details of construction and maintenance requirements of engine and hence able to look after of the maintenance of engine
- 4. Know Air cleaning, Fuel, Cooling, Lubrication, Valves, Ignition and Governor systems.
- 5. Select Tractor or farm equipment as per requirements
- 6. Know all the systems of tractor

Г

## **Learning Structure:**

\_

| Application | Use of I. C. Engines in farm equipments, Us eof tractor for farming activities, maintenance of tractors and farm equipment.                   |  |  |  |  |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|
| Procedure   | Acceleration, Speed control, Braking, Maintenance schedules,<br>Trouble shooting                                                              |  |  |  |  |
|             |                                                                                                                                               |  |  |  |  |
| Principle   | Systems in Tractors anf Farm Equipments such as Ignition system,<br>Braking system, Lubricating system, Cooling system, Transmission<br>sytem |  |  |  |  |
|             |                                                                                                                                               |  |  |  |  |
| Concept     | Farm Power, I. C. Engine, Petrol Engine and Diesel Engine, Tractor, Ignition,                                                                 |  |  |  |  |
|             |                                                                                                                                               |  |  |  |  |
| Facts       | Sources of Farm Power, Tractors, I C Engines, I C Engine and Tractor<br>Systems                                                               |  |  |  |  |

## Theory:

| Торіс                                                                            | Hours | Marks |
|----------------------------------------------------------------------------------|-------|-------|
| 1. Sources of Farm Power                                                         |       |       |
| Classification of sources of farm power, The characteristics, advantages and     |       |       |
| disadvantages of different sources of power, Classification of biogas plants,    |       |       |
| Different components of biogas plants, Floating drum type biogas plant, Fixed    | 04    | 08    |
| drum type biogas plant, Pre-requisites of biogas system, Difference between      |       |       |
| floating gas holder type & fixed drum type biogas plant, Ways of collection of   |       |       |
| solar radiations, Classification of wind mills, Performance of wind mills.       |       |       |
| 2. I. C. Engine                                                                  |       |       |
| Different types heat engines, Classification internal combustion engine in       |       |       |
| different ways, Different parts of I. C. engine components & their construction, |       |       |
| Terms related to I. C. engines, Solved Problems, Working of four stroke cycle    | 06    | 10    |
| engine, Working of two stroke cycle engine, Difference between two stroke and    |       |       |
| four stroke engine, Difference between Diesel Engine and Petrol Engine.          |       |       |
| 3. I. C. Engine Systems                                                          |       |       |
| 3.1 Valves, Firing Order & Firing Interval                                       |       |       |
| Different parts in Valve operating system, The different valve arrangements      |       |       |
| used in the engines, Large size flywheel for single cylinder engines, Poor       |       |       |
| balance of single cylinder engines, Valve operating mechanism, Valve             |       |       |
| Clearance, Valve timing diagram, Firing Order (F.O.), Firing Interval (F.I.)     |       |       |
| 3.2 Ignition System of Tractor                                                   |       |       |
| Spark ignition system, Battery ignition system, Components battery ignition      |       |       |
| system, Capacity of Battery, Battery charging, Magneto ignition system           |       |       |
| with neat diagram, Difference in Battery Ignition and Magneto Ignition,          | 08    | 16    |
| Effect of ignition advance and ignition retard, Need of spark advance and        |       |       |
| retard mechanism.                                                                |       |       |
| 3.3 Governors & Methods of Governing                                             |       |       |
| Need of governor, Governing Systems, Hit & Miss System, Throttle                 |       |       |
| System, Difference between Hit & Miss System and Throttle System of              |       |       |
| governing, Construction and working of Centrifugal Governor (Watt                |       |       |
| governor) and Pneumatic Governor, Governor Regulation, Governor                  |       |       |
| Hunting, Difference between Fly wheel and Governor.                              |       |       |

| 4. I. C. ENGINE SUPPORTING SYSTEMS                                             |    |    |
|--------------------------------------------------------------------------------|----|----|
| 4.1 Air Cleaning System of I.C. Engine                                         |    |    |
| Need of air cleaning system, Different types of air cleaners, Oil soaked       |    |    |
| element type of air cleaner, Dry type air cleaner, Oil bath type of air        |    |    |
| cleaner Pre- cleaner.                                                          |    |    |
| 4.2 Fuel System of I.C. Engine                                                 |    |    |
| Requirements of a diesel fuel supply and injection mechanism, Systems of       |    |    |
| fuel injection (Air injection method AND Direct or Solid injection             |    |    |
| method), Fuel supply system in spark ignition system, Carburetor and its       |    |    |
| functions, Functions of carburetor, working of simple carburetor,              | 08 | 18 |
| components of carburetor and their function, Fuel supply system in diesel      | 08 | 10 |
| engine, Turbocharger.                                                          |    |    |
| 4.3 Cooling System                                                             |    |    |
| Purpose of Cooling, Air cooling, Water cooling its types, components &         |    |    |
| functions                                                                      |    |    |
| 4.4 Lubrication System of I.C. Engine                                          |    |    |
| Needs of lubrication, Theory of lubrication, Classification of lubricants,     |    |    |
| Functions of engine oils, Types of lubrication systems, Splash Lubrication     |    |    |
| System, Pressure/Forced feed lubrication system, Main Parts of Lubrication     |    |    |
| System, Crank Case Ventilation.                                                |    |    |
| 5. Tractor                                                                     |    |    |
| Introduction, Classification of tractor and adoptability. Factors affecting    | 02 | 06 |
| selection of Tractor. General idea about different makes, models, in different | 02 | 06 |
| H.P. ranges of tractors.                                                       |    |    |
| 6. Study of transmission systems                                               |    |    |
| 6.1. Clutch                                                                    |    |    |
| Main functions of clutch, Essential features of clutch, Principle of operation |    |    |
| of clutch, Different types of clutch, Working of single plate clutch system.   |    |    |
| Different parts of clutch system, Working of duel plate clutch system, Clutch  |    |    |
| adjustment, Trouble shootings.                                                 |    |    |
| 6.2 Gear Box                                                                   |    |    |
| Need of gear box in tractors, Principle of gearing, Different types of gear    | 10 | 18 |
| box available on tractors, Sliding mesh gear box, Constant mesh gear box,      |    |    |
| Synchromesh gear box, Trouble shootings.                                       |    |    |
| 6.3 Differential and Final Drive                                               |    |    |
| Necessity and function of differential unit in a tractor, Principle of         |    |    |
| operation of differential unit, Operational details of differential unit,      |    |    |
| Transmission efficiency of differential. Differential lock. Final drive        |    |    |
| mechanism.                                                                     |    |    |

| 7. Study of Supporting systems of tractor                                     |    |     |
|-------------------------------------------------------------------------------|----|-----|
| 7.1 Brakes                                                                    |    |     |
| Classification of brakes, Internal expanding shoe brake, Brake pedal free     |    |     |
| play, External contracting shoe brake, Disc brakes, Principle of operation of |    |     |
| hydraulic brake, Working of hydraulic brake system.                           |    |     |
| 7.2 Steering Geometry                                                         |    |     |
| Qualities of steering system, Ackerman steering, Steering geometry, Main      | 08 | 18  |
| parts of steering system, Working of steering system, Steering ratio, Power   |    |     |
| Steering.                                                                     |    |     |
| 7.3 Hydraulic System                                                          |    |     |
| Merits of hydraulic system over mechanical system, Basic characteristics of   |    |     |
| fluids, basic components of hydraulic system. Working of hydraulic system,    |    |     |
| Types of hydraulic system, Position control, Draft control, Mixed control     |    |     |
| 8. Tractor Power Outlets                                                      |    |     |
| Hitching of implements to tractor, Power Take Off (PTO) shaft. Different      | 02 | 06  |
| types of PTO, Belt pulley.                                                    |    |     |
| Total                                                                         | 48 | 100 |

## Practicals: Skills to be developed:

## **Intellectual Skills:**

- 1. Identify various parts of I. C. Engines and know their functions.
- 2. Operate the I. C. Engine under various conditions which occur on the farm.
- 3. Identify tractor parts and know their functions.
- 4. Know how to operate tractor as per the requirement on the farming jobs.

## **Motor Skills:**

- 1. Ability to draw sketches of the parts of I. C. Engine and Tractor
- 2. Operate the tractor under different conditions for its appropriate use on farm
- 3. Ability to identify faults in I. C. Engines/tractors
- 4. Able to identify the places for lubrication and lubricate the machines efficiently and effectively

## **List of Practicals:**

1. Demonstration of different systems of an IC engine; Students to identify Engine parts and functions, working principles etc.

- 2. Operation of two and four stroke engines.
- 3. Demonstration of Valve system, valve timing diagram and valve setting procedure.
- 4. Demonstration fuel system and air cleaning system of IC engine and familiarization with its parts/components, students to identify functions
- 5. Demonstration of cooling system of tractor engine and familiarization with its parts/components.
- 6. Demonstration of lubrication of tractor engine and familiarization with its parts/components.
- 7. Introduction to transmission system and components
- 8. Demonstration of clutch system and trouble shooting.
- 9. Demonstration of different types of gear box, differential and final drive system and trouble shooting.
- 10. Demonstration of brake systems and trouble shooting.
- 11. Study hydraulic system in tractor.
- 12. Visit to Tractor repair workshop & spare part agencies.

## List of Assignments:

Collection of information broacher, service manual/Operators manual from various dealers of the different makes of the Tractor companies and study the specifications of the same.

# Learning Resources:

Books:

| Sr.<br>No. | Author             | Title                                         | Publisher                            |  |  |
|------------|--------------------|-----------------------------------------------|--------------------------------------|--|--|
| 1          | SC. Jain &         | Farm tractor maintenance &                    | Standard Publishers Distributors,    |  |  |
| 1          | CR.Rai             | repair second Reprint, 1999                   | New Delhi                            |  |  |
| 2          | S D Datil          | Form Dowor First Doprint 2011                 | Aditi Prakashan, At/Po: Bhadole,     |  |  |
| 2          | <b>5. D</b> . Faul | Faim Fower, First Replint, 2011               | Dist: Kolhapur-416 112,              |  |  |
| 3          | AM Michael and     | Principles of Agril. Engineering              | Jain brothers, 16/873 East Park Road |  |  |
| 3          | TP Ojha            | Vol-I 2 <sup>nd</sup> Edn                     | Karol Bagh, New Delhi 110005         |  |  |
| 4          | Jagdiawar Sahay    | Elements of Agril. Engineering,               | Standard publishers Distributors,    |  |  |
| 4          | Jaguiswai Sallay   | - Fourth Edition 2004                         | New Delhi                            |  |  |
| 5          | JB Liljedahl & et  | Tractor and their power unit, 4               | CBS Publishers and Distributors,     |  |  |
| 5          | al.                | authors books (1 <sup>st</sup> Edition, 1997) | New Delhi                            |  |  |
| 6          | C D Nalzra         | Farm machines & Equipment                     | Dhanpat Rai & Sons, 1962, Nai        |  |  |
| 0          | C. F. INAKIA       | Edition 1990.                                 | Sarak Delhi.                         |  |  |

| Course Name        | : Diploma in Agricultural Engineering            |
|--------------------|--------------------------------------------------|
| <b>Course Code</b> | : AU                                             |
| Semester/Year      | : Fourth                                         |
| Subject Title      | : Agricultural Economics and Business Management |
| Subject Code       | : 17454                                          |

## **Teaching and Examination Scheme:**

| Teac | hing Scl | heme | Examination Scheme |     |    |    |    |       |  |
|------|----------|------|--------------------|-----|----|----|----|-------|--|
| TH   | TU       | PR   | PAPER<br>HRS.      | TH  | PR | OR | TW | TOTAL |  |
| 03   |          |      | 03                 | 100 |    |    |    | 100   |  |

NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Seasonal Work (SW).

## **Rationale:**

The subject is very important to understand Economics of Agriculture and also the Agricultural Business aspects to prepare the students for agri business. This deals with importance of Agriculture in India's Economy. It deals with all the aspects of the business such as Accounting, Marketing, Finance, Planning, and Organisation.

Objectives: The student will be able to,

- 1. Know all aspects of Agricultural Business.
- 2. Understand the organisation structure.
- 3. Able to select the financial mode for business operation.

## Theory:

| Topic and Contents                                                          | Hours | Marks |
|-----------------------------------------------------------------------------|-------|-------|
| Topic 1: Agribusiness : An Overview                                         |       |       |
| 1) Meaning and definition                                                   |       |       |
| 2) System of Agribusiness                                                   |       |       |
| a) Agricultural Input Sector                                                |       |       |
| b) Production Sector                                                        |       |       |
| c) Processing Manufacturing Sector                                          |       |       |
| d) Distribution- Marketing Sector                                           |       |       |
| 3) Structural Agribusiness                                                  |       |       |
| Breakdown of the Input, Farm & Product Market Sector                        |       |       |
| a) Farm Supplies                                                            |       |       |
| • Seed                                                                      |       |       |
| • Fertilizer & Chemicals                                                    |       |       |
| • Machinery & Equipments                                                    |       |       |
| Petroleum                                                                   | 08    | 20    |
| Transportation                                                              | 00    | 20    |
| • Frad                                                                      |       |       |
| • Feed                                                                      |       |       |
| • Others                                                                    |       |       |
| b) Farming                                                                  |       |       |
| • Types of farming: Individual, Contractual                                 |       |       |
| and Community Farming,                                                      |       |       |
| c) Processing                                                               |       |       |
| • Industrial                                                                |       |       |
| • Food: Supermarkets, Moll, Restaurants,                                    |       |       |
| Institutions                                                                |       |       |
| • Retail                                                                    |       |       |
| • Other                                                                     |       |       |
| Topic 2. Functions of Management :                                          |       |       |
| ➢ Planning                                                                  |       |       |
| 1. Definition of Planning                                                   |       |       |
| 2. Function of Planning                                                     |       |       |
| 5. a. Types of Plans<br>b. Planning Process                                 |       |       |
| D. Flamming Flocess                                                         |       |       |
| <ul> <li>Objectives</li> </ul>                                              |       |       |
| > Policies                                                                  |       |       |
| > Procedure                                                                 | 20    | 40    |
| Practices                                                                   |       |       |
| c. Characteristics of Sound Plan                                            |       |       |
| d. Steps in Planning                                                        |       |       |
| Gathering facts                                                             |       |       |
| <ul> <li>Analyzing the Facts</li> <li>Economic Change</li> </ul>            |       |       |
| <ul> <li>Forecasting Change</li> <li>Setting Goals &amp; Desults</li> </ul> |       |       |
| Organizing                                                                  |       |       |
| Meaning                                                                     |       |       |

| • Legal Structure                                                       |    |    |
|-------------------------------------------------------------------------|----|----|
| a. The sole Proprietorship                                              |    |    |
| Creating a sole Proprietorship                                          |    |    |
| <ul> <li>Advantages &amp; disadvantages</li> </ul>                      |    |    |
| h The Partnership                                                       |    |    |
| Types of Partnerships                                                   |    |    |
| <ul> <li>Advantages and Disadvantages</li> </ul>                        |    |    |
| c. The Corporation                                                      |    |    |
| Types of Corporation                                                    |    |    |
| Characteristics of Corporation                                          |    |    |
| (Limited, Liability, Continuity of Operation, Tax                       |    |    |
| Aspects, Estate Planning)                                               |    |    |
| d. Co-operative Society                                                 |    |    |
| e. Govt. Sector                                                         |    |    |
| > Directing:                                                            |    |    |
| • Meaning                                                               |    |    |
| • Objectives                                                            |    |    |
| a) Personal Management                                                  |    |    |
| b) Finding or Recruiting People                                         |    |    |
| c) Selecting the right person                                           |    |    |
| d) Job Orientation                                                      |    |    |
| e) Compensation & Fringe Benefits                                       |    |    |
| f) Evaluating Performance                                               |    |    |
| g) Training & Development                                               |    |    |
| h) Promotion & Advancement                                              |    |    |
| i) Termination & dismissal                                              |    |    |
| > Motivating                                                            |    |    |
| • Meaning                                                               |    |    |
| Different Ideas for Managing & Motivating                               |    |    |
| People                                                                  |    |    |
| a) Masllow's Need Hierarchy                                             |    |    |
| b) Motivators & Hygienic Factors                                        |    |    |
| • Meaning & Concept of Controlling, Ordering, Leading,                  |    |    |
| Tonia 3 Einopaiol monogement of Agribusiness                            |    |    |
| S Importance of financial statement                                     |    |    |
| <ul> <li>Balance sheet and Income statement</li> </ul>                  |    |    |
| Meaning, concept importance, preparation of balance and income          |    |    |
| statement.                                                              | 08 | 16 |
| > Preparation of income statement and profit and loss statement         | 00 | 10 |
| Meaning, concepts and calculation of profit and loss, Study of          |    |    |
| different financial ratios : Capital turn over ratio, Rate of return on |    |    |
| investment, Net farm income, Net return to total capital                |    |    |
|                                                                         | 1  |    |

| Topic: 4 Agro - based Industries.                                     |    |     |
|-----------------------------------------------------------------------|----|-----|
| • Importance, need, Classification and types of Agro-based            |    |     |
| Industries.                                                           |    |     |
| • Study of sugar industry, cotton industry, Dal Mills, Rice Mills and |    |     |
| Fruit and Vegetable Processing industry.                              |    |     |
| • Study of procedures and constraints in Agro industry.               |    |     |
| Marketing in Agro based Industries:                                   |    |     |
| • Meaning of marketing, definition, concepts and difference between   |    |     |
| Marketing and Selling,                                                | 12 | 24  |
| Market cost, Price Spread, Market Margin and Marketing                |    |     |
| efficiency.                                                           |    |     |
| • Study of Future and e - Marketing                                   |    |     |
| Marketing Mix                                                         |    |     |
| • 4 P's of Marketing                                                  |    |     |
| Market Segmentation :Meaning Role and Methods                         |    |     |
| Price Policy: Meaning, objectives, pricing methods and prices at      |    |     |
| various stages.                                                       |    |     |
| Total                                                                 | 48 | 100 |

## Learning Resources: Books:

| Sr.<br>No. | Author                            | Title                                          | Publisher                                  |
|------------|-----------------------------------|------------------------------------------------|--------------------------------------------|
| 1          | V.P.S. Arora                      | Agribusiness Management<br>Conceptual Overvide | Manual of arora                            |
| 2          | S. Subha Reddy and<br>P.Raghu Ram | Agricultural Finance and Management            | Oxfordand and IBH<br>Publishing, New Delhi |
| 3          | Rais Ahmad                        | Agribusiness and Rural<br>Management           | Mittal Publishing, New Delhi               |
| 4          | J. Price Gittinger                | Economics Analysis of<br>Agricultural Projects | Manual of Gittinger                        |

Course Name : Diploma in Agriculture Engineering Course Code : AU Semester : Fourth Subject Title : Manufacturing Technology Subject Code : 17047

## **Teaching and Examination Scheme:**

| Teac | ching Scł | neme |              |    | Examinati | on Scheme |     |       |
|------|-----------|------|--------------|----|-----------|-----------|-----|-------|
| TH   | TU        | PR   | PAPER<br>HRS | TH | PR        | OR        | TW  | TOTAL |
|      |           | 04   |              |    | 50#       |           | 50@ | 100   |

## **Rationale:**

Manufacturing process is a basic technology course for mechanical engineering. It enhances the skills which the students have acquired in workshop practice. The technician should be introduced to the basic processes of manufacturing. The course will help the student to get familiarize with working principles and operations like with various patterns, molding, casting, fabrication, turning, drilling, brazing etc.

The basic knowledge of these processes will be helpful to select most suitable processes for conversion of raw material into finished product as per the requirement.

## **General Objectives:**

## Student will be able to develop:

- Know and identify basic manufacturing processes for manufacturing different components.
- Operate and control different machine tools and equipments.
- Manufacture job as per specified dimension.
- Inspect the job.
- Adopt the safety practices.

## Theory: Theory to be taught during practical hours.

| Topic and Contents                                                                                           |
|--------------------------------------------------------------------------------------------------------------|
| Topic 1: PATTERN MAKING                                                                                      |
| 1.1 Pottorn making materials (wood plastics, rubbarg plasters, wayas)                                        |
| 1.2 Types of patterns:                                                                                       |
| Single piece pattern. Split pattern. Match plate pattern. Sweep pattern. Skeleton pattern                    |
| 1.3 Pattern making allowances:                                                                               |
| Shrinkage, draft, machining, distortion, rapping                                                             |
| 1.4 Core prints:                                                                                             |
| Horizontal, vertical, hanging, balancing, wing Colour coding for patterns and core boxes.                    |
| Topic 2: MOULDING                                                                                            |
| 2.1 Moulding Sand                                                                                            |
| 2.1 Moulding Sand<br>2.2 Types: Green Dry Loam Facing, Backing System parting Core sand                      |
| 2.2 Types. Orech, Dry, Loani, Facing, Backing, System, parting, Core sand<br>2 3 Properties of Moulding sand |
| 2.4 Moulding Processes: Green sand, Dry sand, Machine and Shell Moulding                                     |
| Topic 3: CASTING                                                                                             |
| •                                                                                                            |
| 3.1 Casting Principle and operation                                                                          |
| 3.2 Die casting methods: Hot chamber die casting method, Cold chamber die casting method                     |
| 3.3 Melting furnace for ferrous metals: Cupola furnace: Construction and operation, zones,                   |
| capacity, Temperature range                                                                                  |
| 3.3 Melting furnace for non ferrous metals                                                                   |
| 3.4 Electric furnace for steel: Direct arc furnace, High frequency induction furnace                         |
| 3.5 Defects in casting: Causes and remedies, inspection & testing of casting                                 |
| Topic 4: FABRICATION                                                                                         |
|                                                                                                              |
| 4.1 Classification.                                                                                          |
| 4.2 Arc weiding. Principle, Applications, Smelded metal arc weiding, Sub-merged arc weiding                  |
| 4.5 HO/WHO welding<br>A A Resistance welding: Spot Projection Seam Percussion                                |
| 4.5 Gas welding: Techniques, Types of flames, Welding defects                                                |
| 1.6 Soldering and Brazing: Types. Principle and Application                                                  |
| Topic 5: METAL TURNING PROCESS (LATHE MACHINE)                                                               |
|                                                                                                              |
| 5.1 Types of lathes: Light duty, Medium duty and Heavy duty geared lathe, CNC lathe                          |
| 5.2 Specifications                                                                                           |
| 5.5 Basic parts and their functions                                                                          |
| 5.4 Operations and tools – Lurning, parting off, Knurling, facing, Boring, drilling, threading, step         |
| turning, taper turning                                                                                       |
| Practical:                                                                                                   |
| Skills to be developed:                                                                                      |
| *                                                                                                            |
| Intellectual Skills:                                                                                         |

- To develop the skill of manufacturing patterns and their allowances.
- To know and identified different molding methods for different casting methods.
- To understand the molding processes.

## Motor Skills:

- To prepare a pattern making job for casting and moulding.
- To operate lathe machine and to know about speed, feed, depth of cut and to perform different turning operations.
- To fabricate component by using welding.

## List of Practicals:

- 1. One simple wooden and thermocole Pattern Job of maximum 4 students per group, each group should make different type of pattern.
- 2. One turning job on lathe containing the operations like facing, plain turning, step turning, grooving, chamfering.
- 3. Demonstration and assignment on types of molding sands.
- 4. One composite welding job having two different joints. With preparation of joints (Batch of four students per job.)
- 5. Industrial Visit to TIG / MIG welding setup and write report
- 6. Demonstration on molding processes.

## List of Assignments:

• Workshop diary must be maintained by the instructor/lecturer during practical sessions

# Learning Resources:

|            | DUUKS:                             |                                                    |                                           |
|------------|------------------------------------|----------------------------------------------------|-------------------------------------------|
| Sr.<br>No. | Author                             | Title                                              | Publisher                                 |
| 1          | S. K. Hajra Chaudary,<br>Bose, Roy | Elements of workshop Technology -<br>Volume I & II | Media Promoters and<br>Publishers limited |
| 2          | B.S. Raghuvanshi                   | Elements of workshop Technology -<br>Volume I & II |                                           |
| 3          | D. L. Wakyl                        | Processes and Design for<br>Manufacturing          | Prentice Hall                             |
| 4          | O. P. Khanna and Lal               | Production Technology - Volume I<br>& II           |                                           |
| 5          | P. L. Jain                         | Principles of Foundry Technology                   |                                           |
| 6          | W.A.J. Chapman                     | Workshop Technology – Volume I , II<br>& III       |                                           |

## 7. CDs, PPTs Etc.:

• Various PPT's and Transparencies related practical.

## 8. IS, BIS and International Codes:

9. Websites:

w.e.f Academic Year 2012-13

'G' Scheme

WITH EFFECT FROM 2012-13 DURATION : 16 WEEKS

SCHEME : G

# MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI

## TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES

## **COURSE NAME : DIPLOMA IN CHEMICAL ENGINEERING**

**COURSE CODE : CH** 

## **DURATION OF COURSE : 6 SEMESTERS**

#### **SEMESTER : FOURTH**

## PATTERN : FULL TIME - SEMESTER

|           |                                                                                                      |                  |            |          |    |                    |                 |     |        |     |     | ••• |        |     |               |         |
|-----------|------------------------------------------------------------------------------------------------------|------------------|------------|----------|----|--------------------|-----------------|-----|--------|-----|-----|-----|--------|-----|---------------|---------|
|           |                                                                                                      |                  |            | TEACHING |    | EXAMINATION SCHEME |                 |     |        |     |     |     |        |     |               |         |
| SR.<br>NO | SUBJECT TITLE                                                                                        | Abbrev<br>iation | SUB SCHEME |          | Έ  | PAPER              | <b>R</b> TH (1) |     | PR (4) |     | OR  | (8) | TW (9) |     | SW<br>(17400) |         |
|           |                                                                                                      | lation           | CODE       | ТН       | TU | PR                 | HRS.            | Max | Min    | Max | Min | Max | Min    | Max | Min           | (17400) |
| 1         | Physical Chemistry and Materials of Construction                                                     | PCM              | 17423      | 03       |    | 02                 | 03              | 100 | 40     |     |     |     |        | 25@ | 10            |         |
| 2         | Electrical and Electronics                                                                           | EAE              | 17424      | 04       |    | 02*                | 03              | 100 | 40     |     |     |     |        | 25@ | 10            |         |
| 3         | Plant Utility                                                                                        | PUT              | 17425      | 03       |    | 02                 | 03              | 100 | 40     |     |     |     |        | 25@ | 10            | 50      |
| 4         | Fluid Flow Operation                                                                                 | FFO              | 17426      | 03       |    | 04                 | 03              | 100 | 40     | 50# | 20  |     |        | 25@ | 10            | 50      |
| 5         | Chemical Process Technology-II                                                                       | CPT              | 17427      | 03       |    | 04                 | 03              | 100 | 40     | 50# | 20  | -   |        | 25@ | 10            |         |
| 6         | CAD Software                                                                                         | CSO              | 17039      |          |    | 02                 |                 |     |        |     |     |     |        | 25@ | 10            |         |
| 7         | Professional Practices-II                                                                            | PPT              | 17040      |          |    | 03                 |                 |     |        |     |     |     |        | 50@ | 20            |         |
|           |                                                                                                      |                  | TOTAL      | 16       |    | 19                 |                 | 500 |        | 100 |     |     |        | 200 |               | 50      |
| **        | ** Industrial Training (Optional) Examination in 5 <sup>th</sup> Semester Professional Practices-III |                  |            |          |    |                    |                 |     |        |     |     |     |        |     |               |         |

Student Contact Hours Per Week: 35 Hrs.

## THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.

Total Marks : 850

@ - Internal Assessment, # - External Assessment, No Theory Examination, \* - Practicals of Electrical & Electronics at alternate week.

Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work.

\*\* Industrial Training (Optional) - Student can undergo Industrial Training of four weeks after fourth semester examination during summer vacation.

## Assessment will be done in Fifth semester under Professional Practices-III. They will be exempted from activities of Professional Practices-III of 5<sup>th</sup> Semester.

- Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subjects is to be converted out of 50 marks as sessional work (SW).
- > Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.
- Code number for TH, PR, OR, TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.
- For CAD software subject MSBTE should decide the contents of the practical every year through identified experts and ensure that these practicals only performed in the institute.

Course Name : Diploma in Chemical Engineering Course Code : CH Semester : Fourth Subject Title : Physical Chemistry and Materials of Construction Subject Code : 17423

#### **Teaching and Examination Scheme:**

| Teac | ching Scl | neme |              |     | Examinati | on Scheme |     |       |
|------|-----------|------|--------------|-----|-----------|-----------|-----|-------|
| TH   | TU        | PR   | PAPER<br>HRS | TH  | PR        | OR        | TW  | TOTAL |
| 03   |           | 02   | 03           | 100 |           |           | 25@ | 125   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

## **Rationale:**

Different chemicals are used in industries to manufacture a desired product. Various reactions are used for manufacturing desired chemicals. These processes depend upon basic concepts of thermodynamics. Contents of this subject will enable the students to understand thermodynamic concepts which are required during kinetic study.

Storage tank, material handling equipment and reactors require careful selection of material of construction. The material of construction should be compatible with chemicals to be handled. The content of this subject will enable the students in understanding types of corrosion, classification of engineering materials and criteria for selection of material of construction.

## **General Objectives:**

## Students should be able to:

- 1. Understand basic concepts of thermodynamics & it's laws.
- 2. Determine degree of freedom of a given system.
- 3. Understand concepts of adsorption and its application in chemical industry.
- 4. Select material of construction for specific chemicals.

## **Learning Structure:**



## 1.1 **Theory: marks**)

• Scope of thermodynamics

| Chapter | Topic and Contents                                                        | Hours | Marks |
|---------|---------------------------------------------------------------------------|-------|-------|
|         | Topic 1: Thermodynamics                                                   |       |       |
|         | Specific Objectives:                                                      |       |       |
|         | Differentiate between intensive & extensive properties                    |       |       |
|         | State applications of laws of thermodynamics                              |       |       |
|         | Contents:                                                                 |       |       |
|         | 1.2 Concepts of thermodynamics (08 Definitions                            |       |       |
|         | : System, Surroundings, Boundary                                          |       |       |
|         | Homogeneous & Heterogeneous systems                                       |       |       |
|         | • Types of thermodynamic systems -                                        |       |       |
|         | Isolated system, open system, closed system                               |       |       |
|         | • Intensive & extensive properties                                        |       |       |
|         | Thermodynamic states                                                      |       |       |
|         | Equilibrium state, Non equilibrium state                                  |       |       |
|         | Standard states -solid, liquid & gases                                    | 10    |       |
| 1       | 1.2 Thermodynamic processes (06 marks)                                    | 10    | 24    |
|         | • Isothermal process, Adiabatic process, Isobaric process,                |       |       |
|         | Isochoric process, Cyclic process.                                        |       |       |
|         | • Reversible & Irreversible process.                                      |       |       |
|         | • Difference between Reversible & irreversible process                    |       |       |
|         | Internal energy.                                                          |       |       |
|         | 1.3 Basic laws of thermodynamics - (10 marks)                             |       |       |
|         | • pressure, volume, work and their expressions                            |       |       |
|         | <ul> <li>Statement of First law of thermodynamics</li> </ul>              |       |       |
|         | <ul> <li>Definition and Expression of Enthalpy of system</li> </ul>       |       |       |
|         | Adiabatic & isothermal expansion of Gasses                                |       |       |
|         | Statement of Second law of thermodynamic                                  |       |       |
|         | <ul> <li>Statement of second law of thermodynamics. Zeroth law</li> </ul> |       |       |
|         | • Statement of third law of thermodynamics, , Zeroth law                  |       |       |
|         | Topics 2: Phase Rule                                                      |       |       |
|         | Specific Objectives:                                                      |       |       |
|         | Determine degree of freedom of given system                               |       |       |
|         | State phase rule                                                          |       |       |
| 2       | Contents:                                                                 | 04    | 10    |
| 2       | • Phase rule statement, Phase components                                  |       |       |
|         | Degree of freedom                                                         |       |       |
|         | • Derivation of phase rule                                                |       |       |
|         | • The water system, the sulphur system                                    |       |       |
|         | Topics 3: Adsorption & Colloids                                           |       |       |
|         | Specific Objectives:                                                      |       |       |
|         | Give example of adsorption                                                |       |       |
| 2       | <ul> <li>Describe adsorption isotherm</li> </ul>                          | 10    | 20    |
| 5       | Contents:                                                                 | 10    | 20    |
|         | 3.1 Adsorption (12 Marks)                                                 |       |       |
|         | • Definition, example, Mechanism of adsorption                            |       |       |
|         | Types of adsorption                                                       |       |       |

|   | Physical adsorption, chemical adsorption, difference                           |    |    |  |
|---|--------------------------------------------------------------------------------|----|----|--|
|   | • A desemble isothermy Frequedlish adsorption isotherm                         |    |    |  |
|   | • Adsorption isotherm: Freundlich adsorption isotherm,                         |    |    |  |
|   | Langmuir adsorption isotherm                                                   |    |    |  |
|   | • Application of adsorption                                                    |    |    |  |
|   | 5.2 Colloids : (08 Marks)                                                      |    |    |  |
|   | • Definition                                                                   |    |    |  |
|   | • Types of colloidal system -                                                  |    |    |  |
|   | Lyophilic, Lyophobic colloids (solution) its                                   |    |    |  |
|   | characteristics & comparison                                                   |    |    |  |
|   | Methods of preparation of colloids (solution)                                  |    |    |  |
|   | Topics 4: Corrosion                                                            |    |    |  |
|   | Specific Objectives:                                                           |    |    |  |
|   | State types of corrosion                                                       |    |    |  |
|   | Corrosion prevention and control methods                                       |    |    |  |
|   | Contents:<br>4.1 Types of correction (14 Marke)                                |    |    |  |
|   | 4.1 Types of contosion (14 Marks)                                              |    |    |  |
|   | • Definition                                                                   |    |    |  |
|   | • Types of correspond                                                          |    |    |  |
|   | Dry corrosion – Formation of protective films, Crowth of ovidation film        |    |    |  |
|   | Wet correction                                                                 |    |    |  |
|   | Maaring of the terms Electrode notantial                                       |    |    |  |
|   | • Meaning of the terms Electrode potential,                                    |    |    |  |
|   | notantial difference                                                           |    |    |  |
| 4 | Process of correction                                                          | 12 | 24 |  |
| 4 | Effect of temperature on corrosion                                             | 12 | 24 |  |
|   | <ul> <li>Specific types of correspondence by Uniform correspondence</li> </ul> |    |    |  |
|   | nitting corrosion galvanic corrosion oxidation                                 |    |    |  |
|   | corrosion inter granular corrosion selective corrosion                         |    |    |  |
|   | erosion corrosion fretting corrosion                                           |    |    |  |
|   | 4.2 Corrosion prevention and control (10 Marks)                                |    |    |  |
|   | Corrosion prevention methods -                                                 |    |    |  |
|   | Use of high purity metals                                                      |    |    |  |
|   | Use of alloy additions. Special heat treatment                                 |    |    |  |
|   | Corrosion protection methods                                                   |    |    |  |
|   | Use of inhibitors, Electro-chemical protection.                                |    |    |  |
|   | protective coatings                                                            |    |    |  |
|   | • Effect of pH value on corrosion                                              |    |    |  |
|   | Caustic embrittlement                                                          |    |    |  |
|   |                                                                                |    |    |  |

| 5 | <ul> <li>Topics 5 : Material of construction and their properties</li> <li>Specific Objectives:</li> <li>➤ Select compatible material for storage of chemicals</li> <li>Contents:</li> <li>5.1 Common Materials <ul> <li>Classification of engineering materials</li> <li>Selection of material of construction based on properties of chemicals.</li> <li>Commonly used material of construction – composition of materials and its specific use : cast iron, carbon steel – mild steel, stainless steel – SS304, SS316, SS314, alloys of aluminium, PVC, Teflon, Polypropylene, Polyethylene</li> </ul> </li> <li>5.2 Special Materials <ul> <li>Lining and its importance</li> <li>Rubber lining, Glass lining, Lead lining, Plastic lining</li> </ul> </li> </ul> | 12 | 22  |  |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|--|
|   | Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 48 | 100 |  |

## Practical: Skills to be developed: Intellectual Skills:

- 1) Verify the laws and characteristics.
- 2) Analyze given solution and study its thermodynamic properties.
- 3) Understand the set up of experiment.

## Motor Skill:

- 1) Observe the completion of reaction.
- 2) Handle various laboratory regents.
- 3) Accurately measure proper quantity of various chemicals.

## **List of Practicals:**

- 1) To measure the heat of combustion off methyl alcohol and ethyl alcohol.
- 2) To determine the heat of neutralization of acid and alkali.
- 3) Determination of melting point of solid substance.
- 4) Determination of boiling point of liquid.
- 5) Purification of solids by crystallization(potassium chloride and potassium chlorate)
- 6) Verification of the freundrich isotherm in adsorption of acetic acid, benzoic acid by activated charcoal.
- 7) Determination of partition coefficient.

## Learning Resources:

## 1. Books:

| Sr.<br>No. | Author                                     | Title                            | Publisher             |  |
|------------|--------------------------------------------|----------------------------------|-----------------------|--|
| 01         | B. S. Bahal,<br>G. D. Tuli,<br>Arun Bahal  | Essential of Physical Chemistry  | S. Chand              |  |
| 02         | J. M. Coulson & J. F.<br>Richardson        | Chemical Engineering Vol. 6      | Asian Books Pvt. Ltd. |  |
| 03         | Contributors                               | Engineering Chemistry            | Wiley India           |  |
| 04         | B.R.Puri, L.R.Sharma,<br>Madan s, Puthania | Principles of Physical chemistry | S.Chand & company     |  |

#### **Course Name : Diploma in Chemical Engineering/ Plastic Engineering**

Course code : CH / PS Semester : Fourth Subject Title : Electrical and Electronics Subject Code : 17424

## **Teaching and Examination Scheme:**

| Teaching Scheme |    |     |               |     | Examinati | on Scheme |     |       |
|-----------------|----|-----|---------------|-----|-----------|-----------|-----|-------|
| TH              | TU | PR  | PAPER<br>HRS. | TH  | PR        | OR        | TW  | TOTAL |
| 04              |    | 02* | 03            | 100 |           |           | 25@ | 125   |

#### \* - Practicals of Electrical & Electronics at alternate week.

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Most of the equipments used in chemical industry are electrically powered. A minor electrical faults can be attended by a shop floor chemical engineer. This subject of electrical engg. addresses the fundamental concepts and operating principles of electrical appliances. It will enable the students in better handling and commissioning of the equipments.

The second section of the subject deals with the basic of semiconductor devices and their circuits necessary for the electronic control gadgets. It provides the information about logic gates, digital displays, small signal amplifiers and power supplies. This will help the students in building skills of effective handling of electronic control equipments.

## General Objectives: Student will be able to develop:

- Awareness of Electrical Safety.
- Recognize Electrical fault in Chemical Plant.
- Recognize fault in power supply, display & control panel.
- Understand working of basic semiconductor devices.

## **Learning Structure:**



# Section- I Electrical Engineering

| Topic and Content                                                                             | Hours | Marks |
|-----------------------------------------------------------------------------------------------|-------|-------|
| Topic 1: Basic Fundamentals                                                                   |       |       |
| Specific Objectives:                                                                          |       |       |
| State principle of electromagnetic induction.                                                 |       |       |
| <ul> <li>Calculate electrical power and energy from given data.</li> </ul>                    |       |       |
| Contents:                                                                                     |       |       |
| <ul> <li>Ohm's Law – Simple problems on Ohm's Law</li> </ul>                                  | 07    | 10    |
| • Types of supply – A.C. & D.C., definition, representation &                                 |       | -     |
| comparison.                                                                                   |       |       |
| Principle of electromagnetic induction.                                                       |       |       |
| • Concept of single Phase & Three Phase A.C. supply, comparison.                              |       |       |
| • Electrical power, energy – definition, equation, simple problems.                           |       |       |
| Power factor & its importance                                                                 |       |       |
| Topics 2: D.C. Motor                                                                          |       |       |
| Specific Objectives:                                                                          |       |       |
| Draw electrical circuit diagram of D.C. shunt motor.                                          |       |       |
| Draw diagram & explain armature voltage speed control method.                                 |       |       |
| Contents:                                                                                     |       |       |
| • Working principle construction different parts – their material &                           | 06    | 10    |
| application.                                                                                  |       |       |
| <ul> <li>Types of D.C. motor – Electrical circuit of D.C shunt &amp; series motor.</li> </ul> |       |       |
| <ul> <li>Speed control of D.C Shunt &amp; Series motor.</li> </ul>                            |       |       |
| • Necessity of starter & its principle.                                                       |       |       |
| <ul> <li>Applications of D.C. motors related to chemical plant.</li> </ul>                    |       |       |
| Topics 3: A.C. Motor                                                                          |       |       |
| Specific Objectives:                                                                          |       |       |
| $\rightarrow$ Draw electrical circuit diagram of R – Split single phase induction motor.      |       |       |
| State any four parts & their material used for three phase induction motor.                   |       |       |
| Contents                                                                                      | 05    | 0.9   |
| Contents.                                                                                     | 05    | 08    |
| • Three phase induction motor – working principle, construction &                             |       |       |
| • Construction, working & application of following single phase                               |       |       |
| • Construction, working & application of following single phase                               |       |       |
| B = Snlit C = Snlit                                                                           |       |       |
| Topics 4: Transformer                                                                         |       |       |
| Specific Objectives:                                                                          |       |       |
| <ul><li>Compare core type &amp; shell type transformer.</li></ul>                             |       |       |
| > Define voltage ratio, current ratio & transformation ratio of single phase                  |       |       |
| transformer.                                                                                  | 06    | 10    |
| Contents:                                                                                     |       |       |
| • Working principle of transformer Elementary theory of an ideal                              |       |       |
| transformer.                                                                                  |       |       |

| <ul> <li>Construction of core &amp; shell type transformer, comparison.</li> <li>EMF equation (No Derivation), simple problems.</li> <li>Transformation ratio – simple problems.</li> <li>Autotransformer – Concept, advantages, limitations, applications.</li> </ul> Topics 5: Electrical Wiring & Safety Specific Objectives: <ul> <li>State the necessity of fuse.</li> <li>State the necessity of earthing.</li> </ul> Contents: <ul> <li>Types of wires – V.I.R., P.V.C., T.R.S., Specifications as per IS code.</li> </ul>                                                                                                        |    |    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|
| <ul> <li>Fuse – Necessity, kit-kat &amp; HRC fuse - construction, working.</li> <li>Circuit breakers – MCCB, ELCB, principle &amp; application.</li> <li>Electrical wiring – one lamp controlled by single way switch, two lamp controlled by two single way switches (independently), stair case wiring, godown wiring.</li> <li>Lamps – Incandescent lamp, fluorescent lamp, mercury vapour &amp; sodium vapour lamp - construction, application.</li> <li>Electrical safety – Safety precautions, Instruction for restoration of persons suffering from electric shock.</li> <li>Earthing – Need, Types – plate &amp; pipe</li> </ul> | 08 | 12 |
| Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 32 | 50 |

## Section- II Electronics

| Tonic and Content                                   | Hours  | Marks |
|-----------------------------------------------------|--------|-------|
|                                                     | 110015 |       |
| Topic 1: Semiconductor Electronic Devices           |        |       |
| Specific Objectives:                                |        |       |
| Draw V-I characteristics of different devices.      |        |       |
| State the symbols of different components.          |        |       |
| <ul> <li>Contents: <ol> <li>1.1</li></ol></li></ul> | 12     | 20    |
| Topics 2: Bipolar Junction Transistor               |        |       |
| Specific Objectives:                                | 06     | 08    |

| <ul> <li>Draw output characteristics of CE configuration.</li> <li>Describe working of transistor amplifier.</li> <li>Contents:</li> </ul> |    |    |
|--------------------------------------------------------------------------------------------------------------------------------------------|----|----|
| • BJT types – NPN & PNP, their symbols & construction,                                                                                     |    |    |
| • Working of a NPN transistor.                                                                                                             |    |    |
| • Transistor characteristics – Common emitter configuration.                                                                               |    |    |
| • Single stage CE amplifier – circuit diagram & working.                                                                                   |    |    |
| • Power amplifier – Concept & types.                                                                                                       |    |    |
| Applications of transistor.                                                                                                                |    |    |
| Topics 3: Power Supply                                                                                                                     |    |    |
| Specific Objectives:                                                                                                                       |    |    |
| Draw block diagram of power supply.                                                                                                        |    |    |
| Describe working of different rectifier circuits.                                                                                          |    |    |
| Contents                                                                                                                                   |    |    |
| Power supply Necessity block diagram                                                                                                       | 07 | 12 |
| <ul> <li>Postifier Types Helf wave Full wave (center tapped &amp; bridge type)</li> </ul>                                                  |    |    |
| • Rectifier – Types, Hall wave, Full wave (center tapped & bluge type)<br>Circuit diagram, working, waveforms & their comparison           |    |    |
| - Circuit diagram, working, waveforms & their comparison.                                                                                  |    |    |
| • The - Need & types – shunt capacitor, series inductor, LC & n type, circuit diagram                                                      |    |    |
| <ul> <li>Voltage regulator Need principle of zener shupt regulator</li> </ul>                                                              |    |    |
| Topics 4: Digital circuits                                                                                                                 |    |    |
| Specific Objectives:                                                                                                                       |    |    |
| <ul> <li>State symbols of different logic gates</li> </ul>                                                                                 |    |    |
| <ul> <li>Use NAND / NOR gate as universal gates.</li> </ul>                                                                                |    |    |
|                                                                                                                                            |    |    |
| Contents:                                                                                                                                  |    |    |
| • Digital signal, Negative & positive logic.                                                                                               | 07 | 10 |
| • Boolean algebra.                                                                                                                         |    | -  |
| • Logic gates – AND, OR, NOT, NAND, NOR, EX-OR, Symbols,                                                                                   |    |    |
| logic expressions ,truth table.                                                                                                            |    |    |
| • De- Morgan, s theorems – statement, proof using truth table.                                                                             |    |    |
| • Universal gates – definition, NAND, NOR.                                                                                                 |    |    |
| Digital display – Types of LED & LCD display                                                                                               |    |    |
| Total                                                                                                                                      | 32 | 50 |

## Practical: Skills to be developed:

## Skills to be developed:

## Intellectual Skills:

- Correlate speed of the motor with its other parameters.
- Identify the simple faults in electrical and electronics systems.

## **Motor Skills:**

- Use various tools and components for different electrical applications.
- Handle various electronic test and measuring equipments.

#### **List of Practicals:**

## Section-I

- 1) To verify ohm's law.
- 2) To measure electrical Power in Single phase AC circuit.
- 3) To plot the Speed & Armature voltage characteristics of DC shunt motor.
- 4) To plot the Speed & field current characteristics of DC shunt motor.
- 5) To determine transformation ratio of single phase transformer.
- 6) To prepare wiring for one lamp controlled by Single way switch.

## Section-II

- 1) To operate the various laboratory equipments & measuring instruments like power Supply, CRO, DMM.
- 2) To plot forward & reverse characteristics of Silicon Diode.
- 3) To measure percentage line regulation of Shunt Zener regulator.
- 4) To measure voltage gain of single stage common Emitter amplifier at 1 khz.
- 5) To verify the truth tables of various logic gates.
- 6) To verify De Morgan's First theorem.

| Doon       | <b>.</b>                     |                                                                             |                                          |
|------------|------------------------------|-----------------------------------------------------------------------------|------------------------------------------|
| Sr.<br>No. | Author                       | Title                                                                       | Publisher                                |
| 1          | B.L. Theraja                 | Electrical Technology Vol. 1 & 2                                            | S.Chand & Company Ltd.                   |
| 2          | S.L. Uppal                   | Electrical Power                                                            | Khanna Publishers, Delhi.                |
| 3          | N.N. Bhargava,<br>S.C. Gupta | Basic Electronics & Linear<br>N.N. Bhargava, Technical Teachers<br>Circuits | Technical Teachers<br>Training Institute |
| 4          | B.L. Theraja                 | Basic Electronics (Solid State)                                             | S.Chand & Company Ltd.                   |
| 5          | R.P. Jain                    | Modern Digital Electronics                                                  | Tata Mc Graw Hill, Delhi.                |
| 6          | B.D.Arora                    | Electrical Wiring & Estimation<br>Costing                                   | R.B. Publications                        |

# Learning Resources:

Books:

Course Name : Diploma in Chemical EngineeringCourse Code : CHSemester : FourthSubject Title : Plant UtilitySubject Code : 17425

## **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |     | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|-----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH  | PR        | OR        | TW  | TOTAL |
| 03              |    | 02 | 03           | 100 |           |           | 25@ | 125   |

NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

This subject covers the requirement of different utilities for the process plant, along with its generation and its effective utilization. Main utilities required for process plants are water, steam, air & refrigerants. Steam & non- steam heating media are important for conversion of raw material to products in reactors & to elevate the temperature in the chemical processes. Refrigeration is important to maintain the temperature in the process plant. Compressed air, process air is used in processes & instrument air is used in pneumatic devices & controls.

## **General Objectives:**

The student will be able to:

- 1. State the principles involved during water treatment, generation of steam and refrigeration cycles.
- 2. Select the different equipments used to run the process plant with different utilities.
- 3. Understand basic calculation involved in steam generation, psychometric operation and refrigeration.

## **Learning Structure:**


## **Theory Content:**

| Topic and Contents                                                                                                                          | Hours | Marks |
|---------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
| Chapter 1 : Water                                                                                                                           |       |       |
| Specific Objectives:                                                                                                                        |       |       |
| Describe the methods of water treatment                                                                                                     |       |       |
| Explain the problem occurred in Boiler feed water                                                                                           |       |       |
| Contents:                                                                                                                                   |       |       |
| Sources of water hard and soft water     (08 MarKs)                                                                                         | 10    | 20    |
| <ul> <li>Requisites of industrial water and its uses</li> </ul>                                                                             | 10    | 20    |
| Methods of water treatment- Chemical softening, Demineralization                                                                            |       |       |
| 1.2 (12 Marks)                                                                                                                              |       |       |
| Resins used for water softening                                                                                                             |       |       |
| <ul> <li>Reverse osmosis and membrane separation</li> <li>Problems in boiler food water &amp; its treatments. Scale &amp; sludge</li> </ul> |       |       |
| • Problems in boner reed water & its treatments- Scale & studge<br>formation Corrosion Priming & foaming Caustic embrittlement              |       |       |
| Chapter 2 · Refrigeration                                                                                                                   |       |       |
| Specific Objectives:                                                                                                                        |       |       |
| <ul> <li>State the different properties of Refrigerants</li> </ul>                                                                          |       |       |
| <ul> <li>Describe the different Refrigeration system</li> </ul>                                                                             |       |       |
| Contents:                                                                                                                                   |       |       |
| 2.1 (12 Marks)                                                                                                                              |       |       |
| • Definition of Ton of refrigeration and coefficient of performance.                                                                        |       |       |
| <ul> <li>Refrigeration cycles</li> <li>Different methods of refrigeration used in industry. Vanour</li> </ul>                               | 11    | 24    |
| compression. Vapor absorption. Air refrigeration.                                                                                           |       |       |
|                                                                                                                                             |       |       |
| 2.2 (12 Marks)                                                                                                                              |       |       |
| • Different refrigerants- Lithium bromide (eco-Friendly)<br>Monochlorodifluoro methane (R. 22). Carbon di oxide. Ammonia                    |       |       |
| Secondary refrigerants: Brine water and air: Properties and                                                                                 |       |       |
| applications of above.                                                                                                                      |       |       |
| • Simple calculation of C.O.P.                                                                                                              |       |       |
| Chapter 3 : Steam and Steam Generation                                                                                                      |       |       |
| Calculate Enthalpy of different types of steam                                                                                              |       |       |
| Explain Principle, construction & working of Boiler.                                                                                        |       |       |
| Contents:                                                                                                                                   |       |       |
| 3.1 (12 Marks)                                                                                                                              |       |       |
| <ul> <li>Problems based on enthalpy calculation for wet steam, dry saturated</li> </ul>                                                     |       |       |
| steam, superheated steam                                                                                                                    | 14    | 20    |
| 3.2 (18 Marks)                                                                                                                              | 14    | 30    |
| • Types of steam generator / boilers: water tube & fire tube Solid fuel                                                                     |       |       |
| hoiler                                                                                                                                      |       |       |
| <ul> <li>Scaling, trouble shooting, preparing boiler for inspection</li> </ul>                                                              |       |       |
| • Boiler mountings and accessories: principle of operation, construction                                                                    |       |       |
| and working. (water level indicator, pressure gauge, steam trap,                                                                            |       |       |
| <ul> <li>Boiler Act</li> </ul>                                                                                                              |       |       |
| Chaper 4 : Psychrometry                                                                                                                     |       |       |
| Specific Objectives:                                                                                                                        | 08    | 16    |
| State properties of air-water system                                                                                                        |       |       |

| Describe Humidification & Dehumidification process                                                                                 |    |     |
|------------------------------------------------------------------------------------------------------------------------------------|----|-----|
| Contents:                                                                                                                          |    |     |
| • Properties of Air-water vapours.                                                                                                 |    |     |
| • Use of humidity chart                                                                                                            |    |     |
| • Equipment used for humidification, Evaporative cooling, spray ponds, cooling towers, their Construction, working and application |    |     |
| Chapter 5 : Air                                                                                                                    |    |     |
| Specific Objectives:                                                                                                               |    |     |
| State the applications of air.                                                                                                     |    |     |
| Explain the process of getting instrument air                                                                                      | 02 | 06  |
| Contents:                                                                                                                          | 03 | 00  |
| • Use of Compressed air, process air and instrument air                                                                            |    |     |
| • Single, multistage compression, Interstage coolers                                                                               |    |     |
| Process of getting instrument air.                                                                                                 |    |     |
| Chapter 6 : Non steam heating system                                                                                               |    |     |
| Specific Objectives:                                                                                                               |    |     |
| State the temperature ranges of Non steam heating system                                                                           |    |     |
| Explain Principle, Construction & Working of Non steam heating                                                                     | 02 | 04  |
| system.                                                                                                                            | 02 | 01  |
| Contents: Principle, construction and working of :                                                                                 |    |     |
| Thermic fluid heater                                                                                                               |    |     |
| Types of thermic fluid and their temperature ranges.                                                                               |    |     |
| Total                                                                                                                              | 48 | 100 |

#### Practical: Skills to be developed: Intellectual Skills:

1. Analysis of water.

2. Calculation of humidity & use of humidity chart

3 Calculation of heat load in cooling tower

4. Interpretation of steam data using steam table.

## **Motor Skills:**

- 1. Handling of pH meter, TDS meter
- 2. Handling of thermo pack or boiler
- 3. Handling of Reverse Osmosis system
- 4 Handling of cooling tower

## **List of Practicals:**

- 1. To determine the alkalinity of water.
- 2. To determine the hardness of water.
- 3. To determine the pH using pH meter.
- 4. To determine humidity by using whirling psychrometer/sling psychrometer.
- 5. To observe the operations of boiler / thermo pack using simulator.
- 6. To determine outgoing temperature of water from any cooling tower.
- 7. To analyse RO water based on TDS, pH & hardness
- 8. To measure different pressures of compressed air.
- 9. To read / interpret different properties of steam using steam table.

## Learning Resources: Books:

| Sr.<br>No. | Author         | Title                      | Publisher                      |
|------------|----------------|----------------------------|--------------------------------|
| 01         | P. L. Balleney | Thermal Engineering        | Khanna Publisher, New<br>Delhi |
| 02         | S.T. Powel     | Industrial Water Treatment | McGraw Hill, Newyork           |
| 03         | Jain & Jain    | Engineering Chemistry      |                                |
| 04         | B.K. Sarkar    | Thermal Engineering        |                                |

Course Name : Diploma in Chemical EngineeringCourse Code : CHSemester : FourthSubject Title : Fluid Flow OperationSubject Code : 17426

## **Teaching and Examination Scheme:**

| Teac | ching Scl | neme |              |     | Examinati | on Scheme |     |       |
|------|-----------|------|--------------|-----|-----------|-----------|-----|-------|
| TH   | TU        | PR   | PAPER<br>HRS | TH  | PR        | OR        | TW  | TOTAL |
| 03   |           | 04   | 03           | 100 | 50#       |           | 25@ | 175   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

## **Rationale:**

Knowledge of measurement of fluid flow and various fluid transportation machinery is useful to transport different process fluids. The knowledge of this subject helps in installation of different fluid transportation machinery. Principals of Fluid Flow operations are useful in understanding mass transfer and heat transfer operation.

## **General Objectives:**

#### Students will be able to

- 1. Understand the concept of viscosity.
- 2. Calculate mass and volumetric flow rates.
- 3. Understand the principles of different flow meters.
- 4. Install and calculate the flow rate of fluid with different flow meters in closed pipe line.
- 5. Understand working of different types of valves
- 6. Understand the principle and working of different fluid flow machinery.

## **Learning Structure:**



## Theory:

| Chapter | <b>Topics and Contents</b>                                                                              | Hours | Marks |
|---------|---------------------------------------------------------------------------------------------------------|-------|-------|
|         | Introduction to Fluids :                                                                                |       |       |
|         | Specific Objective                                                                                      |       |       |
|         | • Calculate pressure using U tube manometer.                                                            |       |       |
|         | • Compare Newtonian & Non Newtonian fluid.                                                              |       |       |
|         | • State Newton's law of Viscosity.                                                                      |       |       |
|         | 1.1 Properties of fluids                                                                                |       |       |
|         | • Density & viscosity (absolute & Kinematic)                                                            |       |       |
|         | • Vapor pressure & partial pressure                                                                     |       |       |
|         | Atmospheric pressure                                                                                    |       |       |
|         | • Vacuum                                                                                                |       |       |
|         | Absolute pressure                                                                                       |       |       |
| 1       | 1.2 Principle of Hydrostatic Equilibrium                                                                | 07    | 12    |
| 1       | Pressure exerted by a liquid column                                                                     | 07    | 12    |
|         | <ul> <li>Various types of manomaters such as II tuba. Wall</li> </ul>                                   |       |       |
|         | • Various types of manometers such as 0 tube, well<br>type and inclined leg manometer                   |       |       |
|         | <ul> <li>Prossure measurement by U tube menometer and</li> </ul>                                        |       |       |
|         | • Fressure measurement by 0-tube manometer and                                                          |       |       |
|         | 1.3 Types of fluids                                                                                     |       |       |
|         | • Ideal and actual fluids                                                                               |       |       |
|         | <ul> <li>Compressible and incompressible fluids</li> </ul>                                              |       |       |
|         | <ul> <li>Nowton's low of viscosity</li> </ul>                                                           |       |       |
|         | <ul> <li>Newtoni s law of viscosity</li> <li>Newtonion and Non Newtonion fluids with example</li> </ul> |       |       |
|         | • Newtonian and Non-Newtonian fluids with example                                                       |       |       |
|         | of each type.                                                                                           |       |       |
|         | Flow of Fluids (Incompressible & its measurement)<br>Specific Objectives                                |       |       |
|         | • Calculate the volumetric flow rate using orifice mater and                                            |       |       |
|         | • Calculate the volumenter now rate using office meter and<br>Venturi meter                             |       |       |
|         | <ul> <li>Calculate the frictional losses due to expansion and</li> </ul>                                |       |       |
|         | Calculate the inclinial losses due to expansion and contraction                                         |       |       |
|         | • State Hagen Doiceulli's equation                                                                      |       |       |
|         | • State Hagen Folseum's equation.                                                                       |       |       |
|         | 2.1 Volumetric and Wass now rate (10 marks)                                                             |       |       |
|         | <ul> <li>Concept of voluments and mass now rate</li> <li>Interconversion of the above two</li> </ul>    |       |       |
|         | Interconversion of the above two                                                                        |       |       |
|         | • Average velocity                                                                                      |       |       |
|         | • Mass velocity                                                                                         | 20    | 40    |
| 2       | • Point velocity                                                                                        |       |       |
|         | • Equation of continuity                                                                                |       |       |
|         | • Derivation of equation of continuity                                                                  |       |       |
|         | • Numericals based on above sub- topics                                                                 |       |       |
|         | 2.2 Reynolds Number                                                                                     |       |       |
|         | • Definition                                                                                            |       |       |
|         | Reynolds experiment                                                                                     |       |       |
|         | • Concept of laminar, turbulent and transition flow                                                     |       |       |
|         | Critical velocity                                                                                       |       |       |
|         | • Formula for Reynolds Number and Numericals.                                                           |       |       |
|         | 2.3 Bernoulli's equation                                                                                |       |       |
|         | <ul> <li>Various types of energies by liquid</li> </ul>                                                 |       |       |

|   | • Derivation of Bernoulli's equation                                                                |          |    |
|---|-----------------------------------------------------------------------------------------------------|----------|----|
|   | Friction factor correction                                                                          |          |    |
|   | • Work done by pump                                                                                 |          |    |
|   | Kinetic Energy correction                                                                           |          |    |
|   | Numerical                                                                                           |          |    |
|   | 2.4 Friction (12 marks)                                                                             |          |    |
|   | • Concept of friction in fluid flow                                                                 |          |    |
|   | • Types of friction- Form ,skin: Definition.                                                        |          |    |
|   | • Relation between pressure drop, wall friction and                                                 |          |    |
|   | shear stress                                                                                        |          |    |
|   | • Shear stress distribution in pipes                                                                |          |    |
|   | • Relation between average velocity and maximum                                                     |          |    |
|   | velocity for laminar flow                                                                           |          |    |
|   | • Derivation of Hagen Poiseuille's equation                                                         |          |    |
|   | Problems on above topics                                                                            |          |    |
|   | 2.5 Friction in pipes                                                                               |          |    |
|   | • Fanning's friction factor in Laminar and Turbulent                                                |          |    |
|   | flow                                                                                                |          |    |
|   | Friction factor chart                                                                               |          |    |
|   | • Friction losses due to sudden expansion and sudden                                                |          |    |
|   | contraction                                                                                         |          |    |
|   | 2.6 Measurement of fluid flow (12 Marks)                                                            |          |    |
|   | • Variable head meter and variable area meter                                                       |          |    |
|   | • Construction working principle, discharge coefficient,                                            |          |    |
|   | calibration, relative advantages and disadvantages,                                                 |          |    |
|   | Orifica meter Venturimeter                                                                          |          |    |
|   | Office meter, venturmeter                                                                           |          |    |
|   | • Rotameter construction principle concept of variation                                             |          |    |
|   | in flow area, calibration                                                                           |          |    |
|   | • Pitot tube, construction, advantages and formula to                                               |          |    |
|   | calculate point velocity                                                                            |          |    |
|   | Pipe, fittings & valves                                                                             |          |    |
|   | Specific Objectives                                                                                 |          |    |
|   | • List the different types of fittings & valves.                                                    |          |    |
|   | • State equivalent length of pipe fitting, frictional losses                                        |          |    |
|   | in pipe fittings.                                                                                   |          |    |
|   | 3.1 Pipe & Pipe Fittings                                                                            |          |    |
|   | • Standard sizes of pipes, wall thickness, Schedule                                                 | <u> </u> |    |
| 3 | number & Material of construction                                                                   | 07       | 16 |
|   | • Various types of fittings                                                                         |          |    |
|   | • Equivalent length of pipe fittings                                                                |          |    |
|   | 3.2 Classification of valves                                                                        |          |    |
|   | • Construction, working, advantages of Globe, Gate,<br>Dive Boll Disphragm Needle Control volve Non |          |    |
|   | return valve. Safety valve                                                                          |          |    |
|   | 3.3 Construction working and application of Rupture disc                                            |          |    |
|   | Transportation of Fluids                                                                            |          |    |
| 4 | Specific Objectives                                                                                 | 14       | 32 |
|   | • Calculate the NPSH of the centrifugal pump                                                        |          |    |

| Total                                                                                           | <b>48</b> | 100 |
|-------------------------------------------------------------------------------------------------|-----------|-----|
| Vacuum generating equipment Principle, construction and<br>working of Vacuum pump, Jet ejectors |           |     |
| Reciprocating Compressor                                                                        |           |     |
| Centrifugal blower                                                                              |           |     |
| • Range of pressure developed by each type                                                      |           |     |
| <ul> <li>Specific applications of each equipment</li> </ul>                                     |           |     |
| 4.3 Fans, blowers & compressors: (10 marks)                                                     |           |     |
| Characteristics curve of Centrifugal pump                                                       |           |     |
| cavitation, NPSH etc.                                                                           |           |     |
| air binding, priming, suction head, and discharge head,                                         |           |     |
| • Construction, various parts, development of pressure,                                         |           |     |
| 4.2 Centrifugal pump (10 Marks)                                                                 |           |     |
| curves.                                                                                         |           |     |
| Diaphragm pump. Screw pump, Characteristics                                                     |           |     |
| duplex, triplex piston, plunger), gear pump                                                     |           |     |
| • Positive displacement pumps, then types,<br>Reciprocating nump (single acting double acting   |           |     |
| <ul> <li>Classification</li> <li>Dositive displacement number their types</li> </ul>            |           |     |
| - Classification                                                                                |           |     |
| and compressor. (12 marks)                                                                      |           |     |
| • State the range of pressure developed by fan, blower                                          |           |     |
| pump.                                                                                           |           |     |
| • Compare centrifugal pump and positive displacement                                            |           |     |
| Compare centrifugal pump and positive displacement                                              |           |     |

## Practical:

## **Intellectual Skills**

- 1. Interpret data and result.
- 2. Calculate various parameters.
- 3. Identify errors and method of minimizing.

## **Motor Skills**

- 1. Handle Equipment
- 2. Measure accurately various parameters.

## **Lists of Practicals:**

- 1. Understand the phenomenon of viscosity, pressure gradient by demonstration.
- 2. Verify Reynolds experiment and calculate the Reynolds number at the end of laminar regime and beginning of turbulent regime.
- 3. Perform experiment based on Bernoulli's theorem and prove that the summation of pressure head, kinetic head and potential head is constant.
- 4. Estimate the fanning friction factor at different flow rate and draw friction factor chart.
- 5. Calculate the coefficient of discharge of a venturimeter and prepare calibration curve.
- 6. Calculate the coefficient of discharge of an orifice meter and prepare calibration curve.
- 7. Calibrate the rotameter and plot the calibration curve.
- 8. Determine head loss due to sudden expansion and contraction.
- 9. Calculate equivalent length of bend, globe valve and gate valve.
- 10. Plot and understand the characteristic curves of a centrifugal pimp by using centrifugal pump test rig.

## **Assignments: Any Four**

| Sr.<br>No. | Assignments                                                                             |
|------------|-----------------------------------------------------------------------------------------|
| 1          | Calculate pressure at a specific point inside a liquid surface.                         |
| 2          | Conversion of pressure exerted in terms of various liquids columns.                     |
| 3          | Conversion of volumetric flow rate into mass flow rate. Calculating a average velocity, |
|            | mass velocity.                                                                          |
| 4          | 5 Problems based on equation of continuity.                                             |
| 5          | Problems based on Bernoulli's equation.                                                 |
| 6          | Problems based on Reynolds's number.                                                    |
| 7          | Problems based on calculating friction factor for Laminar and Turbulent flow.           |
| 8          | Calculating pressure drop over certain length of pipe using above parameters.           |
| 9          | Equivalent of different pipe fitting having these pipe fittings.                        |
| 10         | Calculating volumetric flow rate by Orificemeter, Venturimeter and Rotameter.           |
| 11         | Calculating H.P. of pump for transporting liquid from one point to other point.         |

# Learning Resources:

Book:

| Sr. No. | Author               | Title                                   | Publisher          |
|---------|----------------------|-----------------------------------------|--------------------|
| 1       | McCabe, Smith        | Unit Operations of Chemical Engineering | McGraw Hill        |
| 2       | Badger & Banchero    | Introduction to Chemical<br>Engineering | McGraw Hill        |
| 3       | Richardson & Coulson | Chemical Engineering<br>Volume-I        | Pergamon Press     |
| 4       | P. Chattopadhyay     | Unit Operations of Chemical Engineering | Khanna Publication |

Websites: www.flowmaster.com www.pipeflow.co.uk www.radcoind.com www.vlab.co.in Course Name : Diploma in Chemical Engineering Course Code : CH Semester : Fourth Subject Title : Chemical Process Technology-II Subject Code : 17427

## **Teaching and Examination Scheme:**

| Teac | hing Scl | heme | Examination Scheme |     |     |    |     |       |
|------|----------|------|--------------------|-----|-----|----|-----|-------|
| TH   | TU       | PR   | PAPER<br>HRS       | TH  | PR  | OR | TW  | TOTAL |
| 03   |          | 04   | 03                 | 100 | 50# |    | 25@ | 175   |

NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

There are different type of Chemical industries like Small, Medium and Large Scale. Diploma students should able to operate and Control manufacturing process of various Chemicals. From this subject student will get knowledge of manufacture of chemicals like alcohol, phenol, oil, Soap, paper etc.

## **General Objectives:**

## The students will be able to

- 1. Know about Raw materials, Physical & Chemical Properties with Chemical reaction for the manufacture of various Chemicals.
- 2. Know manufacturing process of various chemicals
- 3. Understand uses of various Chemicals.

## Learning structure:



## Theory:

| Chapter | Topic and Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Hours | Marks |  |  |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|--|--|
| 1       | <ul> <li>Alconol</li> <li>Specific Objectives :         <ul> <li>Describe manufacturing processes of alcohol with reaction</li> <li>Draw flow sheet/ block diagram</li> </ul> </li> <li>Content:         <ul> <li>Raw Materials , Reactions, Flow sheet/Block diagram, manufacturing process of products &amp; their uses</li> <li>Ethyl alcohol by Corn &amp;Molasses</li> <li>Acetic Acid by Oxidation of Acetaldehyde</li> <li>Butanol by Oxo process from Propulano</li> </ul> </li> </ul>                                                                                                                                                                                                                |       |       |  |  |
| 2       | Paint         Specific Objectives: <ul> <li>State constituents of paint with function</li> <li>Describe manufacturing processes of paint</li> <li>State uses of Varnishes &amp; Lacquers</li> </ul> Content: <ul> <li>Properties of raw materials of paint &amp; their functions</li> <li>Manufacturing of paint</li> <li>Constituent of Pigments</li></ul>                                                                                                                                                                                                                                                                                                                                                   | 05    | 12    |  |  |
| 3       | <ul> <li>Oil, Soap &amp; Detergent</li> <li>Specific Objectives: <ul> <li>State Extraction process of oil</li> <li>State Hydrogenation of oil</li> <li>Describe manufacturing processes of soap &amp; Detergent</li> <li>Explain cleansing action of soap</li> </ul> </li> <li>Content: <ul> <li>Oefinitions - Acid value , Iodine value, Saponification value of oil</li> <li>Extraction of Oil by solvent process</li> <li>Hydrogenation of Oil</li> </ul> </li> <li>3.2 Soap <ul> <li>O6 Marks</li> <li>Classification of Cleansing Compounds</li> <li>Manufacturing of Soap by <ul> <li>Batch Saponification Process</li> <li>Continuous Hydrolysis &amp; Saponification</li> </ul> </li> </ul></li></ul> | 08    | 20    |  |  |

|   | 3.3 Detergents 06 Marks                                                                                |    |      |
|---|--------------------------------------------------------------------------------------------------------|----|------|
|   | Manufacturing of detergents by                                                                         |    |      |
|   | - Sulfated Fatty Alcohols                                                                              |    |      |
|   | - Alkyl-Aryl Sulfonates                                                                                |    |      |
|   | Pulp and Papers                                                                                        |    |      |
|   | Specific Objectives:                                                                                   |    |      |
|   | Describe manufacturing processes of Pulp & paper with<br>reaction                                      |    |      |
|   | To draw flow sheet                                                                                     |    |      |
| 4 | Content:                                                                                               | 05 | 12   |
|   | Raw Materials, Reactions, Flow sheet/Block diagram,                                                    | 00 |      |
|   | manufacturing process of product & their uses                                                          |    |      |
|   | • Pulp by Sulfate (Kraft) process & Sulphite process                                                   |    |      |
|   | recovery of Chemicals                                                                                  |    |      |
|   | • Paper from pulp                                                                                      |    |      |
|   | • Rayon (viscous rayon) form cellulose                                                                 |    |      |
|   | Polymer                                                                                                |    |      |
|   |                                                                                                        |    |      |
|   | Specific Objectives:                                                                                   |    |      |
|   | State meaning of polymerization                                                                        |    |      |
|   | Describe manufacturing processes of polymer with                                                       |    |      |
|   | reactions                                                                                              |    |      |
|   | Content:                                                                                               |    |      |
|   | • Polymerization - Definition of (08 Marks)                                                            |    |      |
| _ | Polymerization, Methods of                                                                             |    |      |
| 5 | Polymerization – Addition & Condensation                                                               | 15 | 24   |
|   | • Raw Materials, Reactions, Flow sheet / Block diagram,                                                |    |      |
|   | manufacturing process of product & their uses                                                          |    |      |
|   | (16  Marks)                                                                                            |    |      |
|   | - Poly Vinyl Chloride(PVC) by Emulsion polymerization                                                  |    |      |
|   | - Polyethylene by Ziegler process Low high medium                                                      |    |      |
|   | Pressure<br>Delustrance from Denzone & Ethylene Styrene Deluster                                       |    |      |
|   | - Polystylelle from beilzelle & Eurylelle Stylelle Polyester<br>Delvester by polymerization of DMT DTA |    |      |
|   | & ethylene glycol                                                                                      |    |      |
|   | Phenol                                                                                                 |    |      |
|   | Specific Objectives:                                                                                   |    |      |
|   |                                                                                                        |    |      |
|   | > Describe manufacturing processes of Phenol with reaction                                             |    |      |
| 6 | > To draw flow sheet                                                                                   |    |      |
|   | Content:                                                                                               |    |      |
|   | Raw Materials, Reactions, Flow sheet/Block diagram,                                                    | 09 | 16   |
|   | manufacturing process of phenol & their uses                                                           |    |      |
|   | a) Cumene Peroxidation Process                                                                         |    |      |
|   | b) Toluene Oxidation Process                                                                           |    |      |
|   | c) Rasching Process                                                                                    |    |      |
|   | d) Chlorobenzene-Caustic hydrolysis                                                                    | 40 | 4.00 |
| 1 | Total                                                                                                  | 48 | 100  |

#### Practical's:

Skills to be developed:

#### **Intellectual Skills:**

- a. Select suitable process of manufacturing
- b. Select proper process condition for getting maximum yield

#### Motor Skills:

- a. Work on manufacturing plant
- b. Set proper temperature and pressure condition
- c. Set controlling steps in manufacturing process

#### **List of Practical's:**

- 1) Estimate the strength of glacial acetic acid by conductometric titration.
- 2) Determine Iodine value of given oil sample by titration method.
- 3) Determine the saponification value of given lubricating oil sample by KOH titration.
- 4) Determine the acid value of given lubricating oil sample by KOH titration.
- 5) Calculate the hiding power of given sample of paint.
- 6) Calculate the percentage of thinner in a given sample of oil paint.
- 7) Prepare phenol formaldehyde resin on the laboratory scale by using phenol and formaldehyde raw material.
- 8) Prepare the soap by batch saponification process and analyze the moisture content of laboratory made soap.
- 9) Prepare ethyl acetate from ethyl alcohol and acetic acid by esterification and determine its density and boiling point.

## Mini Project (any Three):

- 1) Compare moisture content of any three branded Washing Soap in Market (with respect to composition of each soap). Compare with TFM.
- 2) Compare Hiding power of any three branded Paints in Market, Viscosity, % Thinner
- 3) Compare any three refined Oil available in market (with respect to acid value, saponification value)
- 4) Collect information about different types of papers & compare their parameters w.r.t. GSM, folding strength

## **Learning Resources:**

**Books:** 

| Sr.<br>No. | Name of Book                                | Name of Author | Name of Publisher                             |
|------------|---------------------------------------------|----------------|-----------------------------------------------|
| 1          | Dryden Outline of Chemical<br>Technology    | M. Gopala Rao  | East West Publishers 1997, New Delhi.         |
| 2          | Shreve Chemical Process<br>Industries       | George Austin  | Mc Graw Hill<br>Publication<br>1984, Auckland |
| 3          | Chemical Process Organic<br>Synthesis       | P. H. Groggins | Mc Graw Hill 1958,<br>Auckland.               |
| 4          | Handbook of Industrial<br>Chemistry VOL. II | Davis. K. H    | C.B.S Publication<br>2004, New Delhi          |

**Course Name : Diploma in Chemical Engineering** 

Course Code : CH

Semester : Fourth

Subject Title : CAD Software

Subject Code : 17039

## **Teaching and Examination Scheme:**

| Teac | hing Scl | heme | Examination Scheme |    |    |    |     |       |  |
|------|----------|------|--------------------|----|----|----|-----|-------|--|
| TH   | TU       | PR   | PAPER<br>HRS       | TH | PR | OR | TW  | TOTAL |  |
|      |          | 02   |                    |    |    |    | 25# | 25    |  |

## **Rationale:**

Drawing is the language of engineers. It conveys the meaning for construction and erection of Chemical Plant. Now a days computer has become an effective tool for preparing drawing through the software CAD. This subject provides sufficient practice to make use of CAD and draw required drawings.

## **General Objective:**

After studying the subject students will be able to

- Draw process equipments.
- Draw and modify various objects
- Draw plant layout

## Learning Structure:



## List of Practical

| Sr. No. | Name of Topic                                                                                                 | Hours |
|---------|---------------------------------------------------------------------------------------------------------------|-------|
| 1       | Practice of basic commands such as draw, modify etc. (Related commands should be covered in practical period) | 04    |
| 2       | Draw symbols as per IS 3232                                                                                   | 04    |
| 3       | Draw flow diagram for given chemical process (any four )                                                      | 12    |
| 4       | Redraw the given Plant, Equipment layout and Utilities line diagram                                           | 12    |

## Note:

- 1. Give different process for drawing of flow sheet.
- 2. For practical number 4, teacher has to provide drawing.
- 3. Printout of each CAD sheet will be part of Teamwork.

## **Learning Resources:**

| Sr. No. | Author                    | Title                                     | Publisher                                |
|---------|---------------------------|-------------------------------------------|------------------------------------------|
| 01      | K Venugopal               | Engineering Drawing and Graphics Auto CAD | New Age Publication                      |
| 02      | M.V. Joshi<br>V.V Mahajan | Process Equipment Design                  | 1997 Mac Milan India Ltd.                |
| 03      | M Gopala Rao              | Dryden Outline of Chemical<br>Technology  | East West Publishers 1997,<br>New Delhi. |
| 04      | Indian standard           | IS 3232                                   | Govt. of India                           |

Course Name : Diploma in Chemical Engineering Course Code : CH Semester : Fourth Subject Title : Professional Practices-II Subject Code : **17040** 

**Teaching and Examination Scheme:** 

| <b>Teaching Scheme</b> |    |    | Examination Scheme |    |    |    |     |       |  |  |
|------------------------|----|----|--------------------|----|----|----|-----|-------|--|--|
| TH                     | TU | PR | PAPER<br>HRS       | TH | PR | OR | TW  | TOTAL |  |  |
|                        |    | 03 |                    |    |    |    | 50@ | 50    |  |  |

## **Rationale:**

Engineering diploma holders are basically intended to work in industries. Their placements and selection for the jobs is based on the campus interview conducted by respective companies. Since the candidate is supposed to work and carry out actual engineering practices in the industries, his confidence, attitude and ability to communicate with the subordinates is usually tested apart from his technical subject knowledge.

To facilitate this and boost his capabilities the subject of professional practices aims to provide ample opportunities to the students. To accomplish this, industrial visits, lectures by professionals/experts, seminars and group discussions are planned during the semester.

## **Objectives:**

- 1. To acquire information and data of different industry
- 2. To deliver the information and the knowledge required to develop awareness about latest trends in chemical industry.
- 3. To interact with fellow people and present their views.
- 4. To prepare report on industrial visit and expert lectures.

## **Learning Structure:**



## Guidelines for implementing professional practices

- In order to implement contents of professional practice effectively it is necessary for the department to plan the activities for full semester. Minor modifications may be done if required. Following are guidelines for the same.
- Activities to be guided and monitored by the faculty of the concerned department only.
- Involve students in related activities to a great extent to develop learning to learn skills.
- Arrange industrial visits and expert lectures on convenient days. Periods of PP may be allocated to concerned faculty members whose periods may be lost.
   Ensure to carry out all activities suggested.

## Activities:

| Contents                                                                                 | Hours |
|------------------------------------------------------------------------------------------|-------|
| 1. Industrial Visits                                                                     |       |
| Industrial visits to be arranged and report of the same to be submitted by individual    |       |
| students to form the part of the term work. The report to contain information in respect |       |
| to                                                                                       |       |
| a. Raw material required                                                                 |       |
| b. Finished product to be produced                                                       |       |
| c. Capacity of the plant                                                                 |       |
| d. Utilities required and their consumption                                              |       |
| e. Man power requirement                                                                 |       |
| f. General costing                                                                       | 12    |
| g. Various equipments, unit operations and unit processes involved                       |       |
| h. Storage and handling of material                                                      |       |
| i. General layout of the plant                                                           |       |
| Visits to any two of the following.                                                      |       |
| a. Visit to ethanol plant                                                                |       |
| b. Visit to rubber tyre retreading unit                                                  |       |
| c. Visit to electroplating industry                                                      |       |
| d. Visit to a fertilizer industry                                                        |       |
| e. Visit to a plastic industry                                                           |       |
| 2. Lectures                                                                              |       |
| Lectures by professionals / industrial experts / academicians                            |       |
| Two sessions to be held on the following topics                                          |       |
| a. Industrial filtration                                                                 |       |
| b. Mixing and agitation                                                                  | 06    |
| c. Fluid transportation and handling                                                     |       |
| d. Cooling and refrigeration                                                             |       |
| e. Steam generation                                                                      |       |
| f. Introduction to Apprenticeship Training Scheme                                        |       |
| 3. Seminars                                                                              |       |
| Seminar based on information search to be organized from any three of the following      |       |
| areas                                                                                    |       |
| a. Protection of environment                                                             | 10    |
| b. Safety practices in chemical industries                                               | 10    |
| c. General maintenance in chemical plant                                                 |       |
| d. Water purification                                                                    |       |
| e. Non conventional energy sources                                                       |       |
| 4. Group Discussion                                                                      |       |
| The student should discuss in a group of $6 - 8$ and write a brief report on the same.   |       |
| Group discussion to be monitored by faculty members. The following topics to be          |       |
| discussed                                                                                | 12    |
| a. Selection of pumping devices                                                          | 12    |
| b. Treatment of boiler feed water                                                        |       |
| c. Selection of filtration equipments                                                    |       |
| d. Fine chemicals and their applications                                                 |       |
| 5. Student Activities                                                                    |       |
| The group of $3 - 4$ students will perform any one of the following activities           |       |
| a. Comparative statement of prices and specifications                                    | 08    |
| b. Information regarding specifications of different pumps and motors                    |       |
| c. Create data base of past students                                                     |       |

| materials                                                     | Total 48           |
|---------------------------------------------------------------|--------------------|
| n. Concernmention regarding specifications of common of       | ngmeening          |
| the institute.                                                | angineering        |
| e. Collect information regarding various chemical industries  | in the vicinity of |
| pumps and its components                                      |                    |
| d. Collect information regarding material of construction for | pipe fittings,     |

## **Learning Resources:**

## 1. Books:

| Sr. No. | Title                                                                                                      |
|---------|------------------------------------------------------------------------------------------------------------|
| 1.      | Fourth semester subjects reference books                                                                   |
| 2.      | Journals and magazines - IEEE Journals, IT technologies.                                                   |
| 3.      | Local news papers and events                                                                               |
| 4.      | Apprenticeship Training Scheme:- Compiled By – BOAT (Western Region), Mumbai, Available on MSBTE Web Site. |

## 2. Websites:

1. http://www.wikipedia.com

2. http://www.seminarforyou.com

# Course Name : All Branches of Diploma in Engineering & Technology Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG Industrial Training (Optional) after 4<sup>th</sup> semester examination.

Note:- Examination in Professional Practices of 5<sup>th</sup> Semester.

## INDUSTRIAL TRAINING (OPTIONAL)

## Rational:-

There was a common suggestion from the industry as well as other stakeholders that curriculum of Engineering and Technology courses should have Industrial training as part of the curriculum. When this issue of industrial training was discussed it was found that it will be difficult to make industrial training compulsory for all students of all courses as it will be difficult to find placement for all the students. It is therefore now proposed that this training can be included in the curriculum as optional training for student who is willing to undertake such training on their own. The institutes will help them in getting placement or also providing them requisite documents which the student may need to get the placement.

Details:- Student can undergo training in related industries as guided by subject teachers / HOD.

- The training will be for four weeks duration in the summer vacation after the fourth semester examination is over.
- The student undergoing such training will have to submit a report of the training duly certified by the competent authority from the industry clearly indicating the achievements of the student during training. This submission is to be made after joining the institute for Fifth semester.
- The student completing this training will have to deliver a seminar on the training activities based on the report in the subject Professional Practices at Fifth Semester.
- The student undergoing this training will be exempted from attending activities under Professional Practices at Fifth semester except the seminar.
- The students who will not undergo such training will have to attend Professional Practices Classes/activities of fifth semester and will have to complete the tasks given during the semester under this head.
- There work will be evaluated on their submissions as per requirement and will be given marks out of 50. Or student may have to give seminar on training in Industry he attended.
- Institute shall encourage and guide students for Industry training.
- Evaluation:- Report of Training attended and delivery of seminar and actual experience in Industry will be evaluated in fifth semester under Profession Practices-III and marks will be given accordingly out of 50.

'G' Scheme

## MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES

## **COURSE NAME : COMPUTER ENGINEERING GROUP**

## **COURSE CODE : CO/CD/CM/CW**

## DURATION OF COURSE : 6 SEMESTERS FOR CO/CM/CW/IF ( 8 SEMESTERS FOR CD) SEMESTER : FOURTH

#### WITH EFFECT FROM 2012-13 DURATION : 16 WEEKS

**SCHEME : G** 

## PATTERN : FULL TIME - SEMESTER

|           | SUBJECT TITLE                                                                                       |                  |             | TEACHING |      | EXAMINATION SCHEME |       |        |     |        |     |        |     |        |     |               |
|-----------|-----------------------------------------------------------------------------------------------------|------------------|-------------|----------|------|--------------------|-------|--------|-----|--------|-----|--------|-----|--------|-----|---------------|
| SR.<br>NO |                                                                                                     | Abbrevi<br>ation | SUB<br>CODE | S        | CHEM | Έ                  | PAPER | TH (1) |     | PR (4) |     | OR (8) |     | TW (9) |     | SW<br>(17400) |
| 110.      |                                                                                                     | ation            | CODE        | ТН       | TU   | PR                 | HRS.  | Max    | Min | Max    | Min | Max    | Min | Max    | Min | (17400)       |
| 1         | Environmental Studies \$                                                                            | EST              | 17401       | 01       |      | 02                 | 01    | 50#*   | 20  |        |     |        |     | 25@    | 10  |               |
| r         | Computer Hardware &                                                                                 | СПМ              | 17/28       | 03       |      | 02                 | 03    | 100    | 40  | 25#    | 10  |        |     | 25@    | 10  |               |
| 2         | Maintenance β                                                                                       | CIIW             | 17420       | 05       |      | 02                 | 05    | 100    | 40  | 25#    | 10  |        |     | 25@    | 10  |               |
| 3         | Computer Network                                                                                    | CNE              | 17429       | 03       |      | 04                 | 03    | 100    | 40  | 50#    | 20  |        |     | 25@    | 10  |               |
| 4         | Microprocessor and                                                                                  | ΜΛΡ              | 17/31       | 03       |      | 02                 | 03    | 100    | 40  | 25#    | 10  |        |     | 25@    | 10  | 50            |
| 4         | Programming β                                                                                       | MAL              | 17431       | 05       |      | 02                 | 05    | 100    | 40  | 23π    | 10  |        |     | 25@    | 10  |               |
| 5         | Object Oriented Programming β                                                                       | OOP              | 17432       | 03       |      | 04                 | 03    | 100    | 40  | 50#    | 20  |        | -   | 25@    | 10  |               |
| 6         | Computer Graphics                                                                                   | CGR              | 17056       | 01       |      | 02                 |       |        |     | 50#    | 20  |        |     | 25@    | 10  |               |
| 7         | Professional Practices-II β                                                                         | PPT              | 17042       |          |      | 03                 |       |        |     |        |     |        |     | 50@    | 20  |               |
|           |                                                                                                     | r                | TOTAL       | 14       |      | 19                 |       | 450    |     | 200    |     |        |     | 200    |     | 50            |
| **        | * Industrial Training (Optional) Examination in 5 <sup>th</sup> Semester Professional Practices-III |                  |             |          |      |                    |       |        |     |        |     |        |     |        |     |               |

Student Contact Hours Per Week: 33 Hrs.

## THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.

Total Marks : 900

@ - Internal Assessment, # - External Assessment, No Theory Examination, \$ - Common to all branches, #\* - Online Examination,

 $\beta$  - Common to IF

Abbreviations: TH-Theory, TU-Tutorial, PR-Practical, OR-Oral, TW-Term Work, SW-Sessional Work.

\*\* Industrial Training (Optional) - Student can undergo Industrial Training of four weeks after fourth semester examination during summer vacation.

Assessment will be done in Fifth semester under Professional Practices-III. They will be exempted from activities of Professional Practices-III of 5<sup>th</sup> Semester.

- Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subjects is to be converted out of 50 marks as sessional work (SW).
- > Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.
- > Code number for TH, PR, OR and TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.

MSBTE - Final Copy Dt. 30/08/2013

# Course Name : All Branches of Diploma in Engineering & Technology Course Code : AE/CE/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG/AU

Semester : Fourth

Subject Title : Environmental Studies

Subject Code : 17401

**Teaching and Examination Scheme:** 

| Teac | hing Scl | heme | Examination Scheme |      |    |    |     |       |  |  |
|------|----------|------|--------------------|------|----|----|-----|-------|--|--|
| TH   | TU       | PR   | PAPER<br>HRS       | TH   | PR | OR | TW  | TOTAL |  |  |
| 01   |          | 02   | 01                 | 50#* |    |    | 25@ | 75    |  |  |

#### **#\* Online Theory Examination**

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Environment essentially comprises of our living ambience, which gives us the zest and verve in all our activities. The turn of the twentieth century saw the gradual onset of its degradation by our callous deeds without any concern for the well being of our surrounding we are today facing a grave environmental crisis. The unceasing industrial growth and economic development of the last 300 years or so have resulted in huge ecological problems such as overexploitation of natural resources, degraded land, disappearing forests, endangered species, dangerous toxins, global warming etc.

It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

The curriculum covers the aspects about environment such as Environment and Ecology, Environmental impacts on human activities, Water resources and water quality, Mineral resources and mining, Forests, etc.

General Objectives: The student will be able to,

- 1. Understand importance of environment
- 2. Know key issues about environment
- 3. Understands the reasons for environment degradation
- 4. Know aspects about improvement methods
- 5. Know initiatives taken by the world bodies to restrict and reduce degradation

## **Learning Structure:**



## Theory:

| Topic and Contents                                                                                                      | Hours | Marks |
|-------------------------------------------------------------------------------------------------------------------------|-------|-------|
| Topic 1: Nature of Environmental Studies                                                                                |       |       |
| Specific Objectives:                                                                                                    |       |       |
| Define the terms related to Environmental Studies                                                                       |       |       |
| State importance of awareness about environment in general public                                                       | 01    | 04    |
| Contents:                                                                                                               | 01    | 04    |
| • Definition, Scope and Importance of the environmental studies                                                         |       |       |
| Importance of the studies irrespective of course                                                                        |       |       |
| <ul> <li>Need for creating public awareness about environmental issues</li> </ul>                                       |       |       |
| <b>Topic 2: Natural Resources and Associated Problems</b>                                                               |       |       |
| Specific Objectives:                                                                                                    |       |       |
| Define natural resources and identify problems associated with                                                          |       |       |
| them                                                                                                                    |       |       |
| Identify uses and their overexploitation                                                                                |       |       |
| Identify alternate resources and their importance for environment                                                       |       |       |
| Contents:                                                                                                               |       |       |
| 2.1 Renewable and Non renewable resources                                                                               |       |       |
| • Definition                                                                                                            |       |       |
| Associated problems     Associated problems                                                                             |       |       |
| 2.2 Forest Resources                                                                                                    |       |       |
| General description of forest resources                                                                                 |       |       |
| • Functions and benefits of forest resources                                                                            |       |       |
| • Effects on environment due to deforestation, 1 imber                                                                  |       |       |
| 2.3 Water Posources                                                                                                     | 04    | 10    |
| 2.5 Water Resources<br>Hydrosphere: Different sources of water                                                          |       |       |
| Hydrosphere. Different sources of water                                                                                 |       |       |
| • Use and overexploitation of surface and ground water<br>• Effect of floods, draught, dams atc. on water resources and |       |       |
| • Effect of hoods, draught, dams etc. on water resources and                                                            |       |       |
| 2.4 Mineral Resources:                                                                                                  |       |       |
|                                                                                                                         |       |       |
| Categories of mineral resources                                                                                         |       |       |
| Basics of mining activities                                                                                             |       |       |
| • Mine safety                                                                                                           |       |       |
| • Effect of mining on environment                                                                                       |       |       |
| 2.5 Food Resources:                                                                                                     |       |       |
| • Food for all                                                                                                          |       |       |
| Effects of modern agriculture                                                                                           |       |       |
| World food problem                                                                                                      |       |       |
| Topic 3. Ecosystems                                                                                                     |       |       |
| Concept of Ecosystem                                                                                                    |       |       |
| • Structure and functions of ecosystem                                                                                  | 01    | 04    |
| • Energy flow in ecosystem                                                                                              | -     | _     |
| • Major ecosystems in the world                                                                                         |       |       |
| Topic 4. Biodiversity and Its Conservation                                                                              |       |       |
| Definition of Biodiversity                                                                                              | 02    | 06    |
| • Levels of biodiversity                                                                                                |       |       |

| Total                                                                                                    | 16 | 50 |
|----------------------------------------------------------------------------------------------------------|----|----|
| Human Health and Human Rights                                                                            |    |    |
| environment                                                                                              |    |    |
| Population Growth: Aspects, importance and effect on                                                     |    |    |
| Forest Conservation Act                                                                                  |    |    |
| Wildlife Protection Act                                                                                  | 02 | 08 |
| • Water (Prevention and Control of Pollution) Act                                                        | 02 | 00 |
| • Air (Prevention and Control of Pollution) Act                                                          |    |    |
| Environmental Protection Act                                                                             |    |    |
| Brief description of the following acts and their provisions:                                            |    |    |
| Topic 7. Environmental Protection                                                                        |    |    |
| <ul> <li>Concept of Carbon Credits and its advantages</li> </ul>                                         |    |    |
| and their effect on climate                                                                              |    |    |
| Depletion. Nuclear Accidents and Holocaust Basic concents                                                |    |    |
| Climate Change Global warming Acid rain Ozone Laver                                                      | 03 | 10 |
| • water conservation, watershed management, Kall water<br>harvesting: Definition Methods and Benefits    |    |    |
| Voncept of development, sustainable development     Water conservation. Watershed management. Dain water |    |    |
| 1 opic o. Social issues and Environment                                                                  |    |    |
| Noise Pollution: Definition, sources, effects, prevention                                                |    |    |
| • Soil Pollution: Definition, sources, effects, prevention                                               |    |    |
| prevention                                                                                               |    |    |
| • Water Pollution: Definition, Classification, sources, effects,                                         |    |    |
| prevention                                                                                               | 03 | 08 |
| • Air pollution: Definition, Classification, sources, effects,                                           |    |    |
| • Definition                                                                                             |    |    |
| Topic 5. Environmental Pollution                                                                         |    |    |
| Conservation of biodiversity                                                                             |    |    |
| Threats to biodiversity                                                                                  |    |    |
| • Value of biodiversity                                                                                  |    |    |

## Practical: Skills to be developed:

## **Intellectual Skills**:

- 1. Collection of information, data
- 2. Analysis of data
- 3. Report writing

## **Motor Skills:**

- 1. Presentation Skills
- 2. Use of multi media

## List of Projects:

Note: Any one project of the following:

- 1. Visit to a local area to document environmental assets such as river / forest / grassland / hill / mountain
- 2. Visit to a local polluted site: Urban/Rural/Industrial/Agricultural
- 3. Study of common plants, insects, birds

4. Study of simple ecosystems of ponds, river, hill slopes etc

Prepare a project report on the findings of the visit illustrating environment related facts, analysis and conclusion. Also suggest remedies to improve environment.

Learning Resources: Books:

| Sr.<br>No. | Author                                                | Title                                        | Publisher               |  |
|------------|-------------------------------------------------------|----------------------------------------------|-------------------------|--|
| 01         | Anindita Basak                                        | Environmental Studies                        | Pearson Education       |  |
| 02         | R. Rajgopalan                                         | Environmental Studies<br>from Crises to Cure | Oxford University Press |  |
| 03         | Dr. R. J. Ranjit Daniels, Dr.<br>Jagdish Krishnaswamy | Environmental Studies                        | Wiley India             |  |

| Course Name   | : Computer Engineering Group      |
|---------------|-----------------------------------|
| Course Code   | : CO/CD/CM/CW/IF                  |
| Semester      | : Fourth                          |
| Subject Title | : Computer Hardware & Maintenance |
| Subject Code  | : 17428                           |

## **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              | Examinati | on Scheme |    |     |       |
|-----------------|----|----|--------------|-----------|-----------|----|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH        | PR        | OR | TW  | TOTAL |
| 03              |    | 02 | 03           | 100       | 25#       |    | 25@ | 150   |

## NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

The aim of the subject is to teach the basic working of the computer motherboard, peripherals and add-on cards. The subject helps the students to do the maintenance of the Computer, peripherals and its add-on cards. The students will be able to select the proper peripheral as per their specification and requirement. This is the core technology subject. The pre-requisite of the subject is Microprocessor. The subject is practical oriented and will develop the debugging skills in the students.

## **Objectives:**

The student will be able to:

- 1. Debug and repair the faults in system.
- 2. Assemble the system.
- 3. Load the operating system and device drivers in the system.

## **Learning Structure:**



## Theory:

| Sr.<br>No | Theory                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Hrs.  | Marks |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
| <b>No</b> | <ul> <li>Motherboard &amp; Its Component</li> <li>Specific Objectives</li> <li>➤ To Understand the various components of Motherboard.</li> <li>➤ To Know about the different memories in PC &amp; their usage.</li> <li>➤ To Understand the selection of different components of PC.</li> <li>1.1 CPU – Concept like address lines, data lines, internal registers.</li> <li>1.2 Modes of operation of CPU – Real mode, IA-32 mode, IA-32 Virtual Real Mode.</li> <li>1.3 Process Technologies, Dual Independent Bus Architecture, Hyper Threading Technologies &amp; its requirement.</li> <li>1.4 Processor socket &amp; slots.</li> <li>1.5 Chipset basic, chipset Architecture, North / South bridge &amp; Hub Architecture.</li> <li>1.6 Latest chipset for PC</li> <li>1.7 Overview &amp; features of PCI, PCI –X, PCI express, AGP bus.</li> <li>1.8 Logical memory organization conventional memory, extended memory, expanded memory.</li> <li>1.9 Overview &amp; features of SDRAM, DDR, DDR2, DDR3.</li> <li>1.10 Concept of Cache memory:</li> </ul> | 1113. | 24    |
| 2         | <ul> <li>1.13 BIOS – Basics &amp; CMOS Set Up.</li> <li>1.14 Motherboard Selection Criteria.</li> <li>Storage Devices &amp; Interfacing.</li> <li><u>Objective</u> <ul> <li>To understand the Recording techniques in storage devices.</li> <li>To understand the working of storage devices.</li> </ul> </li> <li>2.1 Recording Techniques: FM, MFM, RLL, perpendicular recording</li> <li>2.2 Hard Disk construction and working.</li> <li>2.3 Terms related to Hard Disk.</li> <li>Track, sector, cylinder, cluster, landing zone, MBR, zone recording, write pre-compensation.</li> <li>2.4 Formatting: Low level, High level &amp; partitioning.</li> <li>2.5 FAT Basics: Introduction to file system, FAT 16, FAT 32, NTFS,</li> <li>2.6 Hard Disk Interface: Features of IDE, SCSI, PATA, SATA, Cables &amp; Jumpers.</li> <li>2.7 CD ROM Drive: Construction, recording.(Block diagram)</li> <li>2.8 DVD: Construction, Recording. (Block Diagram)</li> <li>2.9 Blue-ray Disc specification.</li> </ul>                                                  | 08    | 24    |

|   | Disnlav Devices & Interfacing                                                                                                      |    |    |
|---|------------------------------------------------------------------------------------------------------------------------------------|----|----|
|   | Objective                                                                                                                          |    |    |
|   | <ul> <li>To understand the construction and working of display devices<br/>like CRT, LCD.</li> </ul>                               |    |    |
|   | <ul> <li>To understand the Interfacing of above devices to PC</li> </ul>                                                           |    |    |
|   | 3 1 CRT: - Block diagram & working of monochrome & colour Monitor                                                                  |    |    |
|   | 3.2 Characteristics of CRT Monitor :-                                                                                              |    |    |
| 3 | DOT Pitch, Resolution, Horizontal Scanning frequency, Vertical                                                                     | 06 | 12 |
| - | scanning frequency. Interlaced Scanning, Non-Interfaced scanning,                                                                  |    |    |
|   | Aspect ratio.                                                                                                                      |    |    |
|   | 3.3 LCD Monitor: - Functional Block Diagram of LCD monitor,                                                                        |    |    |
|   | working principle, Passive matrix, Active matrix LCD display.<br>3.4 Touch Screen Display – The construction and working principle |    |    |
|   |                                                                                                                                    |    |    |
|   | 3.4 Plasma Display Technology: - Construction & working principle.                                                                 |    |    |
|   | 3.5 Basic Block Diagram of Video Accelerator card                                                                                  |    |    |
|   | Input and Output Devices                                                                                                           |    |    |
|   | <u>Objective</u>                                                                                                                   |    |    |
|   | To understand the construction and working of Input /Output                                                                        |    |    |
|   | Devices.                                                                                                                           |    |    |
|   | To understand the Interfacing of the above peripherals.                                                                            |    |    |
|   | 4.1 Keyboard: Types of key switches: Membrane, Mechanical, Rubber                                                                  |    |    |
| 4 | dome, Capacitive, optoelectronic and interfacing.                                                                                  | 06 | 12 |
|   | 4.2 Mouse: Opto-mechanical, optical (New design)                                                                                   |    |    |
|   | 4.3 Scanner: Flat Bed, Sheet-fed, Handheld: Block diagram of flat Bed                                                              |    |    |
|   | and specifications, OCR, TWAIN, Resolution, Interpolation.                                                                         |    |    |
|   | 4.4 Modem: Internal and External: Block diagram and specifications.                                                                |    |    |
|   | 4.5 Printer: Printer Characteristics, Dot matrix, Inkjet, Laser: block                                                             |    |    |
|   | Dagram and specifications.                                                                                                         |    |    |
|   | Objective                                                                                                                          |    |    |
|   | To understand the working of SMPS                                                                                                  |    |    |
|   | <ul> <li>To understand the power problems.</li> </ul>                                                                              |    |    |
|   | 5.1 Block diagram and working of SMPS.                                                                                             |    |    |
|   | 5.2 Signal description and pin-out diagram of AT and ATX connectors                                                                |    |    |
| 5 | 5.3 Power supply characteristics: Rated wattage, Efficiency, Regulation,                                                           | 04 | 08 |
|   | Ripple, Load regulation, Line regulation.                                                                                          |    |    |
|   | 5.4 Power problems: Blackout, Brownout, surges and spikes.                                                                         |    |    |
|   | 5.5 Symptoms of power problems.                                                                                                    |    |    |
|   | 5.6 Protection devices: circuit breaker, surge suppressor.                                                                         |    |    |
|   | JIPS: Block diagram advantages and disadvantages Ratings                                                                           |    |    |
|   | Interfaces                                                                                                                         |    |    |
|   | Objective                                                                                                                          |    |    |
|   | To understand the ports of PC                                                                                                      |    |    |
|   | <ul> <li>To understand interfacing techniques of devices to ports</li> </ul>                                                       |    |    |
| 6 | 6.1 SCSI, SCSI cables and connectors, SCSI drive configuration.                                                                    |    |    |
|   | 6.2 USB features.                                                                                                                  | 06 | 12 |
|   | 6.3 RS 232 : (Voltages and 9 pin description)                                                                                      | 00 | 14 |
|   | 6.4 Centronics (interface diagram, important signals and timing                                                                    |    |    |
|   | waveform)                                                                                                                          |    |    |
|   | 6.5 Firewire features                                                                                                              |    |    |
|   | 6.6 Blue tooth                                                                                                                     |    |    |

|   | PC Troubleshooting, Maintenance and Tools.                         |    |     |
|---|--------------------------------------------------------------------|----|-----|
|   | <b>Objective</b>                                                   |    |     |
|   | To understand the preventive maintenance of PC                     |    |     |
|   | To understand the diagnostic tools of PC                           |    |     |
|   | 7.1 POST: POST sequence, Beep codes, visual display codes.         |    |     |
| 7 | 7.2 Preventive maintenance: Active, Passive, periodic maintenance  | 06 | 08  |
|   | procedure.                                                         |    |     |
|   | 7.3 Diagnostic Tools: logic Analyzer, logic probe.                 |    |     |
|   | 7.4 Diagnostic software for trouble shooting PC.                   |    |     |
|   | BGA workstation and its applications for reballing of north bridge |    |     |
|   | and south bridge                                                   |    |     |
|   | Total                                                              | 48 | 100 |

## **PRACTICAL:**

Skills to be developed:

## **Intellectual Skills:**

- Understanding basic hardware of computer
- Fault finding of input/output devices.
- Troubleshooting of input/output devices
- Proper connection of input/output devices.

#### **Motor Skills:**

• Proper handling of Computer System Hardware.

## List of Practical:

- 01. Identify and draw the motherboard layout of Intel i3 processor and understand connection and layout of the H67 or P67chipset.
- 02. Perform Basic Input/output System (BIOS) setting and configuration setup using Complementary Metal Oxide Semiconductor (CMOS).
- 03. Format, partition and install a Hard Disk Drive (HDD) and format a pen drive.
- 04. Understand layout, characteristics and functions of different components of Hard Disk Drive (HDD) as a storage device.
- 05. Install Video Graphics Array (VGA) or Super Video Graphics Array (SVGA) display cards.
- 06. Install and understand the working of printer.
- 07. Install and understand the working of Input/output devices such as scanner and modem.
- 08. Connect Switched Mode Power Supply (SMPS) and identify different parts of SMPS. Understand the working of SMPS and Uninterrupted Power Supply (UPS).
- 09. Use diagnostic software to identify installed computer peripherals and test their working condition.
- 10. Find faults related to Monitor, CPU, Hard disk, Printer and other peripherals.
- 11. Form a pico net using Bluetooth devices and transfer data.
- 12. Assemble PC and install an operating system.

## Learning Resources: Books:

| Sr.<br>No. | Author Title                                               |                                                           | Publisher        |  |
|------------|------------------------------------------------------------|-----------------------------------------------------------|------------------|--|
| 01         | Scott Muller                                               | Upgrading & Repairing PCs                                 | Pearson          |  |
| 02         | Mark Minasi The Complete PC Upgrade &<br>Maintenance guide |                                                           | Wiley India      |  |
| 03         | Barry Press and<br>Maricia Press                           | PC Upgrade and Repair                                     | Wiley India      |  |
| 04         | Begelow                                                    | Bigelow's Troubleshooting,<br>Maintaining & Repairing PCs | Tata McGraw Hill |  |
| 05         | Mike Meyers Scott<br>Jernigan                              | Managing & Troubleshooting PCs                            | Tata McGraw Hill |  |
| 06         | D.Balasubramanian                                          | Computer Installation & Servicing                         | Tata McGraw Hill |  |

Course Name: Computer Engineering GroupCourse Code: CO/CD/CM/CWSemester: FourthSubject Title: Computer NetworkSubject Code: 17429

## **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |     | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|-----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH  | PR        | OR        | TW  | TOTAL |
| 03              |    | 04 | 03           | 100 | 50#       |           | 25@ | 175   |

## NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

## **Rationale:**

The world in the information era has become network centric. A Computer networks has been growing with rapid technological progress. Computer communication through networking becomes essential part of our life. We can manage many application like Air Line Reservation, Railway Reservation, E-banking, E-Governance, On-Line shopping, E-learning etc. by clicking mouse button from our own place. Because of this, world become the global village. By considering importance of networking towards all aspects of our life, we here introduce basic concept of networks, network classification, network topologies, network devices, Transmission media, Network reference models, concept of TCP/IP.

This knowledge explores the student for understanding current network management technology.

## **Objectives:**

To develop following skills:

## Intellectual Skills:

- Understand network & can identifying benefits of networks.
- > Understand and describe communication media.
- Compare different types of Topology.
- Compare different types of network devices.
- > Compare OSI and TCP/IP protocol suite.
- Configuration of TCP/IP

## **Motor Skills:**

- 1. Able to handle Computer Network.
- 2. To develop a small Computer Network.

#### MSBTE - Final Copy Dt. 15/06/2012

## **Learning Structure:**


# **Contents: Theory**

| Topic | Content                                                             | Hours | Marks                                                                   |
|-------|---------------------------------------------------------------------|-------|-------------------------------------------------------------------------|
|       | BASIC NETWORK CONCEPTS                                              |       |                                                                         |
|       | Objectives:-                                                        |       |                                                                         |
| 1     | Basic Concept of Network.                                           |       |                                                                         |
|       | Classification of Network.                                          |       |                                                                         |
|       | Benefits of Network.                                                |       |                                                                         |
|       | 1.1 Fundamentals of Computer Network- Definition Need of            |       |                                                                         |
|       | Computer Network, Applications, Component of Computer               |       | Marks         20         20         20         20         20         20 |
|       | Network.                                                            | 00    | 20                                                                      |
| 1     | 1.2 Network Benefits- Sharing Information(File Sharing, E-mail)     | 08    | 20                                                                      |
|       | - Sharing Resources (Printer Sharing, Application Services)         |       |                                                                         |
|       | - Facilitating Centralized Management-Managing Software,            |       |                                                                         |
|       | Maintaining the Network, Backing up data                            |       |                                                                         |
|       | 1.3 Computer Network Classifications- Classification of Network by  |       |                                                                         |
|       | their GeographyPAN, CAN, LAN, MAN, WAN                              |       |                                                                         |
|       | 1.4 Classification of Network by their Component RolePeer-to-Peer   |       |                                                                         |
|       | Network, Server-Based Network, Types of server                      |       |                                                                         |
|       | NETWORK TOPOLOGIES AND NETWORKING DEVICES                           |       |                                                                         |
|       | Objectives:-                                                        |       |                                                                         |
|       | Topology Concepts.                                                  |       |                                                                         |
|       | Different types of Topology.                                        |       |                                                                         |
|       | Network Control Devices.                                            |       |                                                                         |
|       | 2.1 Network Topologies - Introduction, Definition, Selection        |       |                                                                         |
| 2     | Criteria, Types of Topology- 1) Bus 11) Ring 111) Star 1V)          | 10    | 20                                                                      |
|       | Mesh v) Tree vi) Hybrid.                                            |       |                                                                         |
|       | 2.2 Network Control / Connecting Devices - Need of Network          |       |                                                                         |
|       | Control devices, Role of Network Control devices in a               |       |                                                                         |
|       | Network, Connectors, Hub, Repeater, Bridges, Switches,              |       |                                                                         |
|       | Router, Gateway, Modem.                                             |       |                                                                         |
|       | 2.5 Network software: NIC Device Driver, chent-server               |       |                                                                         |
|       | TPANSMISSION MEDIA                                                  |       |                                                                         |
|       | Objectives.                                                         |       |                                                                         |
|       | Concept of Guided and Unguided Transmission Media                   |       |                                                                         |
|       | <ul> <li>Types of Guided Media</li> </ul>                           |       |                                                                         |
|       | <ul> <li>Types of Unguided Media</li> </ul>                         |       |                                                                         |
|       | 3.1 Introduction – Need of Transmission Media Selection Criteria    |       |                                                                         |
|       | 3.2 Types of Transmission Media- 1) Guided Media: Cable             |       |                                                                         |
| 2     | Characteristics, Types of Cable-Twisted Pair Cable, Co-axial        | 10    | •                                                                       |
| 3     | Cable, Fiber Optic Cable. 2) Unguided media: Types of               | 10    | 20                                                                      |
|       | Communication Band-Microwave Communication, Radio wave              |       |                                                                         |
|       | Communication, Satellite Communication, Infrared                    |       |                                                                         |
|       | Communication.                                                      |       |                                                                         |
|       | 3.3 Latest Technologies in Wireless Network-Bluetooth Architecture, |       |                                                                         |
|       | Wi-Fi, Wi- Max.                                                     |       |                                                                         |
|       | 3.4 Cellular (Mobile) Telephone – Band in Cellular Telephony, Calls |       |                                                                         |
|       | using Mobile Phones, Transmitting receiving / Handoff operations.   |       |                                                                         |

| 4 | <ul> <li>Objectives:-</li> <li>Concept of Reference Model.</li> <li>OSI Reference Model Concept.</li> <li>Layers of OSI Reference Model.</li> <li>4.1 Introduction- Layered Architecture, Peer-to- Peer Processes-<br/>Interfaces between Layer, Protocols, Organization of the Layers,<br/>Encapsulation.</li> <li>4.2 Layers of the OSI Reference Model (Functions of each Layer &amp;<br/>Protocols used) – Physical Layer, Data-Link Layer, Network<br/>Layer, Transport Layer, Session Layer, Presentation Layer,<br/>Application Layer.</li> </ul>                                                                                                                                                                                                                                                  | 08 | 18  |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
| 5 | <ul> <li>Objectives:-</li> <li>TCP/ IP Model Concept.</li> <li>Defining/functioning of different Layers of TCP / IP suite.</li> <li>5.1 Introduction –Addressing mechanism in the Internet</li> <li>5.2 IP Addressing – IP Address classes, classless IP addressing,<br/>Subnetting, supernetting, Masking,</li> <li>5.3Layered Structure of the TCP / IP Model – Host-to-Network,<br/>Internet, Transport, Application</li> <li>5.4 TCP / IP Protocol Suite : Host-to-Network-SLIP and PPP, Internet<br/>Layer-ARP,RARP and IP: Introduction, IPv4, IPv6 (Header<br/>Format), Difference between IPv4 &amp; IPv6.<br/>Transport Layer- TCP and UDP (Frame Format,port<br/>addresses),<br/>Application Layer- FTP, SMTP, DNS.</li> <li>5.5 Comparision between OSI and TCP / IP Network Model.</li> </ul> | 12 | 22  |
|   | Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 48 | 100 |

# List of Practical:

| Sr. No. | Title of Experiment                                                                                        | No. of Hours |
|---------|------------------------------------------------------------------------------------------------------------|--------------|
| 1       | To observe Components of Network in your Computer Network<br>Lab. (To know your Network Lab.)              | 04           |
| 2       | To understand network features                                                                             | 04           |
| 3       | To connect and understand different Transmission Media and<br>Network Control devices.                     | 04           |
| 4       | To Prepare a Straight Cable and Network Cross over Cable and test by Line Tester.                          | 04           |
| 5       | To install a network interface card                                                                        | 04           |
| 6       | To Connect Computers in Star Topology using Wired Media and<br>any Network control Device                  | 06           |
| 7       | To connect two hubs/switch by creating crossover connection                                                | 04           |
| 8       | To Configure Peer-to-Peer Network.                                                                         | 06           |
| 9       | To Share Printer and Folder in Network.                                                                    | 04           |
| 10      | To Install TCP/IP Protocols (Version 4 and version 6) and configure advanced features of TCP/IP Protocols. | 04           |

| 11 | Install Wireshark software to capture packet and Configure it to<br>capture Ethernet packet. Verify Ethernet frame structure and its 48<br>bit address.                                                                                                                             | 06 |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 12 | To Run Basic TCP/IP Utilities and Network Commands with all<br>options.(Ping, Ping ::1, ipconfig, Tracert, Netstat, Wireshark, ARP,<br>NBTSTAT.EXE, WINIPCFG.EXE),capture TCP, UDP,IP, ARP,<br>ICMP, Telnet, FTP packets using Wireshark packet sniffer software                    | 06 |
| 13 | To understand Subnet Masking and create two subnets                                                                                                                                                                                                                                 | 04 |
| 14 | <ul> <li>To visit server room and prepare report on</li> <li>1. Proxy Server</li> <li>2. Server Configuration</li> <li>3. Router Configuration</li> <li>4. Firewall Configuration</li> <li>5. Network setup details (Topology, Back up, IP range, network software, UPS)</li> </ul> | 04 |
|    | TOTAL                                                                                                                                                                                                                                                                               | 64 |

#### Learning Resources: Books:

| Sr.<br>No. | Title                                                 | Author              | Publisher                                      |
|------------|-------------------------------------------------------|---------------------|------------------------------------------------|
| 1          | Data Communications and Networks                      | Achyut S. Godbole   | Tata McGraw Hill                               |
| 2          | Data Communications and<br>Networking (Forth Edition) | Behrouz A. Forouzan | Tata McGraw Hill                               |
| 3          | Complete Reference<br>Networking                      | Craig Zacker        | Tata McGraw Hill                               |
| 4          | Computer Networking                                   | Tularam M Bansod    | Dreamtech Press                                |
| 5          | Networking + Certification<br>(Second Edition)        | Microsoft Press     | PHI(Prentice-Hall of India<br>Private Limited) |

Course Name : Computer Engineering Group Course Code : CO/CD/CM/CW/IF Semester : Fourth Subject Title : Microprocessor and Programming Subject Code : 17431

**Teaching and Examination Scheme:** 

| Teaching Scheme Exa |    |    |              | Examinati | on Scheme |    |     |       |
|---------------------|----|----|--------------|-----------|-----------|----|-----|-------|
| TH                  | TU | PR | PAPER<br>HRS | TH        | PR        | OR | TW  | TOTAL |
| 03                  |    | 02 | 03           | 100       | 25#       |    | 25@ | 150   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Microprocessor is brain of computer. Intel family is widely used all over the world. 8085 is the 8-bit CPU and 8086 is the 16-bit CPU. 8086 is the base of all upward developed processors. It is more powerful and efficient computing machine. It overcomes all major limitations of the previous processors. It is able to get interfaced with 8-bit, 16-bit systems. IBM PC is introduced in 1980 with 10MB hard disk, one double side double density floppy disk drive, KBD, monitor and asynchronous communications adapter.

This subject covers Basics of 8085, architecture of 8086 along instruction set. It also covers assembly language programming with effective use of procedure and macros. This will act as base for the advanced assembly language programming for next generation microprocessors.

# **General objectives:**

Students will be able to:

- 1. Understand the execution of instructions in pipelining and address generation.
- 2. Write syntax of given instructions.
- 3. Apply instructions in Assembly Language Program for different problem statements.
- 4. Use the procedures and macros in assembly language programming.

18

#### **Learning Structure:**



#### Theory

| Name of Topics                                               | Hours | Marks |
|--------------------------------------------------------------|-------|-------|
| Topic 1: Basics of Microprocessor                            |       |       |
| Specific Objective: Students will be able to                 |       |       |
| ➢ Draw the architecture of 8085                              |       |       |
| Define the functions of different pins of 8085               |       |       |
| Identify status of different flags                           |       |       |
| 1.1 Evolution of Microprocessor and types                    | 04    | 08    |
| 1.2 8085 Microprocessor,                                     |       |       |
| Salient features                                             |       |       |
| • Pin description,                                           |       |       |
| • Architecture of 8085 - Functional Block diagram,           |       |       |
| Register organization,                                       |       |       |
| Topic 2 :16 Bit Microprocessor: 8086                         |       |       |
| Specific Objective: Students will be able to                 |       |       |
| $\rightarrow$ Define the functions of different pins         |       |       |
| ▶ Draw functional block diagram of 8086                      |       |       |
| $\blacktriangleright$ Understand the operating modes of 8086 |       |       |
| 2.1 8086 Microprocessor.                                     |       |       |
| Salient features                                             |       |       |
| Pin descriptions                                             |       |       |
| Architecture of 8086 - Functional Block diagram              |       |       |
| Register organization                                        |       |       |
| <ul> <li>Concepts of pipelining</li> </ul>                   | 12    | 24    |
| Concepts of piperining,     Moment segmentation              |       |       |
| Memory segmentation                                          |       |       |
| • Physical memory addresses generation.                      |       |       |
| 2.2 Operating Modes of 8080                                  |       |       |
| • 8284 Clock Generator                                       |       |       |
| • 8288 Bus Controller                                        |       |       |
| • 74LS245 Bi-directional Buffer                              |       |       |
| • 74LS373 Octal Latch                                        |       |       |
| Minimum Mode operation and its timing diagram                |       |       |
| Maximum Mode operation and its timing diagram                |       |       |
| <b>Topic 3 : Instruction Set of 8086 Microprocessor</b>      |       |       |
| Specific Objective: Students will be able to                 |       |       |
| Understand the different types of instructions               |       |       |
| Identify the addressing modes of instructions                |       |       |
| State the operation of an instructions                       |       |       |
| 3.1 Machine Language Instruction format,                     |       |       |
| addressing modes                                             |       |       |
| 3.2 Instruction set, Groups of Instructions                  | 10    | 20    |
| Arithmetic Instructions                                      |       |       |
| Logical Instructions                                         |       |       |
| Data transfer instructions                                   |       |       |
| Bit manipulation instructions                                |       |       |
| String Operation Instructions,                               |       |       |
| Program control transfer or branching Instructions           |       |       |
| Process control Instructions                                 |       |       |
| Topic 4 : The Art of Assembly Language Programming           | 04    | 08    |

| Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 48  | 100 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|
| Assembly Language Programs using Macros.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |
| 6.2 Defining Macros.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ſ   |     |
| Assembly Language Programs using Procedure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |
| Reentrant and Recursive procedures.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ſ   |     |
| CALL and RET instructions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |
| Defining Procedure - Directives used, FAR and NEAR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 06  | 16  |
| 6.1 Procedure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |
| ➢ Use procedure and macros                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |
| $\rightarrow$ Understand the purpose of procedure and macros                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |
| Specific Objective: Students will be able to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |
| Topic 6 : Procedure and Macro in Assembly Language Program                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |
| BCD to Hex and Hex to BCD number conversion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |     |
| <ul> <li>Sumg Operations - Length, Reverse, Compare, Concatenation, Copy</li> <li>Count Numbers of '1' and '0' in 8/16 bit number</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |
| DIUCK Hallstel     String Operations Longth Payarsa Compare Consistentian Conv.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |
| Block transfer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |
| <ul> <li>Finding Positive and Negative Numbers in array</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |
| <ul> <li>Soluting numbers in Ascending and Descending order</li> <li>Finding ODD/EVEN numbers in the array.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |
| <ul> <li>Smallest and Largest numbers from array</li> <li>Sorting numbers in Assending and Dessending ander</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |
| Sum of Series     Smallest and L ansast numbers for an entropy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |
| Subtraction, Multiplication and Division                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 12  | 24  |
| • Arithmetic operations on Hex and BCD numbers - Addition,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |
| 5.2 Programming using assembler -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |
| 5.1 Model of 8086 assembly language programs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |
| Debug program using debugger                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |
| Run program using assembler and linker                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |
| <ul> <li>Write a appropriate programs using editor</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |
| Specific Objective: Students will be able to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |
| Topic 5: 8086 Assembly Language Programming.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |
| 4.3 Assembler directives and Operators                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |
| • Debugger.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |     |
| • Linker                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |
| • Assembler                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |     |
| Editors                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |
| 4.2 Assembly Language Programming Tools                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |
| • Converting algorithms to assembly language programs.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |
| Choosing instructions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |
| Initialization checklist                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |
| • Flowchart                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |     |
| Writing Algorithms                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |
| Defining problem                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |
| Industrate the functions of assembler directive and operators     A 1 Program development steps                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |
| Use the different program development tools Use the functions of essembler directive and energy of the second energy of the s |     |     |
| Know the program development steps                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |
| Specific Objective: Students will be able to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1 1 |     |

#### Skills to be developed:

# Intellectual skills:

- Use of programming language constructs in program implementation.
- To be able to apply different logics to solve given problem.
- To be able to write program using different implementations for the same problem
- Study different types of errors as syntax semantic, fatal, linker & logical
- Debugging of programs
- Understanding different steps to develop program such as
  - Problem definition
  - Analysis
  - Design of logic
  - ➢ Coding
  - ➢ Testing
  - > Maintenance (Modifications, error corrections, making changes etc.)

# Motor Skills:

• Proper handling of Computer System.

# **Practicals:**

# List of Practical:

- 1. Identify the Assembly Language programming tools like Assembler, linker, debugger, editor.
- 2. Write an Assembly Language Program to add / subtract two 16 bit numbers.
- 3. Write an ALP to find sum of series of numbers.
- 4. Write an ALP to multiply two 16 bit unsigned/ signed numbers.
- 5. Write an ALP to divide two unsigned/ signed numbers (32/16, 16/8, 16/16, 8/8)
- 6. Write an ALP to add / Sub / multiply / Divide two BCD numbers.
- 7. Write an ALP to find smallest/ largest number from array of n numbers.
- 8. Write an ALP to arrange numbers in array in ascending/ descending order.
- 9. Write an ALP to perform block transfer data using string instructions / without using string instructions.
- 10. Write an ALP to compare two strings using string instructions / without using string instructions.
- 11. Write an ALP to display string in reverse order, string length, Concatenation of two strings.
- 12. Write an ALP to convert Hex to Decimal, Decimal to Hex.

# **Learning Resources**

# 1. Books

| Sr.<br>No. | Name of Book                                                                       | Author          | Publication      |
|------------|------------------------------------------------------------------------------------|-----------------|------------------|
| 1.         | Microprocessor & interfacing<br>(programming & hardware)<br>Revised Second Edition | Douglas V. Hall | Tata McGraw Hill |

| 2. | Microprocessor Architecture,<br>Programming and Applications with<br>the 8085 | Ramesh S. Gaonkar                 | Penram International<br>Publishing (India) |
|----|-------------------------------------------------------------------------------|-----------------------------------|--------------------------------------------|
| 3. | The 8088 and 8086 Microprocessors                                             | Walter A. Triebel, Avtar<br>Singh | Pearson Publications                       |
| 4. | The 8086.8088 Family, Design,<br>Programming, and Interfacing                 | John Uffenback                    | РНІ                                        |

# 2. Websites:

www.intel.com www.pcguide.com/ref/CPU www.CPU-World.com/Arch/ www.techsource .com / engineering- parts/microprocessor.html

| Course Name   | : Computer Engineering Group  |
|---------------|-------------------------------|
| Course Code   | : CO/CD/CM/CW/IF              |
| Semester      | : Fourth                      |
| Subject Title | : Object Oriented Programming |
| Subject Code  | : 17432                       |

#### **Teaching and Examination Scheme:**

| Teaching Scheme     Examination Scheme |    |    |              |     |     |    |     |       |
|----------------------------------------|----|----|--------------|-----|-----|----|-----|-------|
| TH                                     | TU | PR | PAPER<br>HRS | TH  | PR  | OR | TW  | TOTAL |
| 03                                     |    | 04 | 03           | 100 | 50# |    | 25@ | 175   |

#### NOTE:

> Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.

# > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

The ability to organize & process information is key to success in modern age. Object Oriented Programming has become the most preferred approach for software projects. It offers a new and powerful way to cope up with complexity of real world problems. Among the OOP languages available, C++ is one of the most widely used language.

Instead of viewing program as a series of steps to be carried out, OOP approach views it as a group of objects that have certain properties & can take appropriate actions.

Object Oriented Concepts like inheritance, polymorphism, data abstraction and encapsulation etc. requires knowledge of C++, which also acting as base for programming languages like Java, Object Oriented Modeling & Designing (OOMD), VC++.

#### **Objectives:**

To develop following skills:

#### Intellectual Skills:

- 1. Understand the concepts of OOP.
- 2. Implement programs based on OOP concepts.
- 3. Understand basic fundamentals of C++.
- 4. Develop small software applications using C++.

#### **Motor Skills:**

1. Proper Handling of Computer System.

#### MSBTE - Final Copy Dt. 30/08/2013

#### **Learning Structure:**



# Theory:

| Topic<br>No | Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Hours | Marks |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
| 110         | Principles of Object Oriented Programming                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |       |
| 1           | <ul> <li>Objectives:</li> <li>&gt; State OOP's basic Concepts.</li> <li>&gt; Difference between OOP &amp; POP.</li> <li>&gt; C++ Programming structure.</li> <li>1.1 Its need &amp; requirement, Procedure Oriented Programming (POP) verses Object Oriented Programming (OOP), Basic concepts of Object Oriented Programming, Object Oriented Languages, Applications of OOP.</li> <li>1.2 Beginning with C++: What is C++?, keywords, variables, constants basic data types, operators, scope resolution operator, memory management operators, console input/output, structure of C++ program.</li> </ul> | 06    | 12    |
| 2           | <ul> <li>Classes &amp; Objects:</li> <li>Objectives:</li> <li>Defining classes &amp; objects.</li> <li>Declaring &amp; using static data member &amp; static member function, friend function.</li> <li>Programs based on classes &amp; objects.</li> <li>2.1 Structures in C++.</li> <li>2.2 Class &amp; Object: Introduction, specifying a class, access specifies, defining member functions, creating Objects, memory allocations for objects.</li> <li>2.3 Array of Objects, Object as function arguments.</li> <li>2.4 Static data members, static member function, friend Function</li> </ul>         | 08    | 20    |
| 3           | <ul> <li>Constructors &amp; Destructors</li> <li>Objectives:         <ul> <li>State Concepts of constructor &amp; destructor, types of constructor.</li> <li>Programs based on constructor &amp; destructors</li> </ul> </li> <li>3.1 Concepts of Constructors, Types of constructors: Default, Parameterized, Copy.</li> <li>3.2 Overloaded Constructors :Multiple Constructors in a Class, Constructors with default arguments.</li> <li>3.3 Destructors.</li> </ul>                                                                                                                                       | 08    | 14    |
| 4           | <ul> <li>Inheritance: Concept of Reusability</li> <li>Objectives:</li> <li>&gt; Concept of Inheritance &amp; its types.</li> <li>&gt; Types of Visibility modes.</li> <li>&gt; Programs based on Inheritance.</li> <li>4.1 Introduction, defining a derived class, visibility modes &amp; effects.</li> <li>4.2 Types of Inheritance : Single, multilevel, multiple, hierarchical, hybrid</li> <li>4.3 Virtual base class, abstract class, constructors in derived class.</li> </ul>                                                                                                                         | 08    | 20    |
| 5           | Pointers in C++<br>Objectives:<br>> Declare Pointer & Pointer arithmetic.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 10    | 18    |

|   | Tunctions, pute virtual function.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 48 | 100 |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
|   | 6.3 Run time polymorphism: Virtual functions, rules for virtual functions, pure virtual function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |    |     |
|   | overloading: Overloading unary and binary operators, Rules for operator overloading.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |    |     |
| 0 | 6.2 Compile time Polymorphism: Function overloading, operator                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 08 | 16  |
| 6 | 6.1 Introduction, Types of polymorphism: Compile time, Run time                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 08 | 16  |
|   | <ul> <li>Program for overloading operators &amp; functions.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |    |     |
|   | $\rightarrow$ Polymorphism concept & its types.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |    |     |
|   | Objectives:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |    |     |
|   | Polymorphism                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |    |     |
|   | derived class.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |    |     |
|   | 5.4 Pointer to Object: Pointer to Object, this pointer. Pointer to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |    |     |
|   | concatenation reverse                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |    |     |
|   | 5.2 Pointer to Array. Searching, finding length comparisons                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |    |     |
|   | 5.2 Pointer to Array: Searching Insertion deletion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |    |     |
|   | 5.1 Concepts of Pointer: Pointer declaration, Pointer operator,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |    |     |
|   | "this" pointer concept.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |     |
|   | > Pointer to Arrays, string & Object.         > "this" pointer concept.         5.1 Concepts of Pointer: Pointer declaration, Pointer operator, address operator, Pointer arithmetic.         5.2 Pointer to Array: Searching, Insertion, deletion         5.3 Pointer to String: Searching, finding length, comparisons, concatenation, reverse         5.4 Pointer to Object: Pointer to Object, this pointer, Pointer to derived class.         Polymorphism         Objectives:         > Polymorphism concept & its types.         > Program for overloading operators & functions.         6.1 Introduction, Types of polymorphism: Compile time, Run time         6.2 Compile time Polymorphism: Function overloading, operator overloading: Overloading unary and binary operators, Rules for operator overloading.       08       16         6.3 Run time polymorphism: Virtual functions, rules for virtual functions, pure virtual function.       Tatal       48       100 |    |     |

# List of Practical:

| Sr. No. | Title of Experiment                                                                                                                                                             |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | Write a program to Input & Output data for exchanging values of two variables.                                                                                                  |
| 2       | Develop a program to declare a class 'person' having data members name, age & salary. Accept and display this data for one object.                                              |
| 3       | Write a program to declare a class 'employee' having data members name and age.<br>Accept and display the data for three objects.                                               |
| 4       | Write a program to show how static member is shared by multiple objects of the same class.                                                                                      |
| 5       | Develop a program to find out the mean value of a given number using friend function.                                                                                           |
| 6       | Develop a program to print student details of 'stud' class using constructor and destructor                                                                                     |
| 7       | Write a program to find prime number using default argument in constructor                                                                                                      |
| 8       | Write a program to find out the payroll system using single level inheritance.                                                                                                  |
| 9       | <ul><li>A. Write a program to find student details using multiple inheritance.</li><li>B. Write a program to compute total marks of student using virtual base class.</li></ul> |
| 10      | Write a program to evaluate the largest number of an array using pointer                                                                                                        |
| 11      | Write a program to search a character in a string using pointer.                                                                                                                |
| 12      | Write a program to input and display code and price for two items using pointer to object.                                                                                      |

| 13 | Write a program to display roll_no and name of student using 'this' pointer.                          |
|----|-------------------------------------------------------------------------------------------------------|
| 14 | Write a program to using function overloading to calculate volume of cube, cylinder & rectangular box |
| 15 | Write a program to overload unary '' operator                                                         |
| 16 | Write a program to display the output using the virtual function.                                     |

#### Learning Resources: 1. Books:

| 1          | . DUUKS.         |                                                              |              |
|------------|------------------|--------------------------------------------------------------|--------------|
| Sr.<br>No. | Author           | Title                                                        | Publisher    |
| 1          | E Balagurusamy   | Object oriented Programming with C++                         | Mc Graw Hill |
| 2          | Rajesh K. Shukla | Object oriented Programming in C++                           | Wiley India  |
| 3          | B. M. Harwani    | C++ for Beginners                                            | SPD          |
| 4          | Robert Lafore    | Object Oriented Programming in C++ (4 <sup>th</sup> edition) | Pearson      |

# 2. CDs, PPTs Etc.:

www.vikaspublishing.com/teachermanual.aspx (PPTs available)

www.pearsoned.co.in/prc (After Registration resources are available)

# 3. Websites:

www.cplusplus.com www.learncpp.com www.sourcecodesworld.com www.softeam.com **Course Name : Computer Engineering Group** 

Course Code : CO/CD/CM/CW

Semester : Fourth

**Subject Title : Computer Graphics** 

Subject Code : 17056

**Teaching and Examination Scheme** 

| Teaching Scheme |    |    | Examination Scheme |    |     |    |     |       |
|-----------------|----|----|--------------------|----|-----|----|-----|-------|
| TH              | TU | PR | PAPER<br>HRS       | TH | PR  | OR | TW  | TOTAL |
| 01              |    | 02 |                    |    | 50# |    | 25@ | 75    |

#### **Rationale:**

In recent trend, every computer system interacts with the user through a graphical user interface. User can understand the information in both textual and graphical format. Computer Graphics is the study of techniques to improve communication between human and machine. Computer Graphics is one of the most existing, rapidly growing computer fields. The word Computer Graphics means pictures, graphics or scene drawn with the help of a computer system. After studying this subject, a learner will be able to work with 2-dimensional, 3-dimensional graphics, multimedia and animation techniques. It is also useful in many fields such as Engineering drawing, graphics, architectural design, video games and animations.

#### **General Objectives:**

To develop following skills:

#### **Intellectual Skills:**

- Specifically develop the logic and algorithms for developing basic graphics software.
- Use of programming language constructs in program implementation.
- To be able to apply different logics to solve given problem.
- To be able to write program using different implementations for the same problem
- Study different types of errors such as syntax, semantic, fatal, linker & logical
- Debugging of programs
- Understanding different steps to develop program such as
  - Problem definition
  - o Analysis
  - o Design of logic
  - o Coding
  - Testing
  - Maintenance (Modifications, error corrections, making changes etc.)

#### **Motor Skills:**

- Ability to handle keyboard efficiently.
- Ability to use input and output devices.
- Ability to execute C programs.
- Ability to handle computer system carefully.
- Ability to understand Color combinations.

# **Learning Structure:**



#### **Content:**

| Topic<br>No. | Contents                                                                                                      | Hours |
|--------------|---------------------------------------------------------------------------------------------------------------|-------|
|              | Basics of Computer Graphics                                                                                   |       |
|              | Objectives :                                                                                                  |       |
|              | Demonstrate text mode and graphics mode.                                                                      |       |
|              | 1.1 Raster scan display:                                                                                      |       |
| 01           | <b>1.2 Primitive operations: -</b> moveto, lineto                                                             | 02    |
|              | <b>1.3 Graphics file formats:</b> Basics, advantages, disadvantages                                           |       |
|              | – BMP – GIF – JPEG – TIFF – PCX                                                                               |       |
|              | <b>1.4 Graphics Mode Functions-</b> Text mode, Graphic mode                                                   |       |
|              | Shapes, colors,                                                                                               |       |
|              | Line, circle, and polygon.                                                                                    |       |
|              | Objectives:                                                                                                   |       |
|              | Draw Lines using various algorithms.                                                                          |       |
|              | Generate circle with various algorithms.                                                                      |       |
|              | Draw polygons and demonstrate their filling procedures                                                        | 0.4   |
| 02           | 2.1 Basic concepts in line drawing, Line drawing algorithms: DDA                                              | 04    |
| 02           | algorithms, Bresenham's algorithm                                                                             |       |
|              | 2.2 Circle generating algorithms: Symmetry of circle, DDA circle drawing                                      |       |
|              | algorithm, Bresenham's circle drawing algorithm,                                                              |       |
|              | <b>2.5 Polygons</b> – Types of polygons, inside –outside test, Polygon filling: Flood fill Scenline clearithm |       |
|              | Transformations                                                                                               |       |
|              | Objectives.                                                                                                   |       |
|              | Demonstrate 2D transformation techniques                                                                      |       |
|              | Demonstrate 3D transformation techniques                                                                      |       |
| 03           | <b>3 1 2D Transformation:</b> Scaling Reflection Shearing Rotation                                            | 04    |
| 05           | Translation Rotation about an arbitrary point                                                                 |       |
|              | <b>3.2 3D Transformation:</b> Scaling, Rotation, Translation, Rotation about                                  |       |
|              | arbitrary axis                                                                                                |       |
|              | Windowing & clipping                                                                                          |       |
|              | Objectives:                                                                                                   |       |
|              | Operate on various clipping algorithms.                                                                       |       |
|              | Summarize the different transformations.                                                                      | 02    |
| 04           | 4.1 Line clipping: Cohen-Sutherland Line clipping algorithm,                                                  | 03    |
|              | Midpoint subdivision algorithm (06 Marks)                                                                     |       |
|              | <b>4.2 Polygon clipping</b> : Sutherland – Hodgeman Polygon clipping algorithm.                               |       |
|              | Curves and Fractals                                                                                           |       |
|              | Objectives:                                                                                                   |       |
|              | Draw various curves                                                                                           |       |
|              | Predict various fractal types.                                                                                | 03    |
| 05           | 5.1 Curve generation: Arc generation using DDA algorithm,                                                     | 05    |
|              | Interpolation, Approximation, B-Spline, Bezier curves:                                                        |       |
|              | 5.2 Curves Fractals: Hilbert's Curve, Koch curve, Fractal lines, Fractal                                      |       |
|              | Surfaces.                                                                                                     | 1.    |
| 1            | Total                                                                                                         | 16    |

#### **List of Practical:**

| Sr.<br>No. | Title of Experiment                                                       | No. of<br>Hours |
|------------|---------------------------------------------------------------------------|-----------------|
| 1          | Implement DDA algorithm and Bresennham's algorithm for line drawing.      | 02              |
| 2          | Implement DDA algorithm and Bresennham's algorithm of circle drawing.     | 02              |
| 3          | Implement Flood fill algorithm for Polygon filling.                       | 02              |
| 4          | Implement scan-line algorithm for polygon filling.                        | 02              |
| 5          | Write Program for 2-D transformations -> scaling, Rotation                | 03              |
| 6          | Write Program for 2 D transformations -> shearing and Translation program | 03              |
| 7          | Write and implement program for rotation about an arbitrary point         | 03              |
| 8          | Implement Cohen- Sutherland algorithm for line clipping.                  | 03              |
| 9          | Implement midpoint subdivision algorithm for line clipping.               | 03              |
| 10         | Implement Sutherland-Hodgeman algorithm for polygon clipping.             | 03              |
| 11         | Write a program to draw a curve using Bezier's algorithm                  | 03              |
| 12         | Write a program to draw fractal lines.                                    | 03              |

#### List of Practical oriented Projects:

1) Oral geometry insertion for character animation (Develop a system to create an animated mouth in head geometry)

2) Online storyboarding system (Create a system that will keep still images, text descriptions, sample animations, sample audio for each scene of an animation)

#### **Learning Recourses:**

# 1. Books:

| Sr. No | Book Title                                        | Author                         | Publication     |
|--------|---------------------------------------------------|--------------------------------|-----------------|
| 01     | Computer Graphics                                 | M.Pauline Baker & Donald Hearn | Pearson         |
| 02     | Fundamentals of Computer<br>Graphics- 3rd Edition | Peter Shirley                  | SPD – AK Peters |
| 03     | Computer Graphics (With CD)                       | Rajesh Maurya                  | Wiley India     |
| 04     | Computer Graphics                                 | Apurva Desai                   | PHI             |

32

# 2. Websites:

- 1) http://www.graphics.cornell.edu/online/tutorial/
- 2) www.graphics.standard.edu

- 3) www.cmp.uea.ac.uk/research
- 4) www.computerarts.co.uk

#### 3. Magazines:

- 1) Computer Graphics World
- 2) In-plant Graphics
- 3) Computer Arts

Demo lectures with power point presentations using LCD projector should be arranged to develop programming concepts amongst students.

Course Name : Computer Engineering Group Course Code : CO/CD/CM/CW/IF Semester : Fourth Subject Title : Professional Practices-II Subject Code : **17042** 

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    | Examination Scheme |    |    |    |     |       |
|-----------------|----|----|--------------------|----|----|----|-----|-------|
| TH              | TU | PR | PAPER<br>HRS       | TH | PR | OR | TW  | TOTAL |
|                 |    | 03 |                    |    |    |    | 50@ | 50    |

#### **Rationale:**

Our world is witnessing a measure change in communication pattern with expansion of industrial sphere, as industries demanding more competitive and challenging students.

To create multicultural working professionals, student must have positive attitude, confidence, and ability to communicate in addition to basic technological skill.

The purpose of introducing professional practices is to provide opportunity to diploma holder to undergo activities which will enable them to develop confidence. The semester is planned with expert lectures, seminar on technical topics and soft skills, group discussion along with mini project.

#### **Objectives**:

#### **Intellectual Skills:**

Students should be able to:

- 1. Acquire the knowledge from different resources.
- 2. Present a given topic effectively in a seminar and build a stage-daring.
- 3. Interact with colleague through group discussion.

# **Learning Structure:**



#### **Contents:**

| Activity | Name of Activity                                                           | Hours |
|----------|----------------------------------------------------------------------------|-------|
|          | Lectures by professional, industrial experts to be organized from          |       |
|          | following or any other suitable technical areas.                           |       |
|          | [Any two]: -                                                               |       |
|          | 1. Advanced technical writing skill                                        |       |
| 1        | 2. SAP modules and career.                                                 | 0.1   |
| 1        | 3. Career trends in computer / IT field                                    | 04    |
|          | 4. Intelligent computer system.                                            |       |
|          | 5. Advanced trends in hardware technology.                                 |       |
|          | 6. Advanced programming languages in IT field.                             |       |
|          | 7. Introduction to Apprenticeship Training Scheme                          |       |
|          | Information Search:-                                                       |       |
|          | Form group of 6 students. Information should be collected from             |       |
|          | internet, news papers, journals, book etc.                                 |       |
|          | Fach student should submit write-up about 8-10 pages from following        |       |
|          | allocated tonic or any other suitable tonic suggested by teacher           |       |
|          | 1 Human machine interface                                                  |       |
|          | 2 Dynamic languages                                                        |       |
| 2        | 2. Dynamic languages<br>3. Robotic surgery                                 | 06    |
|          | 4. Virtual kayboard                                                        |       |
|          | 5. Wireless USP                                                            |       |
|          | 5. Where SUSD                                                              |       |
|          | 7. Dubble concine                                                          |       |
|          | 7. Buddle sensing                                                          |       |
|          | 8. Blu – ray disc                                                          |       |
|          | 9. Or any other suitable topic                                             |       |
|          | Seminar:-                                                                  |       |
|          | Form a group of 6 students and deliver seminar on any one of the           |       |
|          | following technical topic or any other suitable subject topic suggested by |       |
|          | teacher for 10 minutes. Seminar should be presented in power point         |       |
|          | presentation. Students should draw notes about 8-10 pages on respected     |       |
|          |                                                                            |       |
|          | 1. Trouble shooting methods for various computer peripherals.              |       |
| 3        | 2. Viruses / antivirus and firewalls [checkpoints]                         | 16    |
|          | 3. Protocols suits: - SLIP and PPP, ARP, IP- V6, ICMP-V6, TCP &            |       |
|          | UDP [each protocol may be separate topic].                                 |       |
|          | 4. Stream classes in C++.                                                  |       |
|          | 5. Exception handling in C++.                                              |       |
|          | 6. Pointers in C++.                                                        |       |
|          | 7. Interrupts useful for microprocessor programming.                       |       |
|          | 8. Or any other suitable topic.                                            |       |
|          | Group Discussion:-                                                         |       |
|          | Form a group of 6 students. Teacher should allocate a topic from the       |       |
|          | following list or any other suggested topic and do the group discussion    |       |
|          | for 10 minutes.                                                            |       |
| Λ        | 1. Is china a threat to the Indian software industry?                      | 10    |
| 4        | 2. Education is only business in these days.                               | 12    |
|          | 3. Is male and female equal in all aspects?                                |       |
|          | 4. Opinion about reservation in education sector.                          |       |
|          | 5. Boom in retail sector?                                                  |       |
|          | 6. Whether software is dominant over hardware or vice-versa?               |       |

|   | 7. Or any other topic.                                                   |    |  |  |  |  |  |
|---|--------------------------------------------------------------------------|----|--|--|--|--|--|
|   | Mini Projects / Activities:-                                             |    |  |  |  |  |  |
|   | Form a group of 6 students. Teacher should allocate a topic for mini     |    |  |  |  |  |  |
|   | project from the following topics or any other suggest topic and develop |    |  |  |  |  |  |
|   | the mini project.                                                        |    |  |  |  |  |  |
|   | 1. Web site development system.                                          |    |  |  |  |  |  |
| 5 | 2. Database management system project                                    | 10 |  |  |  |  |  |
|   | 3. Animation project using C and C++.                                    |    |  |  |  |  |  |
|   | 4. System project using front end and back end.                          |    |  |  |  |  |  |
|   | 5. Game designing.                                                       |    |  |  |  |  |  |
|   | 6. Assembly of computer system and installation of application           |    |  |  |  |  |  |
|   | software.                                                                |    |  |  |  |  |  |
|   | Total                                                                    | 48 |  |  |  |  |  |

# **Learning Resources:**

# 1. Books:

| Sr. No. | Title                                                                                                      |
|---------|------------------------------------------------------------------------------------------------------------|
| 1.      | Fourth semester subjects reference books                                                                   |
| 2.      | Journals and magazines – IEEE Journals, IT technologies.                                                   |
| 3.      | Local news papers and events                                                                               |
| 4.      | Apprenticeship Training Scheme:- Compiled By – BOAT (Western Region), Mumbai, Available on MSBTE Web Site. |

### 2. Websites:

- 1. http://www.wikipedia.com
- 2. http://www.seminarforyou.com

# Course Name : All Branches of Diploma in Engineering & Technology Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG Industrial Training (Optional) after 4<sup>th</sup> semester examination.

Note:- Examination in Professional Practices of 5<sup>th</sup> Semester.

# INDUSTRIAL TRAINING (OPTIONAL)

# Rational:-

There was a common suggestion from the industry as well as other stakeholders that curriculum of Engineering and Technology courses should have Industrial training as part of the curriculum. When this issue of industrial training was discussed it was found that it will be difficult to make industrial training compulsory for all students of all courses as it will be difficult to find placement for all the students. It is therefore now proposed that this training can be included in the curriculum as optional training for student who is willing to undertake such training on their own. The institutes will help them in getting placement or also providing them requisite documents which the student may need to get the placement.

Details:- Student can undergo training in related industries as guided by subject teachers / HOD.

- The training will be for four weeks duration in the summer vacation after the fourth semester examination is over.
- The student undergoing such training will have to submit a report of the training duly certified by the competent authority from the industry clearly indicating the achievements of the student during training. This submission is to be made after joining the institute for Fifth semester.
- The student completing this training will have to deliver a seminar on the training activities based on the report in the subject Professional Practices at Fifth Semester.
- The student undergoing this training will be exempted from attending activities under Professional Practices at Fifth semester except the seminar.
- The students who will not undergo such training will have to attend Professional Practices Classes/activities of fifth semester and will have to complete the tasks given during the semester under this head.
- There work will be evaluated on their submissions as per requirement and will be given marks out of 50. Or student may have to give seminar on training in Industry he attended.
- Institute shall encourage and guide students for Industry training.
- Evaluation:- Report of Training attended and delivery of seminar and actual experience in Industry will be evaluated in fifth semester under Profession Practices-III and marks will be given accordingly out of 50.

'G' Scheme

|                                                                                                                                         | MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |           |                 |             |                   |          |                          |          |        |            |         |         |     |     |               |           |
|-----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------------|-------------|-------------------|----------|--------------------------|----------|--------|------------|---------|---------|-----|-----|---------------|-----------|
| COL                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | IN FACUL  | TEA<br>ONION 8- | ACHI<br>CLO | NG A              | ND EA    |                          | TION S   | CHEN   | IE         |         |         |     |     |               |           |
|                                                                                                                                         | $\frac{1}{1} \frac{1}{1} \frac{1}$ | пгазпі    | UNION &         | CLU         |                   | GIE      | LUNDLO                   | GI       |        |            |         |         |     |     |               |           |
| DUR                                                                                                                                     | ATION OF COURSE : SI                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | X SEMES   | TERS            |             |                   |          |                          | W        | TH E   | FFECT      | FROM    | [       |     |     |               |           |
| SEM                                                                                                                                     | ESTER : FOURTH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |                 |             |                   |          |                          | D        | URAT   | ION:1      | 6 WEE   | KS      |     |     |               |           |
| PAT                                                                                                                                     | TERN : FULL TIME - SEN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | AESTER    |                 |             |                   |          |                          | S        | CHEM   | E:G        |         |         |     |     |               |           |
| CD                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | A 1. 1    | CUD             | TF          | EACHI             | NG       |                          |          | EX     | KAMINA     | TION SC | CHEME   |     |     |               | CW        |
| SK.<br>NO.                                                                                                                              | SUBJECT TITLE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ation     | CODE            | S           | CHEM              | E        | PAPER                    | ТН       | (1)    | PR         | (4)     | OR      | (8) | TW  | 7 <b>(9</b> ) | - (17400) |
|                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                 | ТН          | TU                | PR       | HRS.                     | Max      | Min    | Max        | Min     | Max     | Min | Max | Min           | ()        |
| 1                                                                                                                                       | Environmental Studies \$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | EST       | 17401           | 01          |                   | 02       | 01                       | 50#*     | 20     |            |         |         |     | 25@ | 10            |           |
| 2                                                                                                                                       | Colouration of Textiles                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | COT       | 17458           | 03          |                   | 04       | 03                       | 100      | 40     | 50#        | 20      |         |     | 25@ | 10            |           |
| 3                                                                                                                                       | Knitted Fabric Design &<br>Technology                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | KFD       | 17459           | 03          |                   | 02       | 03                       | 100      | 40     |            |         | 25#     | 10  | 25@ | 10            |           |
| 4                                                                                                                                       | Clothing Production<br>Machinery & Equipment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | CPM       | 17460           | 04          |                   | 04       | 03                       | 100      | 40     | 50#        | 20      |         |     | 25@ | 10            | 50        |
| 5                                                                                                                                       | Indian Western Costume                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | IWC       | 17461           | 04          |                   |          | 03                       | 100      | 40     |            |         |         |     |     |               |           |
| 6                                                                                                                                       | CAD in Textile Design                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | CTD       | 17049           |             |                   | 02       |                          |          |        |            |         |         |     | 25@ | 10            |           |
| 7                                                                                                                                       | Professional Practices-II                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | PPS       | 17050           |             |                   | 03       |                          |          |        |            |         |         |     | 50@ | 20            |           |
| 8                                                                                                                                       | Industrial Training                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | ITR       | 17051           |             |                   | **       |                          |          |        |            |         |         |     |     |               |           |
|                                                                                                                                         | •                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           | TOTAL           | 15          |                   | 17       |                          | 450      |        | 100        |         | 25      |     | 175 |               | 50        |
| Stude<br>THE<br>Total<br>@ In                                                                                                           | Student Contact Hours Per Week: <b>32 Hrs.</b><br><b>THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.</b><br>Total Marks: <b>800</b><br>@ Internal Assessment, # External Assessment, #* Online Examination. No Theory Examination, \$ Common to All Conventional Diploma.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |           |                 |             |                   |          |                          |          |        |            |         |         |     |     |               |           |
| ** Industrial training for six weeks to be completed during summer break after Fourth semester. Assessment to be done in Fifth Semester |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                 |             |                   |          |                          |          |        |            |         |         |     |     |               |           |
| Abbr                                                                                                                                    | <ul> <li>Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Termwork, SW- Sessional Work.</li> <li>Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subject are to be converted out of 100 marks as sessional work (SW).</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |           |                 |             |                   |          |                          |          |        |            |         |         |     |     |               |           |
|                                                                                                                                         | Code number for TH, PR,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | OR and TV | W are to be     | given       | as per<br>as suff | fix 1, 4 | evaning c<br>, 8, 9 resp | ectively | to the | subject of | code.   | assessn |     |     |               |           |

Course Name : All Branches of Diploma in Engineering & Technology Course Code : AE/CE/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/AU/FG Semester : Fourth

Subject Title : Environmental Studies

Subject Code : 17401

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |      | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|------|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH   | PR        | OR        | TW  | TOTAL |
| 01              |    | 02 | 01           | 50#* |           |           | 25@ | 75    |

#### **#\* Online Theory Examination**

NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Environment essentially comprises of our living ambience, which gives us the zest and verve in all our activities. The turn of the twentieth century saw the gradual onset of its degradation by our callous deeds without any concern for the well being of our surrounding we are today facing a grave environmental crisis. The unceasing industrial growth and economic development of the last 300 years or so have resulted in huge ecological problems such as overexploitation of natural resources, degraded land, disappearing forests, endangered species, dangerous toxins, global warming etc.

It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

The curriculum covers the aspects about environment such as Environment and Ecology, Environmental impacts on human activities, Water resources and water quality, Mineral resources and mining, Forests, etc.

General Objectives: The student will be able to,

- 1. Understand importance of environment
- 2. Know key issues about environment
- 3. Understands the reasons for environment degradation
- 4. Know aspects about improvement methods
- 5. Know initiatives taken by the world bodies to restrict and reduce degradation

# **Learning Structure:**



## Theory:

| Topic and Contents                                                           | Hours | Marks    |
|------------------------------------------------------------------------------|-------|----------|
| Topic 1: Nature of Environmental Studies                                     |       |          |
| Specific Objectives:                                                         |       |          |
| Define the terms related to Environmental Studies                            |       |          |
| ➢ State importance of awareness about environment in general public          | 0.4   | <u>.</u> |
| Contents:                                                                    | 01    | 04       |
| • Definition, Scope and Importance of the environmental studies              |       |          |
| • Importance of the studies irrespective of course                           |       |          |
| • Need for creating public awareness about environmental issues              |       |          |
| Topic 2: Natural Resources and Associated Problems                           |       |          |
| Specific Objectives:                                                         |       |          |
| $\rightarrow$ Define natural resources and identify problems associated with |       |          |
| them                                                                         |       |          |
| > Identify uses and their overexploitation                                   |       |          |
| > Identify alternate resources and their importance for environment          |       |          |
| Contents:                                                                    |       |          |
| 2.1 Renewable and Non renewable resources                                    |       |          |
| • Definition                                                                 |       |          |
| Associated problems                                                          |       |          |
| 2.2 Forest Resources                                                         |       |          |
| General description of forest resources                                      |       |          |
| Eulerian description of forest resources                                     |       |          |
| Effects on environment due to deforestation. Timber                          |       |          |
| extraction Building of dams waterways etc                                    |       |          |
| 2.3 Water Resources                                                          | 04    | 10       |
| Hydrosphere: Different sources of water                                      |       |          |
| • Use and overexploitation of surface and ground water                       |       |          |
| • Use and overexploitation of surface and ground water                       |       |          |
| • Effect of floods, draught, dams etc. on water resources and                |       |          |
| 2.4 Mineral Resources:                                                       |       |          |
| 2.4 Winerar Resources.                                                       |       |          |
| Categories of mineral resources                                              |       |          |
| Basics of mining activities                                                  |       |          |
| • Mine safety                                                                |       |          |
| Effect of mining on environment                                              |       |          |
| 2.5 Food Resources:                                                          |       |          |
| • Food for all                                                               |       |          |
| • Effects of modern agriculture                                              |       |          |
| World food problem                                                           |       |          |
| Topic 3. Ecosystems                                                          |       |          |
| Concept of Ecosystem                                                         |       |          |
| Structure and functions of ecosystem                                         | 01    | 04       |
| • Energy flow in ecosystem                                                   |       |          |
| Major ecosystems in the world                                                |       |          |
| Topic 4. Biodiversity and Its Conservation                                   |       |          |
| Definition of Biodiversity                                                   | 02    | 0.5      |
| Levels of biodiversity                                                       | 02    | 06       |
| Value of biodiversity                                                        |       |          |

| Definition                                                                       |    |    |
|----------------------------------------------------------------------------------|----|----|
| • Definition                                                                     |    |    |
| <ul> <li>Air pollution: Definition, Classification, sources, effects,</li> </ul> |    |    |
| prevention                                                                       | 03 | 08 |
| • Water Pollution: Definition, Classification, sources, effects,                 | 05 | 00 |
| prevention                                                                       |    |    |
| • Soil Pollution: Definition, sources, effects, prevention                       |    |    |
| Noise Pollution: Definition, sources, effects, prevention                        |    |    |
| Topic 6. Social Issues and Environment                                           |    |    |
| <ul> <li>Concept of development, sustainable development</li> </ul>              |    |    |
| • Water conservation, Watershed management, Rain water                           |    | 10 |
| harvesting: Definition, Methods and Benefits                                     | 03 |    |
| Climate Change, Global warming, Acid rain, Ozone Layer                           | 03 |    |
| Depletion, Nuclear Accidents and Holocaust: Basic concepts                       |    |    |
| and their effect on climate                                                      |    |    |
| Concept of Carbon Credits and its advantages                                     |    |    |
| Topic 7. Environmental Protection                                                |    |    |
| Brief description of the following acts and their provisions:                    |    |    |
| Environmental Protection Act                                                     |    |    |
| Air (Prevention and Control of Pollution) Act                                    |    |    |
| • Water (Prevention and Control of Pollution) Act                                | 02 | 08 |
| Wildlife Protection Act                                                          | 02 | 08 |
| Forest Conservation Act                                                          |    |    |
| Population Growth: Aspects, importance and effect on                             |    |    |
| environment                                                                      |    |    |
| Human Health and Human Rights                                                    |    |    |
| Total                                                                            | 16 | 50 |

# Practical: Skills to be developed:

#### **Intellectual Skills**:

- 1. Collection of information, data
- 2. Analysis of data
- 3. Report writing

# Motor Skills:

- 1. Presentation Skills
- 2. Use of multi media

# List of Projects:

Note: Any one project of the following:

- 1. Visit to a local area to document environmental assets such as river / forest / grassland / hill / mountain
- 2. Visit to a local polluted site: Urban/Rural/Industrial/Agricultural
- 3. Study of common plants, insects, birds

4. Study of simple ecosystems of ponds, river, hill slopes etc.

# Prepare a project report on the findings of the visit illustrating environment related facts, analysis and conclusion. Also suggest remedies to improve environment.

#### Learning Resources: Books:

| Sr.<br>No. | Author                                                | Title                                        | Publisher               |
|------------|-------------------------------------------------------|----------------------------------------------|-------------------------|
| 01         | Anindita Basak                                        | Environmental Studies                        | Pearson Education       |
| 02         | R. Rajgopalan                                         | Environmental Studies<br>from Crises to Cure | Oxford University Press |
| 03         | Dr. R. J. Ranjit Daniels, Dr.<br>Jagdish Krishnaswamy | Environmental Studies                        | Wiley India             |

Course Name : Diploma in Fashion & Clothing Technology Course Code : DC Semester : Fourth Subject Title : Colouration of Textiles Subject Code : 17458

#### **Teaching & Examination Scheme:**

| Teaching Scheme |    |    |              |     | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|-----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH  | PR        | OR        | TW  | TOTAL |
| 03              |    | 04 | 03           | 100 | 50#       |           | 25@ | 175   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

To introduce students to the basic information on commercial dyes and dyeing techniques and Machinery used in industry for dyeing fibres yarn and fabrics. Students will develop an understanding for various traditional modern method of printing and finishing

#### **Objective:**

To make the students well versed with theoretical aspects as well as industrial procedures at various stages of wet processing such as Dyeing, Printing & Finishing.

# **CONTENTS:** Theory

| Chapter | Contents                                                                | Hours | Marks |
|---------|-------------------------------------------------------------------------|-------|-------|
|         | Preparation of fabrics:                                                 |       |       |
|         | Specific objectives:                                                    |       |       |
|         | Students will be able to understand                                     |       |       |
|         | Importance and Objects of preparatory processes before                  |       |       |
|         | textile colouration.                                                    |       |       |
|         | Method of evaluation for preparatory processes.                         |       |       |
|         | 1.1 Introduction to wet processing of textiles,                         |       |       |
|         | 1.2 Impurities in grey fabric,                                          |       |       |
|         | 1.3 Importance of preparation of fabrics,                               |       |       |
|         | 1.4 Mechanical cleaning of fabrics,                                     |       |       |
| 1       | <ul> <li>Objects of shearing &amp; cropping and singeing.</li> </ul>    | 12    | 24    |
|         | - Introduction to shearing, cropping & singeing machines                |       |       |
|         | used in industry.                                                       |       |       |
|         | 1.5 Object of Grey Inspection, Inspection machines, Criteria for        |       |       |
|         | rejection,                                                              |       |       |
|         | 1.6 Objects of wet preparatory processes viz. desizing, scouring,       |       |       |
|         | bleaching and mercerization.                                            |       |       |
|         | 1.7 Enzymatic method of desizing & scouring of cotton.                  |       |       |
|         | 1.8 Evaluation of efficiency of desizing & scouring.                    |       |       |
|         | 1.9 Bleaching of cotton with Hydrogen peroxide.                         |       |       |
|         | - Measurement of whiteness index using CCM.                             |       |       |
|         | Dyeing process & machinery:                                             |       |       |
|         | Specific objectives:                                                    |       |       |
|         | Students will be able to understand                                     |       |       |
|         | Procedure for dyeing different textile substrates.                      |       |       |
|         | Working of important dyeing machinery.                                  |       |       |
|         | 2.1 Definition of dye, pigment, percentage shade, exhaustion,           |       |       |
| 2       | expression.                                                             | 10    | 24    |
| 2       | 2.2 Dye selection for various textile substrates,                       | 12    | 24    |
|         | 2.3 Important steps involved in dyeing of cellulosics with direct,      |       |       |
|         | sulphur, vat and reactive dyes and azoic colours.                       |       |       |
|         | 2.4 Dyeing of polyester with disperse dye by HTHP & Thermosol           |       |       |
|         | method,                                                                 |       |       |
|         | 2.5 Dyeing of P/C blend,                                                |       |       |
|         | 2.6 Concept of dyeing coulon with natural dyes,                         |       |       |
|         | 2.7 working of Jigger, which and Padding Mangle.                        |       |       |
|         | Printing Methods:<br>Specific abjectives:                               |       |       |
|         | Specific objectives:                                                    |       |       |
|         | Difference between dueing and printing                                  |       |       |
|         | <ul> <li>Various styles and methods of printing.</li> </ul>             |       |       |
|         | <ul> <li>Procedure for printing different textile substrates</li> </ul> |       |       |
| 3       | 3.1 Objects                                                             | 10    | 20    |
| 5       | 3.2 Difference between dveing & printing                                | 10    | 20    |
|         | 3.3 Important print paste ingredients & their functions                 |       |       |
|         | 3.4 Introduction to Direct discharge and resist style of printing       |       |       |
|         | on cotton with reactive & on polyester with disperse dyes               |       |       |
|         | 3.5 Methods of printing                                                 |       |       |
|         | - Tie & dye,                                                            |       |       |

|   | - Block printing,                                            |    |     |
|---|--------------------------------------------------------------|----|-----|
|   | - Screen printing.                                           |    |     |
|   | Printing Machines                                            |    |     |
|   | Specific objectives:                                         |    |     |
|   | Students will be able to understand                          |    |     |
|   | Working of printing machinery.                               |    |     |
|   | Modern print effects used in garment industry.               |    |     |
|   | 4.1 Working of table printing,                               |    |     |
|   | - Flat bed printing,                                         |    |     |
| 4 | - Rotary printing,                                           | 10 | 20  |
|   | 4.2 Advantages & limitations.                                |    |     |
|   | 4.3 Specialty prints:                                        |    |     |
|   | - Flock printing,                                            |    |     |
|   | - Pearl printing,                                            |    |     |
|   | - Foam prints,                                               |    |     |
|   | - Foil printing.                                             |    |     |
|   | 4.4 Concept of Ink jet printing technique.                   |    |     |
|   | Evaluation of fastness properties                            |    |     |
|   | Specific objectives:                                         |    |     |
|   | Students will be able to understand                          |    |     |
|   | Method for evaluation of fastness properties.                |    |     |
|   | Norms for fastness properties.                               |    |     |
|   | 5.1 Importance of evaluating fastness properties of dyed and |    |     |
| 5 | printed textiles,                                            | 04 | 12  |
|   | 5.2 General method for evaluating                            |    |     |
|   | - Wash fastness                                              |    |     |
|   | - Rubbing fastness,                                          |    |     |
|   | - Perspiration fastness,                                     |    |     |
|   | - Light fastness and                                         |    |     |
|   | - Sublimation fastness.                                      |    |     |
|   | TOTAL                                                        | 48 | 100 |

**NOTE -** Complete syllabus is restructured and sub topics are detailed. O additions & deletions are made

**Practical:** 

| Sr. No. | Practicals                                                            |  |  |  |  |  |
|---------|-----------------------------------------------------------------------|--|--|--|--|--|
| 1       | Identification of textile fibres by burning and solubility test.      |  |  |  |  |  |
| 2       | Desizing of cotton fabric using enzymatic method.                     |  |  |  |  |  |
| 3       | Scouring of cotton fabric using alkali and enzymes.                   |  |  |  |  |  |
| 4       | Bleaching of cotton fabric using Hydrogen peroxide and measurement of |  |  |  |  |  |
|         | whiteness index on CCM.                                               |  |  |  |  |  |
| 5       | Dyeing of cotton with direct dye.                                     |  |  |  |  |  |
| 6       | Dyeing of Cotton with reactive dye.                                   |  |  |  |  |  |
| 7       | Dyeing of cotton with Vat dye.                                        |  |  |  |  |  |
| 8       | Dyeing of cotton with Sulphur dye.                                    |  |  |  |  |  |
| 9       | Dyeing of cotton with Natural dye.                                    |  |  |  |  |  |
| 10      | Determination of colour fastness to washing.and rubbing.              |  |  |  |  |  |
| 11      | Traditional printing using azoic colours – Batick and tie and dye.    |  |  |  |  |  |

#### w.e.f Academic Year 2012-13

| 12 | Direct style of printing on cotton using reactive dyes.     |  |  |  |
|----|-------------------------------------------------------------|--|--|--|
| 13 | Discharge style of printing on reactive dyed cotton fabric. |  |  |  |
| 14 | Direct style of printing on polyester using disperse dye.   |  |  |  |
| 15 | Foam printing & pearl printing on garments.                 |  |  |  |
| 16 | Visit to process house                                      |  |  |  |

# Note: Each above practical for 3 hrs.

# **References:**

| Author       | Title                      | Year of<br>Publication | Place of<br>Publication & & Publisher                                                                  |
|--------------|----------------------------|------------------------|--------------------------------------------------------------------------------------------------------|
| V. A. Shenai | Textile Fibres             | 1996                   | Sevak Publications , 306, Shree Hanuman<br>Industrial Estate, G. D. Ambedkar Road,<br>Wadala, Mumba-31 |
| V. A. Shenai | Technology of Dyeing       | 1996                   | Do                                                                                                     |
| V. A. Shenai | Technology of<br>Printing  | 1996                   | Do                                                                                                     |
| V. A. Shenai | Technology of<br>Finishing | 1996                   | Do                                                                                                     |
| J. T. Marsh  | Textile Finishing          | 1986                   | B.I. Publication, New Delhi.                                                                           |
| Nalankilli   | Textile Finishing          | 1998                   | Digital Impressions, 288-N, Salem, Main<br>Road, Komarpalayam 638 183                                  |

Course Name : Diploma in Fashion & Clothing Technology Course Code : DC Semester : Fourth Subject Title : Knitted Fabric Design & Technology Subject Code : 17459

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    | Examination Scheme |     |    |     |     |       |
|-----------------|----|----|--------------------|-----|----|-----|-----|-------|
| TH              | TU | PR | PAPER<br>HRS.      | TH  | PR | OR  | TW  | TOTAL |
| 03              |    | 02 | 03                 | 100 |    | 25# | 25@ | 150   |

NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 100 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Knitted fabrics due to its stretchable and favorable properties are in good demand and it is expected to rise day by day. Knitted fabrics find uses for under garments, sports wear, summer and winter dresses, etc. to large extent. This sector is now diversifying into synthetics, domestic fabric, carpets, technical and geotextiles.

# **General Objectives:**

The student will be able to,

- a. Understand Warp & Weft Knitting machine.
- b. Identify different knitted structures.
- c. Understand pattern cutting & sewing of knitted garments.

#### **Learning Structure:**


#### **Detailed Contents:**

| Chapter | Contents                                                                                                                        | Hours | Marks |
|---------|---------------------------------------------------------------------------------------------------------------------------------|-------|-------|
| INO.    | Topic 1 Introduction of Knitting Drocess                                                                                        |       |       |
|         | Specific objective: The student will able to                                                                                    |       |       |
|         | • To define knitting process                                                                                                    |       |       |
|         | <ul> <li>To define kinding process</li> <li>To interpret the difference between woven &amp; traitted</li> </ul>                 |       |       |
|         | • To interpret the difference between woven & kinited                                                                           |       |       |
|         | Classify different britting mashing                                                                                             |       |       |
|         | • Classify different knitting machine.                                                                                          |       |       |
| 1       | 1 1) Definition of worn by oft knitting                                                                                         | 04    | 10    |
|         | 1.1) Definition of walp & welt kinting.                                                                                         |       |       |
|         | 1.2) Valious ways of fabric manufacture                                                                                         |       |       |
|         | 1.5) Reasons for the growth of Kintung                                                                                          |       |       |
|         | 1.4) Froperities of Kings as compared to woven<br>1.5) Definition of basic terms in knitting (Course Wales, Stitch              |       |       |
|         | Length Needle Leon Face Leon Reck leon Course, Wales, Suich                                                                     |       |       |
|         | 1.6) Classification of waft knitting, machines                                                                                  |       |       |
|         | Topic 2 Woft knitting Single jorsey m/c                                                                                         |       |       |
|         | Snecific objective: The student will able to                                                                                    |       |       |
|         | • Identify different parts of knitting and their function                                                                       |       |       |
|         | <ul> <li>Identify different parts of Kintting and their function</li> <li>Describe intermeshing process for knitting</li> </ul> |       |       |
|         | Describe intermesting process for kintung                                                                                       |       |       |
|         | • Identify type of knitted fabric                                                                                               |       |       |
|         | 2.1) Different zones in simpler weft knitting(areal knitting take                                                               |       |       |
|         | 2.1) Different zones in circular wert kintting(creer, kintting, take                                                            |       |       |
|         | 2 2) Details of creal zone                                                                                                      |       |       |
|         | Types of creal their advantage & disadvantage                                                                                   |       |       |
|         | - Types of creef, men advantage & disadvantage,<br>Details of positive feeder – function & its types                            |       |       |
|         | Concept of multifeeder machines                                                                                                 |       |       |
|         | 2 3) Details of knitting zone                                                                                                   |       |       |
| 2       | - Functional elements of knitting machine                                                                                       | 05    | 12    |
|         | - Types of needle & its comparison                                                                                              |       |       |
|         | - Knitting action of different needles                                                                                          |       |       |
|         | - Sinker & its function                                                                                                         |       |       |
|         | - Cylinder Gauge nitch Diameter                                                                                                 |       |       |
|         | - Cams                                                                                                                          |       |       |
|         | - Feeder, feeder density                                                                                                        |       |       |
|         | 2.4) Details of take-up zone                                                                                                    |       |       |
|         | - Fabric spreader                                                                                                               |       |       |
|         | 2.5) Single jersey fabric                                                                                                       |       |       |
|         | - Structure, Loop Diagram                                                                                                       |       |       |
|         | - Knitting cycle for single jersey machine                                                                                      |       |       |
|         | - Characteristic features of single jersey fabric                                                                               |       |       |
|         | Weft knitting Machines-double jersey                                                                                            |       |       |
|         | Specific objectives: The student will able to                                                                                   |       |       |
|         | • Classify different type of knitted fabrics.                                                                                   |       |       |
| 3       | Operate knitting machine.                                                                                                       | 05    | 12    |
|         | • Interpret different knitted fabric structure for appropriate                                                                  |       |       |
|         | use                                                                                                                             |       |       |
|         | • Select the procedure of knitted fabric production.                                                                            |       |       |

|   | Content:                                                                                                                                 |    |    |
|---|------------------------------------------------------------------------------------------------------------------------------------------|----|----|
|   | 3.1) Types of double jersey fabric (Rib. Interlock, Purl.)                                                                               |    |    |
|   | 3.2) Rib knitting machine-Structure, loop diagram, machine                                                                               |    |    |
|   | features Needle arrangement trick arrangement knitting                                                                                   |    |    |
|   | cvcle                                                                                                                                    |    |    |
|   | 3 3) Interlock machine- Structure loop diagram machine features                                                                          |    |    |
|   | needle & trick arrangement Cam arrangement                                                                                               |    |    |
|   | 3 (1) Purl knitting machine, loop diagram, needle arrangement                                                                            |    |    |
|   | principle of needle transfer                                                                                                             |    |    |
|   | 3 5) Characteristic of Rib interlock & purl fabrics                                                                                      |    |    |
|   | Weft knitted fabrics-design aspects                                                                                                      |    |    |
|   | Snecific objective. The student will able to                                                                                             |    |    |
|   | Represent the knitted fabric on paper                                                                                                    |    |    |
|   | <ul> <li>Represent the Kinteel fabric of paper.</li> <li>Draw different knitted fabric structure</li> </ul>                              |    |    |
|   | <ul> <li>Draw different inter the limited fabrics</li> <li>Differentiate the limited fabrics</li> </ul>                                  |    |    |
|   | • Differentiate the knitted faories.                                                                                                     |    |    |
|   | • Estimate yarn required for knitted fabric.                                                                                             |    |    |
|   |                                                                                                                                          |    |    |
|   | 4.1) Basic structure of weft knitted fabrics.                                                                                            |    |    |
|   | 4.2) Different types of stitches like knit, tuck, miss, purl, Loop                                                                       |    |    |
| 4 | diagram of tuck & float stitch. Effect of tuck & float stitch on                                                                         | 04 | 12 |
|   | fabric.                                                                                                                                  |    |    |
|   | 4.3) Representation of stitches on point paper (verbal, line                                                                             |    |    |
|   | diagram symbolic diagrammatic notation)                                                                                                  |    |    |
|   | 4 4) Concept of design needle order and cam order with example                                                                           |    |    |
|   | 4 5) Derivates of single jersey fabric- La-coste cross tuck satin                                                                        |    |    |
|   | iersev blister thick fleece                                                                                                              |    |    |
|   | 4 6) Derivatives of Rib structure-milano rib double pique pique                                                                          |    |    |
|   | nonlin evermonte                                                                                                                         |    |    |
|   | 4 7) Derivatives of Interlock structures- punto- di -roma ottoman                                                                        |    |    |
|   | rib texi pique                                                                                                                           |    |    |
|   | Weft knitting – Jacquard & advanced knitting                                                                                             |    |    |
|   | Specific objective:-The student will able to                                                                                             |    |    |
|   | Identify different knitted structure                                                                                                     |    |    |
|   | <ul> <li>Salect appropriate technique for knitted fabric</li> </ul>                                                                      |    |    |
|   | Content:                                                                                                                                 |    |    |
| 5 | 5 1) Need of jacquard with example                                                                                                       | 05 | 10 |
| 5 | 5.1) Need of Jacquard with example                                                                                                       | 05 | 10 |
|   | 5.2) Concept of stripper with example                                                                                                    |    |    |
|   | 5.5) Concept of shipper with example<br>5.4) Concept of plush (pile) fabric                                                              |    |    |
|   | 5.5) Concept of fleecy fabric                                                                                                            |    |    |
|   | 5.6) Stitch length and its importance                                                                                                    |    |    |
|   | Woft knitting Quality and calculations                                                                                                   |    |    |
|   | Snecific objective: The student will able to                                                                                             |    |    |
|   | • Calculate knitting production in Kg/Day or Maters/day                                                                                  |    |    |
|   | <ul> <li>Estimate varn requirement for a particular production</li> </ul>                                                                |    |    |
| 6 | <ul> <li>Estimate yain requirement for a particular production</li> <li>Calculate no. of machine required for designed output</li> </ul> | 04 | 12 |
| U | • Calculate no. of machine required for designed output                                                                                  | 04 | 14 |
|   | 6 1) Waft knit fahrig Dafaats (Causas & Damadias)                                                                                        |    |    |
|   | 6.2) Tests for weft knit Quality                                                                                                         |    |    |
|   | (0.2) resis for well kill Quality                                                                                                        |    |    |
|   | LO SUCOLCEDI OL ADFIAILLY & BATTE                                                                                                        | 1  |    |

|   | 6.4) Production calculations<br>GSM Calculation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |     |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
|   | Tightness factor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |    |     |
| 7 | <ul> <li>Warp Knitting</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 13 | 22  |
| 8 | <ul> <li>Knit Wear Tech Only related to knitted Garment<br/>Construction</li> <li>Specific objective: The student will able to <ul> <li>To understand pattern making for knitted fabric.</li> <li>To understand procedure of garmenting.</li> </ul> </li> <li>Content: <ul> <li>8.1) Pattern making, block pattern</li> <li>8.2) Fabric spreading</li> <li>8.3) Cutting of fabric – objects &amp; methods</li> <li>8.4) Production of sample garment</li> <li>8.5) Fitting problems &amp; correction for patterns with and without darts</li> <li>8.6) Study of Planning, drawing and reproduction of the knit garment.</li> </ul> </li> </ul> | 08 | 10  |
|   | Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 48 | 100 |

#### **Practical:** Skills to be developed:

#### Intellectual Skills:

- 1) The functions of knitting mechanisms.
- 2) Different knitted fabric structures.
- 3) The designs of needles and cams.

#### **Motor Skills:**

- 1) Identify different knitted fabric structures.
- 2) Draw diagrams of needles and cams.

- 1) Study of passage of yarn through Single jersey circular knitting m/c.
- 2) Study of passage of yarn through flat knitting m/c.
- 3) Study of passage of yarn through double jersey machine..
- 4) Introduction of fabric analysis single jersey fabric
- 5) Fabric analysis of single jersey knitted fabric
- 6) Fabric analysis of double jersey knitted fabric Rib.
- 7) Fabric analysis of double jersey knitted fabric Interlock
- 8) Fabric analysis of single jersey knitted fabric-derivative
- 9) Study of effect of stitch length on knitted fabric.
- 10) Visit to a modern knitting unit
- 11) Visit is a garment manufacturing unit.

#### List of Assignments:

1. Find the needle order & cam order for different knitted structure.

#### Learning Resources:

| 1. | Books: |
|----|--------|
| 1. | DOOU?  |

| Sr.<br>No | Title                                | Author                          | Place of Publication<br>& Publisher    |
|-----------|--------------------------------------|---------------------------------|----------------------------------------|
| 1         | Knitting Technology                  | David Spencer                   | Woodhead Publis-<br>hing - UK          |
| 2         | Introduction to clothing manufacture | Terry Cooklin                   | Om book Services<br>New-Delhi          |
| 3         | The Tech. of clothing manufacture    | Havold carr & Barbara<br>Lathan | Blackwell Science<br>Ltd. UK           |
| 4         | Warp knit engineering.               | A Reisfeld                      | Blackwell Science<br>Ltd. UK           |
| 5         | Warp knitting production             | S. Raj                          | Varlag mellinadtext<br>Heidelberg GMBH |
| 6         | Warp knitting Technology             | D. F. Paling                    | Columbine Press<br>Ltd, Manchester     |
| 7         | Knitting Technology                  | D. B. Ajgaonkar                 | Universal Publishir<br>Mumbai          |
| 8         | Knitting Technology                  | Iyer & Mervinger                | Om book Services<br>New-Delhi          |

#### 2. CDs, PPTs, Models, Charts etc. :

#### 3. IS, BIS and International Codes:

- 1. Reference: ASTM D 3882-85 for fabric skewness.
- 2. Reference: AATCC 178-1994 for barre.

#### 4. Websites:

- 1. http://www.shimaseiki.com/
- 2. http://www.kern-liebers.com/
- 3. http://www.groz-beckert.com/
- 4. http://www.knittingindustry.com

Course Name : Diploma in Fashion & Clothing TechnologyCourse Code : DCSemester : FourthSubject Title : Clothing Production Machinery & EquipmentSubject Code : 17460

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |               |     | Examinati | on Scheme |     |       |
|-----------------|----|----|---------------|-----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS. | TH  | PR        | OR        | TW  | TOTAL |
| 04              |    | 04 | 03            | 100 | 50#       |           | 25@ | 175   |

#### NOTE:

Two tests each of 25 marks are to be conducted as per the schedule given by MSBTE. Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional work (SW).

#### **Rational:**

The Garments manufacturing process require numerous machineries for their manufacture. Also certain super-specialized machineries are used in this filed. This subject introduces these machineries and uses, their assemblies & parts in detail.

#### **General Objectives:**

To impart knowledge in students about garment production Machinery & its detail, including parts & accessories.

#### **Contents: Theory**

| Chapter | Contents                                                                   | Marks | Hours |
|---------|----------------------------------------------------------------------------|-------|-------|
|         | Marker Making & Spreading                                                  |       |       |
|         | Specific Objectives: to know marker planning & spreading process           |       |       |
|         | in mass production                                                         |       |       |
|         | Fabric Packages                                                            |       |       |
|         | • Types of fabric packages,                                                |       |       |
|         | • Effect of type on spreading method.                                      |       |       |
|         | Marker Making                                                              |       |       |
|         | • Definition,                                                              |       |       |
|         | • Types of marker( block, continuous, half garment, whole                  |       |       |
|         | garment, single size, multiple size(sectional, interlocked,                |       |       |
| 1       | mixed size)                                                                | 14    | 08    |
|         | • Factors affecting marker efficiency and quality,                         |       |       |
|         | • Equipments used for making a marker. (Manual,                            |       |       |
|         | pantograph, Computerized)                                                  |       |       |
|         | Spreading                                                                  |       |       |
|         | • Definition                                                               |       |       |
|         | • Types of spread(Single, multiple, stepped ply) and forms of              |       |       |
|         | spreading.(One way, face to face and two way)                              |       |       |
|         | <ul> <li>Requirements for fabric spreading- methods (Manual.</li> </ul>    |       |       |
|         | Spreading carriage, automatic spreading).                                  |       |       |
|         | <ul> <li>Equipments</li> </ul>                                             |       |       |
|         | Cutting Machines                                                           |       |       |
|         | Specific Objectives: to understand construction & working of               |       |       |
|         | various cutting m/cs                                                       |       |       |
|         | • Introduction Types & requirements of quality cutting                     |       |       |
| 2       | <ul> <li>Portable knifes (straight knife, round knife)</li> </ul>          | 16    | 10    |
|         | <ul> <li>Stationary knives (band knife, die cutting machine)</li> </ul>    |       |       |
|         | <ul> <li>Specialised Knives – Notchers drills</li> </ul>                   |       |       |
|         | <ul> <li>Defects in cutting &amp; their remedies</li> </ul>                |       |       |
|         | Needles                                                                    |       |       |
|         | Specific Objectives: to know various parts & types of sewing m/c           |       |       |
|         | needles                                                                    |       |       |
|         |                                                                            |       |       |
| 3       | • Types<br>• Dorte                                                         | 10    | 05    |
|         | • Faits                                                                    |       |       |
|         | Functions                                                                  |       |       |
|         | <ul> <li>Needle size.</li> <li>Defecte des te fersites mes dies</li> </ul> |       |       |
|         | Defects due to faulty needles                                              |       |       |
|         | Sewing Machine                                                             |       |       |
|         | in solving m/os                                                            |       |       |
|         | III sewing m/cs                                                            |       |       |
|         | Basic parts                                                                |       |       |
| 4       |                                                                            | 16    | 12    |
|         | • Bobbin shuttle                                                           | -     |       |
|         | • Loopers                                                                  |       |       |
|         | • Loop spreader                                                            |       |       |
|         | • Threading figure                                                         |       |       |
|         | • Throat plate                                                             |       |       |

|   | Tongue chaining plate                                                |    |    |
|---|----------------------------------------------------------------------|----|----|
|   | • Takeoffs device                                                    |    |    |
|   | Tension setter                                                       |    |    |
|   | • Feed systems                                                       |    |    |
|   | • pressure foot,                                                     |    |    |
|   | • feed dog                                                           |    |    |
|   | Reverse feed                                                         |    |    |
|   | • Stitch length selection                                            |    |    |
|   | • SNLS machine-Study of work aids for sewing                         |    |    |
|   | Over Lock Machines                                                   |    |    |
|   | Specific Objectives: to know the construction & working of over      |    |    |
|   | lock m/c                                                             |    |    |
| 5 | Types of Machine                                                     | 10 | 00 |
| 5 | Threading Diagram                                                    | 10 | 08 |
|   | • Needle Height                                                      |    |    |
|   | • Feed dog Height Angles                                             |    |    |
|   | • Position of upper & Lower Knife, Loopers                           |    |    |
|   | Flat Lock Machine                                                    |    |    |
|   | Specific Objectives: to know the construction & working of flat      |    |    |
|   | lock m/c                                                             |    |    |
|   | • Types                                                              |    |    |
| 6 | • Threading steps with diagram                                       | 06 | 05 |
|   | • Stitch sequence                                                    |    |    |
|   | • Needle height                                                      |    |    |
|   | • Differential feed ratio                                            |    |    |
|   | • Loopers                                                            |    |    |
|   | Work Aid & Fusing, Pressing m/cs                                     |    |    |
|   | Specific Objectives: to understand concept of work aids &            |    |    |
|   | attachments. Also to the fusing & pressing for the apparels.         |    |    |
|   | <ul> <li>Attachments of sewing machine</li> </ul>                    |    |    |
|   | • Rollers                                                            |    |    |
|   | • Guides                                                             |    |    |
|   | • Folders,                                                           |    |    |
|   | Compacting pressure foot                                             |    |    |
|   | • Hemmer                                                             |    |    |
|   | Placket making                                                       |    |    |
|   | <ul> <li>Pocket making attachments</li> </ul>                        |    |    |
| 7 | Collar turning machine                                               | 16 | 10 |
| / | Garment folding machine                                              | 10 | 10 |
|   | Fusing                                                               |    |    |
|   | Objectives & Requirements                                            |    |    |
|   | • Types (Fabrics used and Resins)                                    |    |    |
|   | • Requirements(Time, Temperature, Pressure)                          |    |    |
|   | • Equipment(electric iron, movable flat beds, conveyor,              |    |    |
|   | carasol)                                                             |    |    |
|   | Methods of application of resin                                      |    |    |
|   | Pressing Machines                                                    |    |    |
|   | • Terms(Under, Mouldings, Top Pressing)                              |    |    |
|   | • Types (Dry, Steam, High Pressure Steam)                            |    |    |
|   | <ul> <li>Accessories (Ironing Board, Sleeve Board, Bucks)</li> </ul> |    |    |

|   | • Equipments (Mechanical, Steam, Tunnel                         |     |    |
|---|-----------------------------------------------------------------|-----|----|
|   | Modern Sewing Machines                                          |     |    |
|   | Specific Objectives: to understand modernization in sewing m/cs |     |    |
|   | & to learn some modern m/cs.                                    |     |    |
|   | • Computer aid                                                  | 10  | 06 |
| 8 | • Button hole, button sewing,                                   | 12  | 06 |
|   | • Bar tack,                                                     |     |    |
|   | • Blind stitch machine.                                         |     |    |
|   | <ul> <li>Sewing problems e.g. Seam puckering</li> </ul>         |     |    |
|   | TOTAL                                                           | 100 | 64 |

| Sr. No. | Practical                                                                              |                              |
|---------|----------------------------------------------------------------------------------------|------------------------------|
| 1       | Study the various types & sizes of needles used for different mach fabric.             | iines & different<br>4 Hrs   |
| 2       | Study the major parts of sewing machines                                               | 8 Hrs.                       |
| 3       | Study of sewing threads.                                                               | 4 Hrs.                       |
| 4       | Study the 3-thread, 4-thread & 5-thread over lock sewing machin                        | e 8 Hrs.                     |
| 5       | Study feed of the arm machine                                                          | 8 Hrs.                       |
| 6       | Study the attachments for sewing machine                                               | 8 Hrs.                       |
| 7       | Study the various types of cutting machines                                            | 4 Hrs.                       |
| 8       | Study the buttonhole & button stitch m/c                                               | 8 Hrs.                       |
| 9       | Study the marker planning, fabric spreading, drawing marker & cutype of basic garment. | utting for any one<br>8 Hrs. |
| 10      | Study of vacuum pressing table                                                         | 4 Hrs.                       |

#### **Learning Resources:**

#### Books:

| Author Title                    |                                           | Year of<br>Publication | Place of<br>Publication & Publisher |
|---------------------------------|-------------------------------------------|------------------------|-------------------------------------|
| Harold Carr &<br>Barbara Latham | The Technology of<br>clothing Manufacture | 1994                   | Om book Service. England            |
| R.M. & Webster J.               | Stitches & Seams                          | 1998                   | Manchester, England                 |
| Shaeffer Claire                 | Sewing for Apparel<br>Industry            | 2001                   | Prentice Hall, New Jarsey, USA      |
| Singer cy De cross              | Sewing Lingerie                           | 1991                   | Incorporated USA                    |

Course Name : Diploma in Fashion & Clothing Technology Course Code : DC Semester : Fourth Subject Title : Indian Western Costume Subject Code : 17461

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |               |     | Examinati | on Scheme |    |       |
|-----------------|----|----|---------------|-----|-----------|-----------|----|-------|
| TH              | TU | PR | PAPER<br>HRS. | TH  | PR        | OR        | TW | TOTAL |
| 04              |    |    | 03            | 100 |           |           |    | 100   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rational:**

In India as well as in the western countries, there is vast enhancement and diversities in the dimension of costumes which depend on religion, climate, attitude, ethical values, social lifestyle and prosperity.

#### **General Objectives:**

The student will be able to,

Learning the costume fundamentals their transition relating to major civilizations of the world.

#### **Learning Structure:**



#### **CONTENTS:** Theory

| Chapter | Name of the Topic                                       | Hour | Marks |
|---------|---------------------------------------------------------|------|-------|
|         | History of western costume                              |      |       |
|         | Specific Objectives:                                    |      |       |
|         | Students will be able to history of western costume     |      |       |
|         | Students will be able to men's of western costume       |      |       |
|         | Students will be able to women's of western costume     |      |       |
|         | Students will be able to accessories of western costume |      |       |
|         | Contents:                                               |      |       |
|         | 1.1 Europe costume in 20 <sup>th</sup> century          |      |       |
|         | • Men's wear                                            |      |       |
|         | • Women's wear                                          |      |       |
|         | Accessories                                             |      |       |
| 1       | 1.2 Baltic costume                                      | 10   | 20    |
|         | • Men's wear                                            |      |       |
|         | • Women's wear                                          |      |       |
|         | Accessories                                             |      |       |
|         | 1.3 Asia costume                                        |      |       |
|         | • Men's wear                                            |      |       |
|         | • Women's wear                                          |      |       |
|         | Accessories                                             |      |       |
|         | 1.4 Byzantine costume                                   |      |       |
|         | • Men's wear                                            |      |       |
|         | • Women's wear                                          |      |       |
|         | Accessories                                             |      |       |
|         | History of Western Costume                              |      |       |
|         | Specific Objectives:                                    |      |       |
|         | Students will be able to history of western costume     |      |       |
|         | Students will be able to men's of western costume       |      |       |
|         | Students will be able to women's of western costume     |      |       |
|         | Students will be able to accessories of western costume |      |       |
|         | Contents:                                               |      |       |
|         | 2.1 French costume in 20 <sup>th</sup> century          |      |       |
|         | • Men's wear                                            |      |       |
|         | • Women's wear                                          |      |       |
| 2       | Accessories                                             | 10   | 20    |
| Z       | 2.2 American costume in 20 <sup>th</sup> century        | 12   | 20    |
|         | • Men's wear                                            |      |       |
|         | • Women's wear                                          |      |       |
|         | <ul> <li>Accessories</li> </ul>                         |      |       |
|         | 2.3 Japanese costume                                    |      |       |
|         | • Men's wear                                            |      |       |
|         | • Women's wear                                          |      |       |
|         | Accessories                                             |      |       |
|         | 2.4 China costume                                       |      |       |
|         | • Men's wear                                            |      |       |
|         | • Women's wear                                          |      |       |
|         | Accessories                                             |      |       |

|   | History of Indian costume                              |    |    |
|---|--------------------------------------------------------|----|----|
|   | Specific Objectives:                                   |    |    |
|   | Students will be able to history of Indian costume     |    |    |
|   | Students will be able to men's of Indian costume       |    |    |
|   | Students will be able to women's of Indian costume     |    |    |
|   | Students will be able to accessories of Indian costume |    |    |
|   | Contents:                                              |    |    |
|   | 3.1 Introduction to historic costumes                  |    |    |
|   | • Male costumes during 200 B.C.                        |    |    |
|   | • Female costumes during 200 B.C.                      |    |    |
|   | • Male costumes during 100 A.D. to 1100 A.D.           |    |    |
| 3 | • Female costumes during 100 A.D. to 1100 A.D.         | 10 | 20 |
| 5 | 3.2 Indus valley civilization costumes                 | 10 | 20 |
|   | Male attire                                            |    |    |
|   | • Female attire                                        |    |    |
|   | 3.3 Maurvan and Sunga period costumes                  |    |    |
|   | • Male attire                                          |    |    |
|   | • Female attire                                        |    |    |
|   | 3.4 Gupta period costume                               |    |    |
|   | • Male attire                                          |    |    |
|   | • Female attire                                        |    |    |
|   | 3.5 Mughal period costume                              |    |    |
|   | • Male attire                                          |    |    |
|   | • Female attire                                        |    |    |
|   | Regional Costumes and Jewelry in India                 |    |    |
|   | Specific Objectives:                                   |    |    |
|   | Students will be able to men's of Indian costume       |    |    |
|   | Students will be able to women's of Indian costume     |    |    |
|   | Students will be able to accessories of Indian costume |    |    |
|   | Contents:                                              |    |    |
|   | 4.1 Kashmir costume                                    |    |    |
|   | Male costumes                                          |    |    |
|   | • Female costumes                                      |    |    |
|   | • Jewelry                                              |    |    |
|   | 4.2 Punjab costume                                     |    |    |
| 4 | Male costumes                                          | 12 | 15 |
|   | • Female costumes                                      |    |    |
|   | • Jewelry                                              |    |    |
|   | 4.3 Rajasthan costume                                  |    |    |
|   | • Male costumes                                        |    |    |
|   | • Female costumes                                      |    |    |
|   | • Jewelry                                              |    |    |
|   | 4.4 Gujarat costume                                    |    |    |
|   | • Male costumes                                        |    |    |
|   | • Female costumes                                      |    |    |
|   | • Jewelry                                              |    |    |
|   | 4.5 Bengal costume                                     |    |    |
|   |                                                        |    |    |

|   | • Female costumes                                      |    |    |
|---|--------------------------------------------------------|----|----|
|   | • Jewelry                                              |    |    |
|   | 4.6 Karnataka costume                                  |    |    |
|   | Male costumes                                          |    |    |
|   | • Female costumes                                      |    |    |
|   | • Jewelry                                              |    |    |
|   | Indian Traditional Regional Embroidery                 |    |    |
|   | Specific Objectives:                                   |    |    |
|   | Students will be able to Indian traditional embroidery |    |    |
|   | Students will be able to Indian fabrics, stitches      |    |    |
|   | Students will be able to Indian motifs, colors         |    |    |
|   |                                                        |    |    |
|   | Contents:                                              |    |    |
|   | 5.1 Kashmiri of Kashmir                                |    |    |
|   | Motifs                                                 |    |    |
|   | Colors                                                 |    |    |
|   | • Fabric                                               |    |    |
|   | • Stitches                                             |    |    |
|   | 5.2 Kantha of Bengal                                   |    |    |
|   | Motifs                                                 |    |    |
|   | Colors                                                 |    |    |
|   | Eabric                                                 |    |    |
| 5 | • Stitcher                                             | 10 | 12 |
|   | • Stitutes<br>5.3 Kasuti of Karnataka                  |    |    |
|   | • Motifa                                               |    |    |
|   | Mouns     Calara                                       |    |    |
|   | • Colors                                               |    |    |
|   | • Fabric                                               |    |    |
|   | • Stitches                                             |    |    |
|   | 5.4 Phulakari of Punjab                                |    |    |
|   | • Motifs                                               |    |    |
|   | Colors                                                 |    |    |
|   | • Fabric                                               |    |    |
|   | • Stitches                                             |    |    |
|   | 5.5 Kathiawar and Kutch of Gujarat                     |    |    |
|   | Motifs                                                 |    |    |
|   | Colors                                                 |    |    |
|   | • Fabric                                               |    |    |
|   | • Stitches                                             |    |    |
|   | Costumes for Special Purpose                           |    |    |
|   | Specific Objectives:                                   |    |    |
|   | Students will be able to theatre costumes              |    |    |
|   | Students will be able to sports costumes               |    |    |
|   | Students will be able to factors influencing costume   |    |    |
| 6 | changes                                                | 10 | 13 |
| 0 | Students will be able to world affairs                 | 10 | 15 |
|   | Contents:                                              |    |    |
|   | 6.1 Theatre costume                                    |    |    |
|   | • Fabric                                               |    |    |
|   | Accessories                                            |    |    |
|   | 6.2 Sports costume                                     |    |    |

| Tota                                    | 64 | 100 |
|-----------------------------------------|----|-----|
| Socio-political                         |    |     |
| Geographical                            |    |     |
| Economical                              |    |     |
| 6.4 World Affairs                       |    |     |
| • Lifestyle                             |    |     |
| Attitude                                |    |     |
| Climate                                 |    |     |
| Religion                                |    |     |
| • Style                                 |    |     |
| 6.3 Factors influencing costume changes |    |     |
| Accessories                             |    |     |
| Fabric                                  |    |     |

Practical: Skills to be developed:

**Intellectual Skills**:

**Motor Skills:** 

#### Learning Resources:

#### 1. Books:

| Sr.<br>No. | Author            | Title                                         | Publisher                                  |  |  |  |  |
|------------|-------------------|-----------------------------------------------|--------------------------------------------|--|--|--|--|
| 1          | G.S. Ghurge       | Indian Costumes                               | Mahajan Publishers,<br>Ahmedabad           |  |  |  |  |
| 2          | Savithri Pandit   | Indian Embroidery                             | Mahajan Publishers,<br>Ahmedabad           |  |  |  |  |
| 3          | Contini Mila      | Fashion from Ancient Egypt to the present day | West Duxbury<br>Manchester                 |  |  |  |  |
| 4          | Shailaja D. Naik  | Traditional Embroideries Of India             | A.P.H.Publishing<br>Corporation, New Delhi |  |  |  |  |
| 5          | Barfoot Audrey    | Everyday costumes in Britain                  | Woodhead Publishing<br>Cambridge,U.K.      |  |  |  |  |
| 6          | Pistolese, Rojara | History & Fashion                             | Woodhead Publishing<br>Cambridge,U.K.      |  |  |  |  |
|            |                   |                                               |                                            |  |  |  |  |

- 2. CDs, PPTs, Models, Charts etc. :
- 3. IS, BIS and International Codes:
- 4. Websites:

MSBTE - Final Copy Dt. 30/08/2013

Course Name : Diploma in Fashion & Clothing Technology Course Code : DC Semester : Fourth Subject Title : CAD in Textile Designing Subject Code : 17049

#### **Teaching and Examination Scheme:**

| Teac | ching Scl | heme |               |    | Examinati | on Scheme |     |       |
|------|-----------|------|---------------|----|-----------|-----------|-----|-------|
| TH   | TU        | PR   | PAPER<br>HRS. | TH | PR        | OR        | TW  | TOTAL |
|      |           | 02   |               |    |           |           | 25@ | 25    |

#### **Rational:**

This subject will give specific application of the developed concept in developing textile design. Innovation, creation with the help of high performance tool of CAD will help the user to transfer his creativity within no time.

#### **General Objectives:**

Students will learn different concepts and application of those concepts in developing textile designs. How ideas are formed and implemented in the process of design development, Human skills and computer skills will be utilized for the formation of innovative designs as per the requirement of current market trends are concerned. History to modern design trends will be exposed to the students. Students will have hands on experience of developing designs for men, women and kids as well as home textiles.

#### **Detailed contents of Theory topics to be taught during practical hours:**

**Topic No.1** \* Selection of thread spacing & thread diameter in the warp and weft directions for shirting, sarees and home textiles.

- Selection of colours of warp and weft as per the end use
- Select the weaves as per the requirements
- Observe simulation & modify it if necessary

Topic No.2 \* Use of different tools for design development in printing

- Image development and colour processing for printed design
- Development of half-tone design
- Development of different designs for various end uses in printing.

**Topic No.3** \* Use of software for creating various woven & printed designs and storing the same for development of design library for further reference.

#### **Practice:**

| Sr. No. | Practical                                                                             |
|---------|---------------------------------------------------------------------------------------|
|         | A) Development of textile design with weaving software (12 hrs)                       |
|         | 1) Development of stripes shirting design                                             |
|         | 2) Development of checks shirting design                                              |
| 1       | 3) Development of extra warp design                                                   |
|         | 4) Development of extra weft design                                                   |
|         | 5) Development of saree design with body border and pallov                            |
|         | 6) Development of home textiles                                                       |
|         | B) Development of textile design with print software (12 hrs.)                        |
|         | 1) Development of ladies dress material design                                        |
|         | 2) Development of all over scarce design                                              |
| 2       | 3) Development of kinds wear design                                                   |
|         | 4) Development of shirting design – stripes                                           |
|         | 5) Development of shirting design checks                                              |
|         | 6) Development of home textiles                                                       |
| 3       | C) Preparation and development of design library for woven & printed design. (8 hrs.) |

#### References: Books:

| Author        | Title                       | Year of<br>Publication | Place of Publication &<br>Publisher |
|---------------|-----------------------------|------------------------|-------------------------------------|
| V.A. Shenal   | Wonder weaves System        | 1989                   | Universal Publishers, Mumbai        |
| Grovisicki    | Ned graphics                | 1988                   | Manchester, UK                      |
| Nisbet        | Colorado International rued | 1996                   | Thianville Paris                    |
| Cooklin Gerry | The Design Scope company    | 1992                   | Kempen                              |
| V.A. Shenal   | Design deskpru              | 1990                   | Universal Publishers,<br>Mumbai     |

Course Name : Diploma in Fashion & Clothing Technology Course Code : DC Semester : Fourth Subject Title : Professional Practices-II Subject Code : 17050

#### **Teaching and Examination Scheme:**

| Teac | hing Scl | heme |               |    | Examinati | on Scheme |     |       |
|------|----------|------|---------------|----|-----------|-----------|-----|-------|
| TH   | TU       | PR   | PAPER<br>HRS. | TH | PR        | OR        | TW  | TOTAL |
|      |          | 03   |               |    |           |           | 50@ | 50    |

#### **Rationale:**

Most of the diploma holders join industries. Due to globalization and competition in the industrial and service sectors the selection for the job is based on campus interviews or competitive tests.

While selecting candidates a normal practice adopted is to see general confidence, ability to communicate and their attitude, in addition to basic technological concepts.

The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

#### **Objectives:**

Student will be able to:

- 1. Acquire information from different sources.
- 2. Prepare notes for given topic.
- 3. Present given topic in a seminar.
- 4. Interact with peers to share thoughts.
- 5. Prepare a report on industrial visit, expert lecture.

#### **Learning Structure:**



| Sr. No. | Activities                                                                  | Hours     |  |  |  |  |  |  |
|---------|-----------------------------------------------------------------------------|-----------|--|--|--|--|--|--|
|         | Industrial Visits                                                           |           |  |  |  |  |  |  |
|         | Structured industrial visits be arranged and report of the same shall be    |           |  |  |  |  |  |  |
|         | submitted by the individual student, to form a part of the term work.       |           |  |  |  |  |  |  |
|         | The industrial visits may be arranged in the following areas / industries : |           |  |  |  |  |  |  |
|         | 1) Garment industry                                                         |           |  |  |  |  |  |  |
|         | 2) Apparel marketing                                                        |           |  |  |  |  |  |  |
|         | 3) Apparel merchandising                                                    |           |  |  |  |  |  |  |
| 1       | 4) Garment chemical processing industry                                     | 14        |  |  |  |  |  |  |
|         | 5) Quality Testing laboratories of Garments in industries or                |           |  |  |  |  |  |  |
|         | reputed organizations                                                       |           |  |  |  |  |  |  |
|         | 6) Fashion Merchandising                                                    |           |  |  |  |  |  |  |
|         | 7) Fashion Marketing                                                        |           |  |  |  |  |  |  |
|         | 8) Manufacturing organizations for observing various manufacturing          |           |  |  |  |  |  |  |
|         | processes of Yarn & Fabric Production.                                      |           |  |  |  |  |  |  |
|         | 9) Knitting Industry.                                                       |           |  |  |  |  |  |  |
|         | Lectures by Professional / Industrial Expert lectures to be organized       |           |  |  |  |  |  |  |
|         | from any two of the following areas:                                        |           |  |  |  |  |  |  |
|         | 1) Interview Techniques.                                                    |           |  |  |  |  |  |  |
| 2       | 2) Modern machines in garmenting                                            |           |  |  |  |  |  |  |
|         | 3) Applications of CAD/CAM in fashion & apparel manufacturing.              |           |  |  |  |  |  |  |
|         | 4) Testing of fabrics for apparel manufacturing.                            |           |  |  |  |  |  |  |
|         | Information Search:                                                         |           |  |  |  |  |  |  |
|         | Information search can be done through manufacturer's catalogue,            |           |  |  |  |  |  |  |
|         | websites, magazines, books etc. and submit a report any one topic.          |           |  |  |  |  |  |  |
|         | Following topics are suggested:                                             |           |  |  |  |  |  |  |
| 3       | 1) Different types of needles.                                              | 08        |  |  |  |  |  |  |
|         | 2) CAD/CAM Software.                                                        |           |  |  |  |  |  |  |
|         | 3) Accessories for Garments.                                                |           |  |  |  |  |  |  |
|         | 4) Apparel production process.                                              |           |  |  |  |  |  |  |
|         | 5) Fashion Designing.                                                       |           |  |  |  |  |  |  |
|         | 6) Fashion Merchandising.                                                   |           |  |  |  |  |  |  |
|         | Seminar:                                                                    |           |  |  |  |  |  |  |
| 4       | student shall submit a report of at least 10 pages and deliver a seminor    | 08        |  |  |  |  |  |  |
|         | student shall submit a report of at least 10 pages and deliver a seminar    |           |  |  |  |  |  |  |
|         | (Presentation time – 10 minutes)                                            |           |  |  |  |  |  |  |
|         | Mini Project / Activities: (any one)                                        |           |  |  |  |  |  |  |
|         | 1) Stitching a trouser /woman's wear/kid's wear with own pattern            |           |  |  |  |  |  |  |
| 5       | cutting.                                                                    |           |  |  |  |  |  |  |
|         | 2) Development of different design on a CAD Software.                       |           |  |  |  |  |  |  |
|         | 3) Collection of different accessories used for garments                    |           |  |  |  |  |  |  |
|         | Total                                                                       | <b>48</b> |  |  |  |  |  |  |

Course Name : Diploma in Fashion & Clothing Technology

Course Code : DC

Semester : Fourth

Subject Title : Industrial Training

Subject Code : 17051

#### **Teaching and Examination Scheme:**

| Teac | hing Scl | neme |               |    | Examinati | on Scheme |    |       |
|------|----------|------|---------------|----|-----------|-----------|----|-------|
| TH   | TU       | PR   | PAPER<br>HRS. | TH | PR        | OR        | TW | TOTAL |
|      |          | *    |               |    |           |           |    |       |

## **\*\* Industrial training for six weeks to be completed during summer break after Fourth semester.** Assessment to be done in Fifth Semester

#### **Objectives:**

- Experience the industrial environment for textile industrial processes, equipment & practices.
- Collect data about Plant lay out, equipment and machines-specifications and working available in different sections and collect data.
- Experience operation of machines and process parameters of spinning and weaving departments for the target production and collect data.
- Appreciate factory utilities power water illumination men and material movement, pollution control, industrial safety etc.
- Carryout the material testing at different stages of yarn and fabric production for quality.
- Experience maintenance schedules of all the equipment and collect information on the effects of negligence of maintenance.
- Diagnose problems and find solutions to problems related with operation, and maintenance of equipment.
- Study the organization structure, job description, job specifications, promotional schemes, motivational strategies, etc.
- Collect data on production incentives, methods study and time & motion studies.
- Critical study of all activities with a view to find the areas for improvement.
- Devise solution to problem areas.
- Collect information / data for project work and seminars.

However, the detailed list of areas of study, working and data collection has been prepared and is enclosed in **3.5** – **Specific area of study and working.** The student should regularly refer to this list and accordingly choose the areas and acquire the knowledge information and skills.

#### **GUIDE LINES FOR INPLANT TRAINING**

#### GENERAL INFORMATION OF THE ORGANISATION:

- 1. History and Organization.
- 2. Types of Garment produced.
- 3. Quantity of Garments produced Per Day
- 4. Buyer's Information
- 5. Market: Local / Export.
- 6. Lay out of all departments with dimensions.
- 7. Process Flow Chart.

#### **GENERAL OBSERVATION OF THE FOLLOWING DEPARTMENTS:**

#### **Training:**

- 1. Who is head?
- 2. Training duration
- 3. Psycho motor Activities
- 4. Hand eye co-ordination Activities

#### Merchandising:

- 1. Who is head?
- 2. People / designations involved in- their roles and responsibilities
- 3. Documents maintained
- 4. Duties of merchandiser
- 5. Types of samples to be sent to buyer to get approval.

#### **Production Planning & Control**

- 1. Who is head?
- 2. People / designations involved in- their roles and responsibilities
- 3. Documents maintained
- 4. Responsibilities
- 5. Planning of material required to in house including wastages and allowances

#### **Fabric Store:**

- 1. Who is head?
- 2. People / designations involved in- their roles and responsibilities
- 3. Documents maintained
- 4. Type of Fabric used- Technical specifications if so.

#### MSBTE - Final Copy Dt. 30/08/2013

#### 17051DC4

#### w.e.f Academic Year 2012-13

- 5. Fabric Inspection, Classification of faults.
- 6. Shade sorting
- 7. Fabric grading systems- four point/ ten point
- 8. Quality levels- Acceptation and rejection

#### Sampling & CAD:

- 1. Who is head?
- 2. People / designations involved in- their roles and responsibilities
- 3. Documents maintained
- 4. Study of Manual / CAD System of pattern making.
- 5. Types of machines in Sampling Dept.
- 6. Types of samples prepared.

#### **Cutting Department:**

- 1. Who is head?
- 2. People / designations involved in- their roles and responsibilities
- 3. Documents maintained
- 4. No. and types of machines in Cutting Dept.- their technical specification,
- 5. Study of Manual and Automatic Cutting Machine.
- 6. Study of Fabric Laying and Cutting Process.
- 7. Production per shift.
- 8. Bundling, ticketing, relaying

#### **Sewing Department:**

- 1. Who is head?
- 2. People / designations involved in- their roles and responsibilities
- 3. Documents maintained
- 4. No. and types of machines in Sewing Dept.- their technical specification like Speed & Efficiency.
- 5. No. of lines set and active
- 6. No. of machines per line.
- 7. Type of machines in the line.
- 8. Shift wise productivity and ancillary labor.
- 9. Transportation of Material.
- 10. Various production systems followed- linear, skill center
- 11. Observations at various modules- front, back, collar, cuff, assembly and special operations.
- 12. Quality inspection at various stages.

#### 17051DC4

#### **Embroidery:**

- 1. Who is head?
- 2. People / designations involved in- their roles and responsibilities
- 3. Documents maintained
- 4. No. and types of machines in Embroidery Dept.- their technical specification like Speed & Efficiency.

# Finishing (Checking, Button Sewing & Buttonhole, Inspection, Washing, Pressing, Packing, Dispatch):

- 1. Who is head?
- 2. People / designations involved in- their roles and responsibilities
- 3. Documents maintained
- 4. No. and types of machines in Finishing Dept.- their technical specification like Speed & Efficiency.
- 5. Defects in Garments and Solutions.
- 6. Type of pressing- form/ flatbed pressing
- 7. Type of packing for Local and Export.
- 8. Type of Storage/ Warehousing/ Dispatch

#### **Quality Control Department:**

- 1. Study of Testing Machines, Calibration of machines.
- 2. Department wise Quality Assurance activities, various studies, Audit.
- 3. Quality Parameters obtained.
- 4. Norms followed.
- 5. Quality Management Programs like TPM, KAIZEN etc.

#### **Finance department:**

The following information can be gathered if possible. If the management is reluctant to supply the information, do not to insist upon.

- 1. Wages and fringe benefits given to the worker of various department.
- 2. Method of depreciation used for cost purpose.
- 3. Administrative charges.
- 4. Cost of Fabric.
- 5. Cost for Garment Production.
- 6. Method of Costing.

#### MSBTE - Final Copy Dt. 30/08/2013

#### w.e.f Academic Year 2012-13

- 7. Electricity Cost.
- 8. Factory Overhead Charges

#### **Industrial Engineering Department:**

- 1. Plant layout- frequency of changing
- 2. Fire handling systems.
- 3. Water requirements and Water supply system.
- 4. Generator Capacity / Type.
- 5. Electrical units consumed per day
- 6. Types of wastage.
- 7. Price of waste obtained in various departments.
- 8. Control and elimination of wastage.

#### Personnel & human resources department:

- 1. Duties / responsibilities of various levels of workers.
- 2. Welfare schemes of workers / staff.
- 3. Labor handling.
- 4. Workload of various categories of workers.
- 5. Sanitation and other human right facilities provided.

#### ASSESSMENT STRATEGY

- a) Report of the industrial training shall be prepared by each student on the basis of his/her actual work done, during the six weeks industrial training.
- b) This report should be submitted in typed and bound form within 1 month after completion of the industrial training.
- c) Industrial training should be assessed equally by external and internal examiners for the oral exam assessment.
- d) Industrial training should be assessed by internal examiner only for term work assessment.

'G' Scheme

### MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI

#### TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES

#### **COURSE NAME : DIPLOMA IN DIGITAL ELECTRONICS**

#### **COURSE CODE : DE**

#### **DURATION OF COURSE : 6 SEMESTERS**

#### **SEMESTER : FOURTH**

#### FULL TIME / PART TIME : FULL TIME

| 101  |                                       |        |             |          |       |                    |                       |          |         | D       |         |       |        |     |               |         |
|------|---------------------------------------|--------|-------------|----------|-------|--------------------|-----------------------|----------|---------|---------|---------|-------|--------|-----|---------------|---------|
|      | SUBJECT TITLE                         |        |             | TEACHING |       | EXAMINATION SCHEME |                       |          |         |         |         |       |        |     |               |         |
| SR.  |                                       | Abbrev | SUB<br>CODE | SCHEME   |       | PAPER              | TH                    | (1)      | PR      | (4)     | OR (8)  |       | TW (9) |     | SW<br>(17400) |         |
| 110. |                                       | lation | CODE        | ТН       | TU    | PR                 | HRS.                  | Max      | Min     | Max     | Min     | Max   | Min    | Max | Min           | (17400) |
| 1    | Environmental Studies \$              | EST    | 17401       | 01       |       | 02                 | 01                    | 50#*     | 20      |         |         |       |        | 25@ | 10            |         |
| 2    | Industrial Measurements β             | IME    | 17434       | 03       |       | 02                 | 03                    | 100      | 40      |         |         |       |        | 25@ | 10            |         |
| 3    | Principles of Analog<br>Communication | PAC    | 17439       | 03       |       | 02                 | 03                    | 100      | 40      | 25#     | 10      |       |        | 25@ | 10            | 50      |
| 4    | Microprocessor                        | MIC    | 17443       | 03       |       | 02                 | 03                    | 100      | 40      | 25#     | 10      |       |        | 25@ | 10            | 50      |
| 5    | Linear Integrated Circuits β          | LIC    | 17445       | 04       |       | 02                 | 03                    | 100      | 40      | 50#     | 20      |       |        | 25@ | 10            |         |
| 6    | Visual Basic β                        | VBA    | 17043       | 01       |       | 02                 |                       |          |         |         |         |       |        | 25@ | 10            |         |
| 7    | Professional Practices-II β           | PPS    | 17044       |          |       | 03                 |                       |          |         |         |         |       |        | 50@ | 20            |         |
|      |                                       | ,      | TOTAL       | 15       |       | 15                 |                       | 450      |         | 100     |         |       |        | 200 |               | 50      |
| **   | Industrial Training (Optional)        |        |             | Exa      | amina | tion i             | n 5 <sup>th</sup> Sem | ester Pr | ofessio | onal Pr | actices | s-III |        |     |               |         |
|      |                                       |        |             |          |       |                    |                       |          |         |         |         |       |        |     |               |         |

Student Contact Hours Per Week: **30 Hrs.** 

#### THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.

Total Marks: 800

@- Internal Assessment, # - External Assessment,

No Theory Examination, \$ - Common to all branches, #\* - Online Theory Examination,

WITH EFFECT FROM 2012-13

**DURATION : 16 WEEKS** 

SCHEME : G

 $\beta$  - Common to ET / EJ / EN / EX / IE / IS / IC / EV / MU / IU / ED / EI

Abbreviations: TH-Theory, TU-Tutorial, PR-Practical, OR-Oral, TW-Term Work, SW-Sessional Work.

\*\* Industrial Training (Optional) - Student can undergo Industrial Training of four weeks after fourth semester examination during summer vacation.

Assessment will be done in Fifth semester under Professional Practices-III. They will be exempted from activities of Professional Practices-III of 5<sup>th</sup> Semester.

Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subjects is to be converted out of 50 marks as sessional work (SW).

> Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

> Code number for TH, PR, OR and TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.

MSBTE - Final Copy Dt. 30/08/2013

Course Name : All Branches of Diploma in Engineering & Technology Course Code : AE/CE/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/

#### ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG/AU

Semester : Fourth

Subject Title : Environmental Studies

Subject Code : 17401

**Teaching and Examination Scheme:** 

| Teaching Scheme |    |    |              | Examinati | on Scheme |    |     |       |
|-----------------|----|----|--------------|-----------|-----------|----|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH        | PR        | OR | TW  | TOTAL |
| 01              |    | 02 | 01           | 50#*      |           |    | 25@ | 75    |

#### **#\* Online Theory Examination**

NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Environment essentially comprises of our living ambience, which gives us the zest and verve in all our activities. The turn of the twentieth century saw the gradual onset of its degradation by our callous deeds without any concern for the well being of our surrounding we are today facing a grave environmental crisis. The unceasing industrial growth and economic development of the last 300 years or so have resulted in huge ecological problems such as overexploitation of natural resources, degraded land, disappearing forests, endangered species, dangerous toxins, global warming etc.

It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

The curriculum covers the aspects about environment such as Environment and Ecology, Environmental impacts on human activities, Water resources and water quality, Mineral resources and mining, Forests, etc.

General Objectives: The student will be able to,

- 1. Understand importance of environment
- 2. Know key issues about environment
- 3. Understands the reasons for environment degradation
- 4. Know aspects about improvement methods
- 5. Know initiatives taken by the world bodies to restrict and reduce degradation

#### **Learning Structure:**



#### Theory:

| Topic and Contents                                                                                                                      | Hours | Marks |
|-----------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
| Topic 1: Nature of Environmental Studies                                                                                                |       |       |
| Specific Objectives:                                                                                                                    |       |       |
| Define the terms related to Environmental Studies                                                                                       |       |       |
| State importance of awareness about environment in general public                                                                       | 01    | 04    |
| Contents:                                                                                                                               | 01    | 04    |
| • Definition, Scope and Importance of the environmental studies                                                                         |       |       |
| Importance of the studies irrespective of course                                                                                        |       |       |
| <ul> <li>Need for creating public awareness about environmental issues</li> </ul>                                                       |       |       |
| <b>Topic 2: Natural Resources and Associated Problems</b>                                                                               |       |       |
| Specific Objectives:                                                                                                                    |       |       |
| Define natural resources and identify problems associated with<br>them                                                                  |       |       |
| Literin                                                                                                                                 |       |       |
| <ul> <li>Identify uses and their overexploitation</li> <li>Identify alternate resources and their importance for environment</li> </ul> |       |       |
| Contents.                                                                                                                               |       |       |
| 2.1 Renewable and Non renewable resources                                                                                               |       |       |
| Definition                                                                                                                              |       |       |
| Associated problems                                                                                                                     |       |       |
| 2.2 Forest Resources                                                                                                                    |       |       |
| General description of forest resources                                                                                                 |       |       |
| Eulerian description of forest resources                                                                                                |       |       |
| <ul> <li>Effects on environment due to deforestation. Timber</li> </ul>                                                                 |       |       |
| extraction. Building of dams, waterways etc.                                                                                            |       |       |
| 2.3 Water Resources                                                                                                                     | 04    | 10    |
| • Hydrosphere: Different sources of water                                                                                               |       |       |
| • Use and overexploitation of surface and ground water                                                                                  |       |       |
| • Effect of floods, draught, dams etc. on water resources and                                                                           |       |       |
| community                                                                                                                               |       |       |
| 2.4 Mineral Resources:                                                                                                                  |       |       |
| Categories of mineral resources                                                                                                         |       |       |
| Basics of mining activities                                                                                                             |       |       |
| • Mine safety                                                                                                                           |       |       |
| • Effect of mining on environment                                                                                                       |       |       |
| 2.5 Food Resources:                                                                                                                     |       |       |
| • Food for all                                                                                                                          |       |       |
| • Effects of modern agriculture                                                                                                         |       |       |
| World food problem                                                                                                                      |       |       |
| Topic 3. Ecosystems                                                                                                                     |       |       |
| Concept of Ecosystem                                                                                                                    |       |       |
| Structure and functions of ecosystem                                                                                                    | 01    | 04    |
| • Energy flow in ecosystem                                                                                                              |       |       |
| Major ecosystems in the world                                                                                                           |       |       |
| Topic 4. Biodiversity and Its Conservation                                                                                              |       |       |
| Definition of Biodiversity                                                                                                              | 02    | 06    |
| • Levels of biodiversity                                                                                                                |       |       |

| Total                                                                                                                                          | 16 | 50 |
|------------------------------------------------------------------------------------------------------------------------------------------------|----|----|
| Human Health and Human Rights                                                                                                                  |    |    |
| environment                                                                                                                                    |    |    |
| Population Growth: Aspects, importance and effect on                                                                                           |    |    |
| Forest Conservation Act                                                                                                                        |    |    |
| Wildlife Protection Act                                                                                                                        | 02 | 00 |
| • Water (Prevention and Control of Pollution) Act                                                                                              | 02 | 08 |
| • Air (Prevention and Control of Pollution) Act                                                                                                |    |    |
| Environmental Protection Act                                                                                                                   |    |    |
| Brief description of the following acts and their provisions:                                                                                  |    |    |
| Topic 7. Environmental Protection                                                                                                              |    |    |
| <ul> <li>Concept of Carbon Credits and its advantages</li> </ul>                                                                               |    |    |
| and their effect on climate                                                                                                                    |    |    |
| Depletion, Nuclear Accidents and Holocaust: Basic concepts                                                                                     |    |    |
| Climate Change Global warming Acid rain Ozone Laver                                                                                            | 03 | 10 |
| • water conservation, watershed management, Kalli water<br>harvesting: Definition Methods and Benefits                                         |    |    |
| Concept of development, sustainable development     Water conservation Watershed management Pain water                                         |    |    |
| Concept of development systemship development                                                                                                  |    |    |
| Noise Pollution: Definition, sources, effects, prevention     Topic 6 Social Issues and Environment                                            |    |    |
| <ul> <li>Son Pollution: Definition, sources, effects, prevention</li> <li>Noise Dellution: Definition, sources, effects, prevention</li> </ul> |    |    |
| Prevention<br>Soil Pollution: Definition, courses, offects, prevention                                                                         |    |    |
| • water Pollution: Definition, Classification, sources, effects,                                                                               |    |    |
| prevention                                                                                                                                     | 03 | 08 |
| • Air pollution: Definition, Classification, sources, effects,                                                                                 |    |    |
| • Definition                                                                                                                                   |    |    |
| Topic 5. Environmental Pollution                                                                                                               |    |    |
| Conservation of biodiversity                                                                                                                   |    |    |
| Threats to biodiversity                                                                                                                        |    |    |
| Value of biodiversity                                                                                                                          |    |    |

#### Practical: Skills to be developed:

#### **Intellectual Skills**:

- 1. Collection of information, data
- 2. Analysis of data
- 3. Report writing

#### Motor Skills:

- 1. Presentation Skills
- 2. Use of multi media

#### List of Projects:

Note: Any one project of the following:

- 1. Visit to a local area to document environmental assets such as river / forest / grassland / hill / mountain
- 2. Visit to a local polluted site: Urban/Rural/Industrial/Agricultural
- 3. Study of common plants, insects, birds

4. Study of simple ecosystems of ponds, river, hill slopes etc

Prepare a project report on the findings of the visit illustrating environment related facts, analysis and conclusion. Also suggest remedies to improve environment.

Learning Resources: Books:

| Sr.<br>No. | Author                                                | Title                                        | Publisher               |  |
|------------|-------------------------------------------------------|----------------------------------------------|-------------------------|--|
| 01         | Anindita Basak                                        | Environmental Studies                        | Pearson Education       |  |
| 02         | R. Rajgopalan                                         | Environmental Studies<br>from Crises to Cure | Oxford University Press |  |
| 03         | Dr. R. J. Ranjit Daniels, Dr.<br>Jagdish Krishnaswamy | Environmental Studies                        | Wiley India             |  |

| Course Name   | : Electronics Engineering Group          |
|---------------|------------------------------------------|
| Course Code   | : ET/EN/EX/EJ/IE/IS/IC/DE/EV/MU/IU/ED/EI |
| Semester      | : Fourth                                 |
| Subject Title | : Industrial Measurements                |
| Subject Code  | : 17434                                  |

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              | Examinati | on Scheme |    |     |       |
|-----------------|----|----|--------------|-----------|-----------|----|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH        | PR        | OR | TW  | TOTAL |
| 03              |    | 02 | 03           | 100       |           |    | 25@ | 125   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

The science of instrumentation system plays vital role in the development of technology. An electronic system has prime importance in the field of instrumentation. Most of the physical parameters can be converted into electrical signal with the use of transducers. The obtained electrical signal can be conditioned, processed, displayed and controlled with the use of advanced control system.

With the background of measuring instruments, this subject deals with measurement of different physical parameters like temperature, pressure etc. covering the entire gamut of industrial measurement. Different types of transducers used for measurement of different physical quantities with their construction, working principle, advantages, and disadvantages are studied through this subject.

#### **General Objectives:**

After studying this subject the students will be able to:

- 1) Understand the nature and working of instrumentation system used in industrial & general applications.
- 2) Classify the physical parameters with their proper units
- 3) Understand the concepts of different types of transducers

#### **Learning Structure:**



#### **Theory Contents:**

| Topic<br>No | Theory                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Hrs. | Marks |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|
|             | <ul> <li>Transducers:</li> <li>Specific Objectives:</li> <li>Draw and describe the block diagram of Instrumentation system.</li> <li>Compare different Transducers</li> <li>Draw and describe different Electronic Transducers.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |       |
| 1           | <ul> <li>Contents <ul> <li>Instrumentation System:<br/>Block diagram of Instrumentation system: Function of each<br/>block, Explanation of basic instrumentation systems</li> <li>Transducer:<br/>Need of Transducer:<br/>Classification of transducers: Active and Passive, Analog and<br/>Digital, Primary and Secondary.</li> <li>Electrical Transducers:<br/>Resistive transducers- Linear &amp; Angular potentiometers<br/>Capacitive transducer<br/>Inductive transducer –LVDT, RVDT (As a displacement<br/>transducer)<br/>Piezoelectric transducer<br/>(Principle of operation and applications of above)</li> <li>Selection criterion of transducers</li> </ul> </li> </ul>                                                                                                                                              | 08   | 16    |
| 2           | <ul> <li>Pressure measurement</li> <li>Draw and describe the non-elastic and elastic pressure transducers.</li> <li>Draw and describe electronic pressure transducers.</li> <li>Write procedure of calibration of elastic pressure gauges using dead weight tester.</li> <li>Contents <ul> <li>Pressure:</li> <li>Definition</li> <li>Types - Absolute, Gauge, Atmospheric, Vacuum( Definition, Units)</li> </ul> </li> <li>Classification of Pressure measuring devices</li> <li>Non elastic pressure transducer:</li> <li>U tube</li> <li>Inclined Tube</li> <li>Well type manometer</li> <li>Elastic pressure transducer:</li> <li>Bourdon Tube</li> <li>Bellows</li> <li>Diaphragm</li> <li>Capsule</li> <li>Electronic pressure transducers:</li> <li>Bourdon tube with LVDT</li> <li>Diaphragm with Strain gauge</li> </ul> | 08   | 20    |

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | ,  |    |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|
|   | • Calibration of pressure gauge using dead weight tester<br><u>Note:</u> Each transducer should be studied on the basis of working                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |    |    |
|   | principle, construction, advantages, disadvantages and applications.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |    |    |
|   | <ul> <li>Flow Measurement</li> <li>List Of different types of flow.</li> <li>List of different types of flow measuring transducers.</li> <li>Draw and describe construction and working of different Flow measuring transducers.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |    |
| 3 | <ul> <li>Contents <ul> <li>Flow:</li> <li>Definition</li> <li>Types of Flow –Laminar, turbulent, Reynolds number</li> </ul> </li> <li>Classification of flow measuring transducers : <ul> <li>Variable head flow meter- Venturimeter, orifice plate meter</li> <li>Variable area flow meter – Rota meter</li> <li>Electromagnetic Flow meter</li> <li>Ultrasonic flow meter- Time difference and Doppler Type</li> </ul> </li> <li>Note: Each transducer should be studied on the basis of working</li> </ul>                                                                                                                                                                                                                                                                              | 06 | 14 |
| 4 | <ul> <li>principle, construction, advantages, disadvantages and applications.</li> <li>Level Measurement         <ul> <li>State the need of level measurement.</li> <li>List of different level measuring methods.</li> <li>Draw the construction and describe working of Level measuring transducers.</li> </ul> </li> <li>Contents         <ul> <li>Level: Definition</li> <li>Need of level measurement methods:</li> <li>Float type – linear &amp; rotary potentiometer (Contact type)</li> <li>Capacitive type (Contact type)</li> <li>Ultrasonic type (Non-contact type)</li> <li>RADAR type (Non-contact type)</li> </ul> </li> <li>Note: Each transducer should be studied on the basis of working principle, construction, advantages, disadvantages and applications.</li> </ul> | 08 | 16 |
| 5 | <ul> <li>Temperature measurement         <ul> <li>List different temperature measuring scales and its conversions.</li> <li>List different temperature measuring transducers.</li> <li>Draw the construction and describe working of different temperature transducers.</li> </ul> </li> <li>Contents         <ul> <li>Temperature :<br/>Definition and units<br/>First law of thermodynamics<br/>Different temperature scales &amp; their conversions</li> <li>Classification of temperature measuring transducers:</li> </ul> </li> </ul>                                                                                                                                                                                                                                                | 10 | 20 |

|   | Total                                                                                                                                          | 48 | 100 |
|---|------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
|   | principle, construction, advantages, disadvantages and applications.                                                                           |    |     |
|   | Note: Each transducer should be studied on the basis of working                                                                                |    |     |
|   | • pH Measurement                                                                                                                               |    |     |
|   | Magnetic pick-up (Non contact type)                                                                                                            |    |     |
|   | Photoelectric pick-up (Non contact type)                                                                                                       |    |     |
|   | Classification of speed measurement methods                                                                                                    |    |     |
|   | Definition                                                                                                                                     |    |     |
|   | • Speed                                                                                                                                        |    |     |
|   | Hygrometer- hair type, capacitive, resistive type                                                                                              |    |     |
|   | Psychrometer - Dry & wet Bulb thermometer type                                                                                                 |    |     |
| 6 | Humidity measurement devices:                                                                                                                  | 08 | 14  |
|   | Types Absolute relative                                                                                                                        |    |     |
|   | Humidity:     Definition                                                                                                                       |    |     |
|   | Contents                                                                                                                                       |    |     |
|   |                                                                                                                                                |    |     |
|   | measuring transducers.                                                                                                                         |    |     |
|   | <ul> <li>Draw the construction and describe working of Speed</li> </ul>                                                                        |    |     |
|   | transducers.                                                                                                                                   |    |     |
|   | <ul> <li>Draw the construction and describe working of Humidity</li> </ul>                                                                     |    |     |
|   | <ul> <li>List different types of humidity and its units.</li> </ul>                                                                            |    |     |
|   | Special Transducers and Measurements                                                                                                           |    |     |
|   | <b><u>INDEE</u></b> Each transducer should be studied on the basis of working principle construction advantages disadvantages and applications |    |     |
|   | Pyrometer - Optical, Radiation                                                                                                                 |    |     |
|   | etc. (Based on material, temperature ranges)                                                                                                   |    |     |
|   | Thermocouple - Seeback & Peltier effect, Types J, K, R, S, T                                                                                   |    |     |
|   | RTD - (PT-100), $2/3/4$ wire systems (circuit diagram only)                                                                                    |    |     |
|   | Thermistors                                                                                                                                    |    |     |
|   | Bimetallic thermometer                                                                                                                         |    |     |
|   | Filled system type thermometer.                                                                                                                |    |     |

#### Practical: Skills to be developed:

#### **Intellectual Skills:**

- Selection of transducer based on application.
- > Interpretation of results.

#### Motor Skills:

- > Connection of different transducers with measuring system.
- > Measurement of various physical parameters using transducers.
- > Observation and plotting the characteristics.

#### List of Practicals:

| Sr. No. | Title of the Experiment                                                     |  |  |
|---------|-----------------------------------------------------------------------------|--|--|
| 1       | Measure displacement using LVDT                                             |  |  |
| 2       | Measure weight using strain gauge pressure transducer with cantilever setup |  |  |
| 3  | Measure pressure using Bourdon tube pressure gauge                           |
|----|------------------------------------------------------------------------------|
| 4  | Calibrate pressure gauge using Dead weight pressure gauge tester             |
| 5  | Determine the rate of flow of liquid in pipe using Rotameter                 |
| 6  | Calculate flow through pipe using orifice meter                              |
| 7  | Measure temperature of liquid using Resistance Temperature Detector (PT 100) |
| 8  | Measure temperature of liquid using thermocouple                             |
| 9  | Observe and interpret humidity of air using wet and dry bulb Hygrometer      |
| 10 | Measure speed of motor using non contact type photo electric tachometer.     |

## **Learning Resources:**

## 1. Books:

| Sr.<br>No. | Author                         | Title                                                         | Publisher                                         |
|------------|--------------------------------|---------------------------------------------------------------|---------------------------------------------------|
| 01         | A.K.Sawhney                    | Electrical and Electronic<br>Measurements and Instrumentation | Dhanpat Rai & Sons.                               |
| 02         | S.K.Singh                      | Industrial Instrumentation & Control                          | Tata McGraw Hill Publishing<br>Co. Ltd; N. Delhi  |
| 03         | D. Patranabis                  | Principles of Industrial Instrumentation                      | Tata McGraw Hill Publishing<br>Co. Ltd; N. Delhi  |
| 04         | Rangan Mani<br>Sharma          | Instrumentation Systems and Devices                           | Tata McGraw Hill Publishing<br>Co. Ltd; N. Delhi  |
| 05         | Bela Liptak<br>Kriszta Venczel | Process Measurement<br>Instrument Engineers Handbook          | Chilton Book Co.                                  |
| 06         | B.C.Nakra<br>K.K.Chaudhry      | Instrumentation Measurement and Analysis                      | Tata McGraw Hill Publishing<br>Co. Ltd; N. Delhi. |

## 2. CD/ PPTs etc.:

- > www.proprofs.com/webschool
- > www.osvn.com

### 3. Websites

- http://en.wikipedia.org/wiki/
- > www.youtube.com/ "here type name of instrument"
- ➤ www.controlnet.com

| Course Name   | : Diploma in Digital Electronics     |
|---------------|--------------------------------------|
| Course Code   | : DE                                 |
| Semester      | : Fourth                             |
| Subject Title | : Principles of Analog Communication |
| Subject Code  | : 17439                              |

### **Teaching and Examination Scheme:**

| Teac | hing Scl | neme |              |     | Examinati | on Scheme |     |       |
|------|----------|------|--------------|-----|-----------|-----------|-----|-------|
| TH   | TU       | PR   | PAPER<br>HRS | TH  | PR        | OR        | TW  | TOTAL |
| 03   |          | 02   | 03           | 100 | 25#       |           | 25@ | 150   |

### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

### **Rationale:**

Electronic Communication plays vital role in day to day activities. Development of communication Technology has increased its application in allied field of electronics including telephony, telegraphy, satellite , Mobile, RADAR, industrial controls, online application like internet banking, ATM machine, Wireless network, optical communication, Mobile communication system.

Analog communication is a foundation for all advanced subjects in communication engineering.

This subject will focus on the operation of analog transmission and reception techniques. This subject also deals with pulse modulation and their different types.

Study of Elements of Electronics, Electronic Devices and Circuits is prerequisite for Analog communication subject.

## **General Objectives:**

The student will able to

- 1. Know different electronic communication systems.
- 2. Understand concept of modulation and demodulation of AM / FM.
- 3. Understand the operation of AM/ FM transmitter and receiver.
- 4. Understand the operation of TV transmission and receptions.

## **Learning Structure:**



## **Theory Contents:**

| Topic<br>No | Theory                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Hrs. | Marks |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|
| 110         | Electronic Communication and Modulation Techniques                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |       |
| 1           | Electronic Communication and Modulation Techniques         Specific Objectives:         > Able to draw block diagram of electronic communication system         > Identify types of electronic communication systems.         > Describe different types of modulation.         Contents:         1.1 Basics of electronic communication         0.1 The importance of electronic communication.         0 Definition: Analog, Digital and Baseband signal         Elements of basic electronic communication system (Draw block diagram and explain each block.)         • Concept of transmission bandwidth.         • Noise and types of noise         1.2 Basics of Modulation         • Types: AM, FM, PM: Definition         1.3 Amplitude Modulation         • Modulation index-definition, its effect on modulated signal         • Mathematical equation of amplitude modulated wave & its meaning, concepts of side band (SSB,DSB), vestigial sideband (VSB)         • Bandwidth requirement         • Representation of AM signal in time & frequency domain         • Power relations in AM wave, simple numerical         • Circuit diagram and working of BJT/FET modulator.         1.4 Frequency modulation       [08]         • Deviation ratio, maximum deviation ratio, mathematical representation of FM signal in time domain & frequency domain         • Doviation ratio, maximum deviation varactor diode modulator, Armstrong method <th>12</th> <th>24</th> | 12   | 24    |
|             | PPM using IC 555.<br>Wave Propagation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |       |
| 2           | <ul> <li>Specific Objectives:</li> <li>Understand theory of electromagnetic radiation.</li> <li>State different types of wave propagation.</li> <li>Define the various atmospheric layers</li> <li>Define the terms maximum usable frequency, critical</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 06   | 10    |

|   | frequency, skip distance & fading.                                                                                          |    |    |
|---|-----------------------------------------------------------------------------------------------------------------------------|----|----|
|   | Eundamental of electromagnetic waves. Transverse                                                                            |    |    |
|   | electromagnetic wave.                                                                                                       |    |    |
|   | • Types of Wave Propagation                                                                                                 |    |    |
|   | • Ground Wave.                                                                                                              |    |    |
|   | • Sky wave, ionosphere & its effect.                                                                                        |    |    |
|   | Space Wave, Duct propagation                                                                                                |    |    |
|   | Troposphere scatter propagation                                                                                             |    |    |
|   | <ul> <li>Concept of actual height &amp; virtual weight</li> </ul>                                                           |    |    |
|   | • Critical frequency, skip distance & fading, maximum usable                                                                |    |    |
|   | frequency.                                                                                                                  |    |    |
|   | Antennae                                                                                                                    |    |    |
|   | Specific Objectives:                                                                                                        |    |    |
|   | <ul> <li>Define antenna.</li> <li>Understand the term related with the antenna.</li> </ul>                                  |    |    |
|   | <ul> <li>Understand the structure radiation pattern &amp; application of</li> </ul>                                         |    |    |
|   | different antennae                                                                                                          |    |    |
|   | Contents:                                                                                                                   |    |    |
|   | 3.1 Antenna fundamentals : [04]                                                                                             |    |    |
|   | Resonant antenna and Non-resonant antennas                                                                                  |    |    |
| 3 | • Definition : Radiation pattern ,polarization, bandwidth, beam                                                             |    |    |
|   | width, antenna resistance, directivity & power gain, antenna gain                                                           | 06 | 12 |
|   | 3.2 Dipole antenna [04]                                                                                                     |    |    |
|   | • Half wave dipole antenna (Resonant Antenna) & its Radiation                                                               |    |    |
|   | pattern.                                                                                                                    |    |    |
|   | • Folded dipole antenna & its radiation pattern.                                                                            |    |    |
|   | • Radiation pattern for Dipole Antenna of different length.                                                                 |    |    |
|   | 3.3 Structure, radiation pattern & application of antennas. [04]                                                            |    |    |
|   | • Loop antenna.                                                                                                             |    |    |
|   | <ul> <li>I agi-Uda antenna</li> <li>Miara waya antanna</li> <li>Dich antanna &amp; Horn antanna</li> </ul>                  |    |    |
|   | <ul> <li>Microstrip antennas, Bectangular, circular and square</li> </ul>                                                   |    |    |
|   | Radio Receiver                                                                                                              |    |    |
|   | Specific Objectives:                                                                                                        |    |    |
|   | 1 5                                                                                                                         |    |    |
|   | State super heterodyne principle                                                                                            |    |    |
|   | Compare TRF & super heterodyne receivers.                                                                                   |    |    |
|   | Contents:                                                                                                                   |    |    |
|   | 4.1. AM Receiver : [12]                                                                                                     |    |    |
|   | • Block diagram of luned Radio Frequency receiver and its                                                                   | 00 | •  |
| 4 | Block diagram of super beterodyna receiver                                                                                  | 08 | 20 |
|   | <ul> <li>Block diagram of super neterodyne receiver</li> <li>RE Section and Characteristics of AM radio receiver</li> </ul> |    |    |
|   | sensitivity selectivity fidelity                                                                                            |    |    |
|   | • Image frequency and its rejection                                                                                         |    |    |
|   | • Frequency changing and tracking.                                                                                          |    |    |
|   | • Demodulation of AM signal.                                                                                                |    |    |
|   | • Diode detector, practical diode detector.                                                                                 |    |    |
|   | • Need of AGC & its types – simple, delayed.                                                                                |    |    |

|   |        | Total                                                                                                                                                     | 48 | 100 |
|---|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
|   | •      | Block Diagram and operation of color TV receiver (PAL D,<br>NTSC, and SECAM type)<br>Block diagram of MATV, CATV, HDTV and CCTV and their<br>applications |    |     |
|   | •      | Block diagram of Colour TV transmitter.                                                                                                                   |    |     |
|   | 6.2    | PIL [08]                                                                                                                                                  |    |     |
|   | •      | Color Picture tube, principle and working of                                                                                                              |    |     |
| 6 |        | Vidicon<br>Plumbicon<br>Solid State comercinesed on CCD                                                                                                   |    |     |
|   | •      | Introduction to TV camera tube, principle and working of                                                                                                  | 08 | 16  |
|   | Conte  | ents:<br>[08]                                                                                                                                             |    |     |
|   | >      | Explain the function of Color TV transmitter and receiver.                                                                                                |    |     |
|   | Specif | Describe TV camera tube and colour picture tube                                                                                                           |    |     |
|   |        | ransmitter and Receiver                                                                                                                                   |    |     |
|   |        | details, Equalizing pulses, CCIR B standards for Colour signal transmission & reception.                                                                  |    |     |
|   | •      | Composite Video Signal - Pedestal height, Blanking pulse,<br>Colour burst, Horizontal sync pulse details, Vertical sync pulse                             |    |     |
|   | 5.2    | [08]                                                                                                                                                      |    |     |
|   |        | secondary colours Grassman's law, additive Colour mixing subtractive Colour mixing.                                                                       |    |     |
|   |        | brightness, contrast, viewing distance, luminance, Hue, saturation, compatibility. Colour theory, primary colours and                                     |    |     |
| 5 | •      | horizontal resolution.                                                                                                                                    | 08 | 18  |
|   | •      | Concept: Aspect ratio, image continuity, interlace scanning, scanning periods – horizontal and vertical vertical resolution                               |    |     |
|   | 5.1    | State CCIK-B standards for 1 v system [10]                                                                                                                |    |     |
|   | ۲<br>۲ | Draw and understand composite video signal wave-forms                                                                                                     |    |     |
|   | >      | Explain Tri-colour theory and Grassman's Law                                                                                                              |    |     |
|   |        | <b>Te Objectives:</b> Define various terms used in TV system                                                                                              |    |     |
|   | TV Fu  | undamentals                                                                                                                                               |    |     |
|   | •      | PLL as FM demodulator.                                                                                                                                    |    |     |
|   | •      | Circuit diagram and working of slop detector and Balanced slop detector                                                                                   |    |     |
|   |        | receiver                                                                                                                                                  |    |     |
|   | 4.2 F  | Block diagram and explanation of FM Super heterodyne radio                                                                                                |    |     |
|   | 40 E   | [00]                                                                                                                                                      |    |     |

## Practical: Intellectual Skills:

1. Interpret the results of output waveforms

### Motor Skills:

- 1. Testing and observing the waveforms at various stages
- 2. Fault finding

### List of Practical's

- 1. Observe and draw the waveform of AM & calculate modulation index of AM
- 2. Observe and draw the waveform of FM & calculate modulation index of FM
- 3. Observe and draw the waveforms of FM modulator using IC 566.
- 4. Observe the wave forms at various points in AM receiver. Trouble shooting and fault finding in AM receiver.
- 5. Observe & Plot the graph of RF Characteristics of Radio Receiver: Selectivity, Sensitivity, Fidelity.
- 6. Generate PAM and observe the waveforms of PAM
- 7. Generate PWM, PPM and observe the waveforms of PWM, PPM using IC's.
- 8. Plot the radiation pattern of Dipole & Yagi-Uda antenna.
- 9. Plot the radiation pattern of basic microstrip patch antenna.
- 10. Trace: a) chroma section, b) picture tube, c) video amplifier of TV receiver
- 11. Voltage analysis of: a) chroma section, b) picture tube c) Video amplifier,
- 12. Voltage analysis of:
  - a) Vertical Section b) Horizontal Section c) Power supply of TV receiver.

#### Learning Resources: Books:

| Sr.<br>No. | Author                                            | Title                               | Publisher                                    |
|------------|---------------------------------------------------|-------------------------------------|----------------------------------------------|
| 01         | George Kennedy,<br>Bernard Davis,<br>SRM Prasanna | Electronic Communication<br>Systems | TATA Mc-Graw Hill 5 <sup>th</sup><br>Edition |
| 02         | Louis E Frenzel                                   | Communication Electronics           | TATA Mc-Graw Hill 5 <sup>th</sup><br>Edition |
| 03         | V Chandra Sekar                                   | Analog Communication                | Oxford University Press                      |
| 04         | Television & Radio<br>Engineering                 | A.M Dhake                           | Tata McGraw-Hill                             |
| 05         | Modern TV Practice<br>(4 <sup>th</sup> edition )  | R.R Gulati                          | New Age International                        |

### Web Sites:

- 1. en.wikipedia.org
- 2. www.masd .k12.pa.us ( Electromagnetic Spectrum)

- 3. www.staff.ncl.ac.uk (modulation & demodulation)
- 4. circuitdiagram.net/am-radio-receiver.html (AM radio receiver circuit diagram)
- 5. http://www.circuitdiagram.org/am-radio-receiver-with-mk484.html
- 6. www.circuitstoday.com/single-chip-fm-radio-circuit

### List of equipments

- 1. CRO, Function generator, spectrum analyzer, DMM
- 2. AM,FM,PAM,PWM,PPM Modulation/ Demodulation trainer kits
- 3. Transmission line trainer kit/ Coaxial cable e.g. (RG174)—100mtrs.
- 4. Antenna demonstration kit/ Antenna for measuring its parameters
- 5. Radio and Television receiver trainer kits

Course Name: Diploma in Digital ElectronicsCourse Code: DESemester: FourthSubject Title: MicroprocessorSubject Code: 17443

### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |     |     | Examination | on Scheme |       |
|-----------------|----|----|--------------|-----|-----|-------------|-----------|-------|
| TH              | TU | PR | PAPER<br>HRS | TH  | PR  | OR          | TW        | TOTAL |
| 03              |    | 02 | 03           | 100 | 25# |             | 25@       | 150   |

### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

### **Rationale:**

Microprocessor plays important role in computer based application and is heart of the system. The Microprocessors along with memory and I/O's constitute a complete system for industrial application. Since most of the peripherals are 8 bit in nature and hence the 8 bit processor 8085 is introduced in microprocessor curriculum. It covers comprehensive study of architecture, programming and interfacing.

Microprocessor and its programming require the background information of principles of digital electronics. By completing this module student can write high level language program for peripheral controlling mechanism in embedded system.

### **General Objectives:**

### The student will be able to

- > Understand the architecture of 8-bit microprocessor.
- Learn instruction set and programming.
- ➤ Learn to interpret peripherals and its interfacing.
- Implement minimum system design.

### **Learning Structure:**



### **Theory:**

| Topic<br>No | Contents                                                                                                                                                                                                                                                                                                                                                                                                                       | Hours | Marks |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
| 110         | 8 Bit Microprocessor - 8085                                                                                                                                                                                                                                                                                                                                                                                                    |       |       |
|             | <ul> <li>Specific Objectives:</li> <li>Comprehend Components and terminology of computer system and microprocessor based system</li> <li>Describe Architecture of 8 bit processor</li> <li>Contents:</li> </ul>                                                                                                                                                                                                                |       |       |
| 1           | <ul> <li>Introduction to 8 bit microprocessor and Microcomputer, system buses</li> <li>Salient features of 8085</li> <li>8085 microprocessor architecture-Register section, ALU, Interrupt control, Serial I/O control, Timing and control and pin description</li> <li>De-multiplexing of low order Address/Data bus, and generation of control signals</li> </ul>                                                            | 08    | 16    |
| 2           | <ul> <li>8085 Instructions and Programming <ul> <li>Develop assembly language program.</li> </ul> </li> <li>Contents: <ul> <li>Instruction format, Addressing modes, 8085 Instruction Set</li> <li>Machine Cycle and Timing diagram</li> <li>Assembly language programming</li> </ul> </li> </ul>                                                                                                                              | 12    | 24    |
| 3           | <ul> <li>Subroutine and Interrupts</li> <li>Comprehend stack, subroutine and interrupts</li> <li>Contents : <ul> <li>Stack and subroutine, time delay subroutine</li> <li>Interrupts- Necessity of interrupts, interrupt handling, Types of interrupts, Vector Interrupt locations, Interrupt control instructions (EI,DI RIM and SIM), Priority of interrupts, Polling of interrupts, Pending interrupts</li> </ul></li></ul> | 08    | 12    |
| 4           | <ul> <li>Memory and I/O Interfacing</li> <li>➢ Interface various memory chips with 8085</li> <li>Contents:         <ul> <li>Memory interfacing: RAM/ ROM Memory map.</li> <li>I/O Interfacing Techniques- I/O mapped I/O, memory mapped I/O</li> <li>Serial I/O lines – SOD and SID</li> <li>Comparison of I/O mapped I/O and memory mapped I/O.</li> </ul> </li> </ul>                                                        | 08    | 16    |
| 5           | <ul> <li>Programmable Peripheral Devices</li> <li>Draw and describe peripheral programmable devices and interfaces</li> <li>Contents:         <ul> <li>Programmable Peripheral Interface IC 8255-Block diagram, Pin Description, operating modes, simple I/O programs</li> </ul> </li> </ul>                                                                                                                                   | 08    | 20    |

|   | <ul> <li>Programmable I/O ports and Timer IC 8155-Block diagram,<br/>Pin Description, operating modes of timer and I/O ports,<br/>simple programs on timer operations only</li> <li>Features of 8355, Block Diagram and Pin Description</li> <li>Comparison of features of 8155 and 8255 and 8355 ICs</li> </ul> |    |     |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
|   | Data transfer Techniques and Interfacing the Peripherals                                                                                                                                                                                                                                                         |    |     |
|   | <ul> <li>Classify data transfer techniques.</li> <li>Implement minimum system</li> </ul>                                                                                                                                                                                                                         |    |     |
|   | Contents:                                                                                                                                                                                                                                                                                                        |    |     |
| 6 | • Types of data transfer techniques                                                                                                                                                                                                                                                                              | 04 | 12  |
|   | • DMA controlled data transfer.                                                                                                                                                                                                                                                                                  |    |     |
|   | • Interfacing of Peripherals 8255, 8155, 8355                                                                                                                                                                                                                                                                    |    |     |
|   | <ul> <li>Interring of LED, Seven Segment Display, DIP Switches,</li> </ul>                                                                                                                                                                                                                                       |    |     |
|   | ADC, DAC, Stepper Motor using PPI.                                                                                                                                                                                                                                                                               |    |     |
|   | • Minimum system based on 8085, 8155, and 8355                                                                                                                                                                                                                                                                   |    |     |
|   | Total                                                                                                                                                                                                                                                                                                            | 48 | 100 |

## **Practical:**

## **Intellectual Skills**:

- Select peripheral and interface to provide the solution for minimum system.
- Develop algorithm, flowchart, Assembly language program and execution

## Motor Skills:

- Load and execute the program in user memory of microprocessor kit.
- Observe the result in specific memory locationand registers.
- Develop logic for practical applications of microprocessor.

## **List of Practicals:**

- 1) Assembly language programs for addition and subtraction of 8 bit /16 bit numbers.
- 2) Assembly language program for block transfer.
- 3) Assembly language program to multiply two 8 bit numbers using add and shift techniques.
- 4) Find one's and two's compliment of a given number and exchange the lower and upper nibble of a byte.
- 5) Sort odd and even bytes from given 10 bytes and Find Largest and smallest numbers from given block.
- 6) Arrange given block in Ascending and descending order
- 7) Assembly language program to transmit / receive 8 bit serial data using SID and SID lines.
- 8) Interface simple switches and LEDs using 8255 and develop water level controller using 8085.
- 9) Generation of square wave using 8155 timer
- 10) Assembly language program to interface ADC/DAC with 8085.

### Learning Resources:

## 1. Books:

| Sr.<br>No. | Author            | Title                                                                     | Publisher               |
|------------|-------------------|---------------------------------------------------------------------------|-------------------------|
| 1          | Ramesh S. Gaonkar | Microprocessor Architecture,<br>Programming and Applications with<br>8085 | Penram International    |
| 2          | B.Ram             | Fundamentals of Microprocessors and Microcomputers                        | Danpat Rai publications |
| 3          | Aditya P. Mathur  | Introduction to Microprocessor                                            | Tata Mcgraw Hill        |
| 4          | Shridhar Ghosh    | 0000 to 8085                                                              |                         |

## 2. CDs, PPTs etc:

http://www.slideshare.net/saumitra5552001/8085-paper-presentation-presentation http://yesnarayanan.blogspot.com/2008/07/8085-ppt.html http://yesnarayanan.blogspot.com/2008/12/8085-microprocessor-tutorials.html http://www.authorstream.com/Presentation/vishesh\_0802-236980-8085-entertainment-pptpowerpoint/

## 3. Websites:

- 1) www.8085 projects.info
- 2) www.topsite.com/best/8085
- 3) www.enow.com

| Course Name   | : Electronics Engineering Group          |
|---------------|------------------------------------------|
| Course Code   | : ET/EN/EX/EJ/IE/IS/IC/DE/EV/MU/IU/ED/EI |
| Semester      | : Fourth                                 |
| Subject Title | : Linear Integrated Circuits             |
| Subject Code  | : 17445                                  |

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |     | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|-----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH  | PR        | OR        | TW  | TOTAL |
| 04              |    | 02 | 03           | 100 | 50#       |           | 25@ | 175   |

### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Modern age technology has developed on high density and high speed electronics circuits. Integrated circuits are basis of these high density circuits enabled to reduce size, weight and cost of equipments. They have intrinsic features such as low power consumption, low noise and ease of design.

Today the growth of any industry depends upon electronics to great extent. Contents of this subject are the basic building blocks of different analog circuits.

Basic operating and designing principle of such a large collection of circuits establishes a foundation for understanding new development in the electronics field, instrumentation and power control. This subject acquaints student with general analog principles and design methodologies using integrated circuit for system design.

Prerequisites various devices and circuits studied in elements of electronics and electronic devices and circuits. Prospects- LSI, MSI, VLSI.

### **General Objectives:**

Students will be able to:

- Understand working principle of Op-Amp and IC555
- Develop electronics circuits using timer IC555 and Op-Amp

• Analyze the response of frequency selective circuits such as PLL with respect to the incoming signal.

## **Learning Structure:**

## **Application:**



## **Contents: Theory**

| Topic | Content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Hours | Marks |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
|       | <b>Operational Amplifier (Op-Amp):</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |       |
|       | Specific Objectives :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |       |
|       | Draw labeled block diagram of Op-Amp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |
|       | Specify and define Different parameters of Op-Amp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |       |
|       | Interpret ideal transfer characteristics of Op-Amp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |       |
|       | Contents:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |       |
|       | • Importance of Op-Amp:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |       |
|       | Block diagram of Op-Amp and function of each block with the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |       |
|       | circuit such as balanced, Unbalanced, differential amplifiers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |       |
|       | with simple current source, level shifter and complementary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |       |
| 1     | push-pull amplifier. Equivalent Circuit, Circuit Symbols And                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 12    | 10    |
|       | Terminals. Op-Amp IC-741 pin diagram and function.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |       |
|       | • Parameters of Op-Amp:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |       |
|       | Input offset voltage, Input offset current, Input bias current,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |       |
|       | differential input resistance, Input capacitance, Input voltage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |       |
|       | range, offset voltage adjustment range, Common Mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |       |
|       | Rejection Ratio (CMRR), Supply Voltage Rejection Ratio                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |       |
|       | (SVRR), large signal voltage gain and transfer characteristics,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |       |
|       | supply voltages, supply current, output voltage swing, output                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |       |
|       | resistance, slew rate, gain bandwidth product, output short                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |       |
|       | circuit current.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |       |
|       | <b>Op-Amp Configuration:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |       |
|       | Specific Objectives: Students will be able to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |       |
|       | Differentiate open and close loop configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |       |
|       | Identify inverting and non-inverting configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |       |
|       | Construct integrator and differentiator.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |       |
|       | <b>1</b> One of the state of the sta |       |       |
|       | 2.1 Open loop and closed loop configuration of Op-Amp, [08]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |       |
|       | Open loop configuration Investing Non investing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |       |
|       | Clean loop configuration – Inverting, Non-Inverting                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |       |
| 2     | differential emplifier unity gain emplifier (voltage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 12    | 10    |
| 2     | follower) inverter(sign changer)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 12    | 10    |
|       | Tonower), inverter(sign changer)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |       |
|       | <b>2.2</b> Inverting and non-inverting configuration of [10]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |       |
|       | Adders (summing amplifier scaling Amplifier averaging                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |       |
|       | amplifier) Subtractor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |       |
|       | Basic Integrator                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |       |
|       | Basic Differentiator                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |
|       | Basic concept of frequency compensation of On-Amp and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |       |
|       | Offset nulling                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       |       |
|       | Numerical based on designing of above circuit.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       |       |
|       | Applications of Op-Amp:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |       |
|       | Specific Objectives:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |
|       | <ul> <li>Compute component values for instrumentation amplifier.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |       |
| 3     | Explain IC LM-324                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 12    | 22    |
|       | Explain different applications of Op-Amp.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |       |
|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |       |
|       | <b>3.1</b> Need for signal conditioning and signal processing. [08]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |       |

|   | Circuit diagram, operation, derivation of output voltage<br>Equation. advantages and applications of Instrumentation<br>amplifier.<br>Pin diagram pin functions and specifications of IC LM 324<br>Voltage to current converter (with floating load, with grounded<br>load) Current to voltage converter.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |    |    |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|
|   | <b>3.2</b> Sample and hold circuit. [16]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |    |    |
|   | <ul> <li>Logarithmic and antilogarithmic amplifiers (using Diodes)</li> <li>Analog divider and analog multiplier</li> <li>Comparator: Circuit diagrams and operation of</li> <li>Zero crossing detector,</li> <li>Schmitt trigger,</li> <li>Window detector,</li> <li>Phase detector,</li> <li>Active peak detector,</li> <li>Peak to peak detector</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |    |    |
| 4 | <ul> <li>Filters:</li> <li>Specific Objectives:</li> <li>Distinguish the types of filter</li> <li>Explain active and passive filter</li> <li>Explain different parameters of filter.</li> <li>Contents: <ul> <li>Introduction to filters ,Classification of filters,</li> <li>Concept of passive and active filters</li> <li>Merits and demerits of active filters over passive filters</li> <li>Ideal and actual characteristics, terms: - cut off frequency, Pass band, Stop band, center frequency, roll off rate, BW, Q-factor, first order and second order Butterworth filters, order of filter, Low pass filter, high pass filter, band pass filter ( wide band pass , narrow band pass filter) Band reject filter(wide band reject, narrow band reject filter), all pass filter. Numerical based on design of different filters.</li> </ul> </li> </ul> | 10 | 16 |
| 5 | <ul> <li>Timers</li> <li>Specific Objectives:</li> <li>Draw block diagram of IC 555</li> <li>Understand industrial applications of IC 555,565</li> <li>5.1 Introduction to timer IC 555 [10]</li> <li>Block diagram of IC 555 and its pin diagram and function of each pin.</li> <li>Concepts of different timer circuits used in industries: water level controller, Touch plate switch, frequency divider.</li> <li>Numericals based on timers.</li> <li>5.2 Phase Lock Loop</li> <li>Principle of operation, block diagram of PLL. [08]</li> <li>Applications of PLL as multiplier, FM demodulator.</li> <li>Pin diagram and pin functions of IC 565(PLL)</li> </ul>                                                                                                                                                                                         | 10 | 18 |

|   | Oscillators:                                                                                                                                        |    |     |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
|   | Specific Objectives:                                                                                                                                |    |     |
|   | Explain concept of oscillators                                                                                                                      |    |     |
|   | Explain different types of oscillators                                                                                                              |    |     |
|   | Develop multivibrators and oscillators for given values.                                                                                            |    |     |
| 6 | Contents:                                                                                                                                           | 00 | 16  |
| 0 | Concept of oscillators,                                                                                                                             | 08 | 10  |
|   | • Types of oscillators: Phase shift oscillators, Wien bridge oscillators using IC-741                                                               |    |     |
|   | • Types of Multivibrators: Monostable, Astable, Bistable using IC-555 and IC-741. Schmitt trigger, voltage controlled oscillator (VCO) using IC 555 |    |     |
|   | Total                                                                                                                                               | 64 | 100 |

## Practical:

## **Intellectual Skills:**

- 1. Interpret the waveforms.
- 2. Find faults in circuits.

### Motor Skill:

1. Testing and Measurement.

## **List of Practicals:**

| Sr. No. | Title of the Experiment                                                                 |
|---------|-----------------------------------------------------------------------------------------|
|         | Determine the op-amp parameters:                                                        |
| 01      | • Input Offset Voltage (V <sub>io</sub> )                                               |
| 01      | • Output Offset Voltage (V <sub>00</sub> )                                              |
|         | Common mode rejection ratio (CMRR)                                                      |
| 02      | Determine the gain of Inverting and Non-inverting amplifier using op-amp and            |
| 02      | compare it with theoretical gain.                                                       |
| 03      | Verify the operation of Adder and Subtractor circuit using op-amp IC 741.               |
|         | Verify the working of active integrator and differentiator circuits using op-amp IC 741 |
|         | for following inputs:                                                                   |
| 04      | • Sine waveform                                                                         |
|         | • Square waveform                                                                       |
|         | Rectangular waveform                                                                    |
| 05      | Assemble V to I converter and I to V converter using IC 741 and measure the             |
| 03      | respective output.                                                                      |
|         | Verify the working of following comparator circuits using op-amp IC 741 and draw the    |
| 06      | input-output waveforms                                                                  |
| 00      | • Zero crossing detector                                                                |
|         | Active peak detector                                                                    |
| 07      | Assemble first order low pass Butterworth filter using op-amp and plot the frequency    |
| 07      | response and determine its cutoff frequency.                                            |
| 08      | Assemble Astable multivibrator circuit using IC 741. Plot the output waveform and       |
| 00      | determine the frequency of oscillations and duty cycle.                                 |
| 09      | Assemble Monostable multivibrator circuit using IC 555. Plot the output waveform        |
| 07      | and determine the on-time.                                                              |
| 10      | Assemble Schmitt trigger circuit using IC 555. Plot the output waveform and             |

|    | determine UTP and LTP                                                                             |
|----|---------------------------------------------------------------------------------------------------|
| 11 | Assemble Instrumentation amplifier circuit using IC 324 and determine the overall gain.           |
| 12 | Verify the operation of frequency Multiplier using PLL IC 565 and determine the output frequency. |

# Learning Resources:

# Books:

| Sr.<br>No. | Author            | Title                                                              | Publisher        |
|------------|-------------------|--------------------------------------------------------------------|------------------|
| 01         | K.R. Botkar       | Integrated Circuit                                                 | Khanna           |
| 02         | Ramakant Gayakwad | Op-Amps and Linear Integrated Circuit                              | PHI              |
| 03         | Serigo Franco     | Design with Operational Amplifier and<br>Analog Integrated Circuit | Tata-McGraw Hill |
| 04         | Willam D. Stanley | Operation Amplifier with Linear<br>Integrated Circuit              | Person           |

**Course Name : Electronics Engineering and Video Engineering Group** 

Course Code : ET/EJ/IE/IS/EN/EX/IC/MU/EV/DE/IU/ED/EI

Semester : Fourth

Subject Title : Visual Basic

Subject Code : 17043

#### **Teaching and Examination Scheme:**

| Teac | ching Scl | heme |              |    | Examinati | on Scheme |     |       |
|------|-----------|------|--------------|----|-----------|-----------|-----|-------|
| TH   | TU        | PR   | PAPER<br>HRS | TH | PR        | OR        | TW  | TOTAL |
| 01   |           | 02   |              |    |           |           | 25@ | 25    |

#### **Rationale:**

Today's most of the electronically operated devices, integrated circuits, controllers, equipments, gadgets are run by specific drivers/software. To understand design, develop and write drivers programming knowledge is required. To run the devices software has to be user friendly. New approach is to use graphical user interface. Graphical user interface can be implemented using visual software's.

Traditionally visual basic is the most popular, versatile, suitable, simple and commonly used visual programming language to write efficient, compact and portable interfaces, drivers/ software's.

The subject will enable the students to inculcate visual programming concepts and methodology used to write, debug, compile and execute simple visual basic programs using different powerful data types, built in visual controls and integrated visual basic environment (IDE) provided by Microsoft visual studio. Students will be exposed to event driven programming and bottom up approached used in objects oriented programming.

Students will understand how a complex interface can be easily implemented in visual basic with almost no programming expertise.

This course will lay the basic foundation of visual programming which will enable students to develop simple to complex programmable systems interfaces in the real world of work

## **General Objectives**

Students will able to.

- 1. Learn visual programming development environment, concepts and methodology.
- 2. Use essential components (visual tools ) of Visual software's
- 3. Develop the skill of visual basic programming to build custom standalone applications
- 4. Develop applications with Multiple documents interface (MDI) using common dialog, menus and graphics
- 5. Use ADO for database connectivity with different databases.
- 6. Create simple reports using data report, Seagate crystal reports and integrating it with visual basic
- 7. Develop applications using class modules

MSBTE - Final Copy Dt. 30/08/2013



## Theory

| Name of Topics                                                                        | Hours |
|---------------------------------------------------------------------------------------|-------|
| Topic 1] Introduction to Visual Environment                                           |       |
| Specific Objectives:                                                                  |       |
| Familiar with IDE of Visual basic                                                     |       |
| Use concepts of object based language                                                 |       |
| Use basic elements of visual interface                                                |       |
| Use properties, events and methods at design time and runtime                         |       |
| <ul> <li>Create objects, place them on forms</li> </ul>                               | 02    |
| Contents:                                                                             |       |
| 1.1 Concepts of visual programming object features properties methods events          |       |
| 1.7 Environment of VB – Menu har toolbar project explorer toolbox properties          |       |
| window form designer form layout immediate window                                     |       |
| 1.3 Concept of project elements of projects form their properties methods and events  |       |
| Topic 21 Introduction to Visual Pasia                                                 |       |
| Specific Objectives:                                                                  |       |
| Specific Objectives.                                                                  |       |
| Use uniferent data types Use neworful factures of arrays and collections              |       |
| Use powerful features of arrays and conections                                        |       |
| > write procedures and functions                                                      |       |
| > Call procedures and functions                                                       |       |
| > Differentiate between procedure and functions                                       | 0.2   |
| Use library functions for math and string operations                                  | 02    |
| > Use Inputbox and Msgbox functions                                                   |       |
| Contents:                                                                             |       |
| 2.1 Data types, variables, constants, arrays, collections                             |       |
| 2.2 procedures, Arguments, function, return values, control flow statements, loop     |       |
| statements, Nested control structures, exit statement                                 |       |
| 2.3 Math operators & formulas, logical operators, string functions, special functions |       |
| available in VB like Input Box (), Message Box (), Format ().                         |       |
| Topic 3] Controls and Events                                                          |       |
| Specific Objectives:                                                                  |       |
| Use basic controls                                                                    |       |
| Select appropriate controls for given data                                            |       |
| Set properties of different basic controls                                            |       |
| Call methods and events of basic controls                                             |       |
| Demonstrate the use of each control with simple examples                              | 02    |
| Contents:                                                                             | 02    |
| 3.1 Basic controls: Text box, list Box, Combo Box, Scroll Bar, frame, Option button,  |       |
| checkbox, command button, OLE controls                                                |       |
| 3.2 File, Drive, directory, Picture box, Image and timer controls .Designing a form   |       |
| using controls, concepts of event & properties, changing properties (runtime &        |       |
| design time) Important events of each control & creating applications using           |       |
| controls.                                                                             |       |
| Topic 4] Advance Controls & Events                                                    |       |
| Specific Objectives:                                                                  |       |
| Add extrinsic controls in an application                                              |       |
| Use common dialog box control and its properties such open, save as, font,            | 02    |
| color, print and help                                                                 | 03    |
| Use rich text box to design simple ms-word like application                           |       |
| Use and create explorer like utilities using tree view and list controls              |       |
| Familiar with windows common controls                                                 |       |

| Contents:                                                                               |    |
|-----------------------------------------------------------------------------------------|----|
| 4.1 Common Dialog Box controls, The Tree view and List, View controls, the rich         |    |
| textbox controls                                                                        |    |
| 4.2 Windows common controls – status Bar, Tab control, image list control, Important    |    |
| properties, changing properties at design or run time, event handling.                  |    |
| Topic 5] Module, Class Module, Mdi, Menu Graphics                                       |    |
| Specific Objectives:                                                                    |    |
| Write class modules                                                                     |    |
| Define functions and procedures in class module                                         |    |
| Access functions and procedures from class module                                       |    |
| Use multiple document interface                                                         |    |
| Design menu based applications such as notepad editor                                   |    |
| Work with graphic functions and methods                                                 | 03 |
| Contents:                                                                               |    |
| 5.1 Concept of module, class module, using class module to define functions,            |    |
| procedures, variables and accessing them using objects                                  |    |
| 5.2 MDI- MDI form and child form, Creation and use in                                   |    |
| 5.3 Menu: Creating own menu using menu editor, popup menu.                              |    |
| 5.3 Graphics: Basic controls – Line & shape control, line method, circle method, Pset   |    |
| method, RGB () Functions, Paint picture () method, Load picture () function.            |    |
| Topic 6] Database and Report                                                            |    |
| Specific Objectives:                                                                    |    |
| Create database                                                                         |    |
| Use ADO and its properties, methods and events                                          |    |
| Select appropriate concepts such as back-end and front-end                              |    |
| Make database connectivity with different databases                                     |    |
| Generate report using Data Report and Crystal Report                                    |    |
| Contents:                                                                               | 04 |
| 6.1 Concept of database, Record, Record set, Data control & its important properties    | 0. |
| 6.2 validating data, entering data, visual data manager.                                |    |
| 6.3 Programming with ADO (Active data objects), using ADO Objects at design time-       |    |
| connection, command, record set, parameter, Creating & closing a connection;            |    |
| executing a command,                                                                    |    |
| 6.4 Using ADO Objects at run time, attaching visual controls to record set at run time, |    |
| Using delete, save, search, update exit, new, add, methods.                             |    |
| 6.5 Report generation using data report and crystal report                              |    |
| Total                                                                                   | 16 |

## **TERM WORK:-**

| Sr<br>No. | Name of the Experiments                                                                    |
|-----------|--------------------------------------------------------------------------------------------|
|           | a) Study and Understand Visual                                                             |
|           | Basic Environment                                                                          |
| 1         | b) Develop VB Project which                                                                |
| 1         | accepts User Name & Password                                                               |
|           | using three forms Login Form1                                                              |
|           | and Form2 to accept data, and                                                              |
|           | Form3 to display data.                                                                     |
| 2         | Design simple calculator to perform mathematical function using Control array like Windows |
| 2         | Calculator.                                                                                |
| 3         | Design GUI to Find Resistor Value from it's color code.                                    |
| 4         | Display student data using structure in loop. Implement it using Class module & Procedures |
| ) (CD)    |                                                                                            |

| 5  | Demonstrate list boxes features with sorted list and selected item transfer facility.                                                                                                                                                                          |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6  | <ul><li>a) Design Color box using RGB function to observe color change using H- scroll bar.</li><li>b) Design project to demonstrate file, folder &amp; drive controls to explore drive &amp; folders.</li></ul>                                               |
| 7  | Design GUI for Testing AC series Circuit                                                                                                                                                                                                                       |
|    | Practice Experiment / Exercise                                                                                                                                                                                                                                 |
| 8  | <ul><li>a) Design project to implement Common Dialog box controls such as open, save, Color, Font,<br/>Printer &amp; Help</li><li>b) Design a menu structure like notepad using menu editor</li></ul>                                                          |
| 9  | Design MDI application with 4 child forms & arrange forms with cascade, Tile Horizontal,<br>Tile Vertical arrangements                                                                                                                                         |
| 10 | Design student database project using ADO connectivity in design time and runtime and MS access as backend database engine, with basic features such as add, edit, update, save, cancel, delete feature and generate Report using Data Report / Crystal Report |
| 11 | Develop mini VB Project                                                                                                                                                                                                                                        |

## **Reference Books**:

| Sr.<br>No. | Author                            | Author Title                      |                             |
|------------|-----------------------------------|-----------------------------------|-----------------------------|
| 01         | MSDN library on Line<br>Reference |                                   | From Microsoft MSDN Library |
| 02         | Evangelos Petroustus              | Mastering VB6                     | WILEY India                 |
| 03         | Steven Holzner                    | Visual basic 6                    | Dream Tech. Press           |
| 04         | Content Development<br>Group      | Visual Basic 6.0<br>Programming   | Tata McGraw Hill            |
| 05         | Mohammed Azam                     | Programming with visual basic 6.0 | Vikas Publishers            |
| 06         | Nel Jerka                         | The complete referenceVB6         | Tata McGraw Hill Publishing |

Course Name : Electronics Engineering Group Course Code : ET/EJ/EN/EX/IE/IS/IC/DE/EV/MU/IU/ED/EI Semester : Fourth Subject Title : Professional Practices-II

Subject Code : 17044

### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |    | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH | PR        | OR        | TW  | TOTAL |
|                 |    | 03 |              |    |           |           | 50@ | 50    |

## **Rationale:**

Most of the diploma holders join industries. Due to globalization and competition in the industrial and service sectors the selection for the job is based on campus interviews or competitive tests.

While selecting candidates a normal practice adopted is to see general confidence, ability to communicate and attitude, in addition to basic technological concepts.

The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

## **Objectives:**

To develop the following skills:

## Intellectual skills:

- 1) Analyze information from different sources.
- 2) Prepare reports.

### Motor skills:

- 1) Present given topic in a seminar.
- 2) Interact with peers to share thoughts.
- 3) Prepare a report on industrial visit, expert lecture.

## **Learning Structure:**



## **Contents:**

| Activity | Content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Hours |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 1        | <ul> <li>Industrial Visits</li> <li>Structured industrial visits be arranged and report of the same should be submitted by the individual student to form a part of the term work.</li> <li>Minimum two industrial visits may be arranged in the following areas/ industries : <ul> <li>i) Electronic equipment manufacturing unit</li> <li>ii) Resistance Welding unit</li> <li>iii) Industrial automation unit</li> <li>iv) Sugar mill, Paper mill, Cement Industry.</li> <li>v) Railway station control room.</li> <li>vi) Telephone Exchange.</li> <li>vii) Any other suitable Industry.</li> </ul> </li> </ul> | 16    |
| 2        | <ul> <li>Lectures by Professional / Industrial Expert to be organized from any of<br/>the following areas (Any three) <ol> <li>Cyber laws.</li> <li>Fiber optics communication system</li> <li>Disaster management</li> <li>Atomic energy</li> <li>Industrial Safety</li> <li>Computer security systems/Ethical hacking.</li> <li>Any other suitable topic</li> <li>Introduction to Apprenticeship Training Scheme</li> </ol> </li> </ul>                                                                                                                                                                           | 08    |
| 3        | <ul> <li>Information Search :<br/>Information search can be done through manufacturers, catalogue, internet, magazines; books etc. and submit a report on one of the following topics: <ul> <li>i) GPS</li> <li>ii) Market survey for motors used in electronic application</li> <li>iii) Electronic billing system.</li> <li>iv) Elevators installation and maintenance</li> <li>v) Any other suitable areas</li> </ul> </li> </ul>                                                                                                                                                                                | 06    |
| 4        | Seminar :<br>Seminar topic should be related to the subjects of fourth semester. Each<br>student shall submit a report of at least 10 pages and deliver a seminar<br>(Presentation time – 10 Minutes)                                                                                                                                                                                                                                                                                                                                                                                                               | 10    |
| 5        | <b>Group Discussion</b> :<br>The students should discuss in group of six to eight students and write a brief<br>report on the same as a part of term work. The topic of group discussion may<br>be selected by the faculty members.                                                                                                                                                                                                                                                                                                                                                                                 | 08    |
|          | Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 48    |

# Learning Resources:

# 1. Books:

| Sr.<br>No. | Author               | Title                  | Publisher                     |  |  |
|------------|----------------------|------------------------|-------------------------------|--|--|
| 01         | NRDC, Publication Bi | Invention Intelligence | National Research Development |  |  |

|    | Monthly Journal                                                                                               | Journal                                            | Corporation, GOI. |  |  |  |  |  |
|----|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------|-------------------|--|--|--|--|--|
|    |                                                                                                               |                                                    |                   |  |  |  |  |  |
| 02 | DK Publishing                                                                                                 | How things works encyclopedia                      | DK Publishing     |  |  |  |  |  |
| 03 | Trott                                                                                                         | Innovation mgmt.& new product development          | Pearson Education |  |  |  |  |  |
| 04 | E.H. McGrath, S.J.                                                                                            | Basic Managerial Skills<br>for All – Ninth Edition | PHI               |  |  |  |  |  |
| 05 | Apprenticeship Training Scheme:- Compiled By – BOAT (Western Region), Mumbai,<br>Available on MSBTE Web Site. |                                                    |                   |  |  |  |  |  |

## 2. Web sites

www.engineeringforchange.org www.wikipedia.com www.slideshare.com www.teachertube.com

# Course Name : All Branches of Diploma in Engineering & Technology Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG Industrial Training (Optional) after 4<sup>th</sup> semester examination.

Note:- Examination in Professional Practices of 5<sup>th</sup> Semester.

## INDUSTRIAL TRAINING (OPTIONAL)

## Rational:-

There was a common suggestion from the industry as well as other stakeholders that curriculum of Engineering and Technology courses should have Industrial training as part of the curriculum. When this issue of industrial training was discussed it was found that it will be difficult to make industrial training compulsory for all students of all courses as it will be difficult to find placement for all the students. It is therefore now proposed that this training can be included in the curriculum as optional training for student who is willing to undertake such training on their own. The institutes will help them in getting placement or also providing them requisite documents which the student may need to get the placement.

Details:- Student can undergo training in related industries as guided by subject teachers / HOD.

- The training will be for four weeks duration in the summer vacation after the fourth semester examination is over.
- The student undergoing such training will have to submit a report of the training duly certified by the competent authority from the industry clearly indicating the achievements of the student during training. This submission is to be made after joining the institute for Fifth semester.
- The student completing this training will have to deliver a seminar on the training activities based on the report in the subject Professional Practices at Fifth Semester.
- The student undergoing this training will be exempted from attending activities under Professional Practices at Fifth semester except the seminar.
- The students who will not undergo such training will have to attend Professional Practices Classes/activities of fifth semester and will have to complete the tasks given during the semester under this head.
- There work will be evaluated on their submissions as per requirement and will be given marks out of 50. Or student may have to give seminar on training in Industry he attended.
- Institute shall encourage and guide students for Industry training.
- Evaluation:- Report of Training attended and delivery of seminar and actual experience in Industry will be evaluated in fifth semester under Profession Practices-III and marks will be given accordingly out of 50.

'G' Scheme

WITH EFFECT FROM 2012-13

**DURATION : 16 WEEKS** 

SCHEME · G

#### MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI U

# TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES

#### **COURSE NAME : ELECTRICAL ENGINEERING GROUP**

#### **COURSE CODE : EE/EP**

## **DURATION OF COURSE : SIX SEMESTERS**

#### **SEMESTER : FOURTH**

#### FULL TIME / PART TIME : FULL TIME

|           |                                                      |         |       |     |       |        |                      |           | 201               |         | •••     |        |     |        |     |               |
|-----------|------------------------------------------------------|---------|-------|-----|-------|--------|----------------------|-----------|-------------------|---------|---------|--------|-----|--------|-----|---------------|
| -         |                                                      |         |       | ТЕ  | ACHI  | NG     | EXA                  |           | XAMINATION SCHEME |         |         |        |     |        | GW  |               |
| SR.<br>NO | SUBJECT TITLE                                        | abbrevi | SUB   | S   | CHEM  | E      | PAPER TH             |           | H (1)             |         | (4)     | OR (8) |     | TW (9) |     | SW<br>(17400) |
|           |                                                      | ation   | CODE  | ТН  | TU    | PR     | HRS.                 | Max       | Min               | Max     | Min     | Max    | Min | Max    | Min | (17400)       |
| 1         | Environmental Studies \$                             | EST     | 17401 | 01  |       | 02     | 01                   | 50#*      | 20                |         |         |        |     | 25@    | 10  |               |
| 2         | Elements of Mechanical<br>Engineering                | EME     | 17413 | 02  |       | 02     | 02                   | 50        | 20                |         |         |        |     | 25@    | 10  |               |
| 3         | Industrial Instrumentation                           | IIN     | 17414 | 04  |       | 02     | 03                   | 100       | 40                | 50#     | 20      |        |     | 25@    | 10  |               |
| 4         | D.C. Machines & Transformers                         | DMT     | 17415 | 04  |       | 02     | 03                   | 100       | 40                | 50#     | 20      |        |     | 25@    | 10  | 50            |
| 5         | Industry Electrical Systems-I                        | IES     | 17416 | 03  | 01    | 02     | 03                   | 100       | 40                |         |         | 25#    | 10  | 25@    | 20  |               |
| 6         | Transmission and Distribution of<br>Electrical Power | TDE     | 17417 | 04  |       |        | 03                   | 100       | 40                |         |         |        |     |        |     |               |
| 7         | Professional Practices-II                            | PPT     | 17038 |     |       | 03     |                      |           |                   |         |         |        |     | 50@    | 20  |               |
|           |                                                      |         | Total | 18  | 01    | 13     |                      | 500       |                   | 100     |         | 25     |     | 175    |     | 50            |
| **        | Industrial Training (Optional)                       |         |       | Exa | minat | ion in | 5 <sup>th</sup> Seme | ster Prof | fession           | al Prac | tices-I | II     |     |        |     |               |

#### Student Contact Hours Per Week: 32 Hrs.

## THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.

### Total Marks : 850

@ - Internal Assessment, # External Assessment, No Theory Examination, \$ - Common to all branches, #\* Online Examination,

Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work

\*\* Industrial Training (Optional) - Student can undergo Industrial Training of four weeks after fourth semester examination during summer vacation.

## Assessment will be done in Fifth semester under Professional Practices-III. They will be exempted from activities of Professional Practices-III of 5<sup>th</sup> Semester.

- > Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subjects is to be converted out of 50 marks as sessional work (SW).
- Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.  $\geq$
- Code number for TH, PR, OR, TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.

**Course Name : All Branches of Diploma in Engineering & Technology** 

# Course Code : AE/CE/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG/AU

Semester : Fourth

Subject Title : Environmental Studies

Subject Code : 17401

**Teaching and Examination Scheme:** 

| Teaching Scheme |    |    |              |      | Examinati | on Scheme |    |       |
|-----------------|----|----|--------------|------|-----------|-----------|----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH   | PR        | OR        | TW | TOTAL |
| 01              |    | 02 | 01           | 50#* |           |           | 25 | 75    |

#### **#\* Online Theory Examination**

NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

### **Rationale:**

Environment essentially comprises of our living ambience, which gives us the zest and verve in all our activities. The turn of the twentieth century saw the gradual onset of its degradation by our callous deeds without any concern for the well being of our surrounding we are today facing a grave environmental crisis. The unceasing industrial growth and economic development of the last 300 years or so have resulted in huge ecological problems such as overexploitation of natural resources, degraded land, disappearing forests, endangered species, dangerous toxins, global warming etc.

It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

The curriculum covers the aspects about environment such as Environment and Ecology, Environmental impacts on human activities, Water resources and water quality, Mineral resources and mining, Forests, etc.

General Objectives: The student will be able to,

- 1. Understand importance of environment.
- 2. Know key issues about environment.
- 3. Understands the reasons for environment degradation.
- 4. Know aspects about improvement methods.
- 5. Know initiatives taken by the world bodies to restrict and reduce degradation.

## **Learning Structure:**



## Theory:

| Topic and Contents                                                   | Hours | Marks |
|----------------------------------------------------------------------|-------|-------|
| Topic 1: Nature of Environmental Studies                             |       |       |
| Specific Objectives:                                                 |       |       |
| Define the terms related to Environmental Studies                    |       |       |
| State importance of awareness about environment in general public    | 01    | 0.4   |
| Contents:                                                            | 01    | 04    |
| • Definition, Scope and Importance of the environmental studies      |       |       |
| <ul> <li>Importance of the studies irrespective of course</li> </ul> |       |       |
| • Need for creating public awareness about environmental issues      |       |       |
| Topic 2: Natural Resources and Associated Problems                   |       |       |
| Specific Objectives:                                                 |       |       |
| Define natural resources and identify problems associated with       |       |       |
| them                                                                 |       |       |
| Identify uses and their overexploitation                             |       |       |
| Identify alternate resources and their importance for environment    |       |       |
| Contents:                                                            |       |       |
| 2.1 Renewable and Non renewable resources                            |       |       |
| Definition                                                           |       |       |
| Associated problems                                                  |       |       |
| 2.2 Forest Resources                                                 |       |       |
| General description of forest resources                              |       |       |
| • Functions and benefits of forest resources                         |       |       |
| • Effects on environment due to deforestation, Timber extraction,    |       |       |
| Building of dams, waterways etc.                                     | 0.4   | 10    |
| 2.3 Water Resources                                                  | 04    | 10    |
| Hydrosphere: Different sources of water                              |       |       |
| • Use and overexploitation of surface and ground water               |       |       |
| • Effect of floods, draught, dams etc. on water resources and        |       |       |
| community                                                            |       |       |
| 2.4 Mineral Resources:                                               |       |       |
| • Categories of mineral resources                                    |       |       |
| <ul> <li>Basics of mining activities</li> </ul>                      |       |       |
| <ul> <li>Mine safety</li> </ul>                                      |       |       |
| Effect of mining on environment                                      |       |       |
| 2.5 Food Resources:                                                  |       |       |
|                                                                      |       |       |
| • Food for all                                                       |       |       |
| Effects of modern agriculture                                        |       |       |
| World food problem                                                   |       |       |
| Topic 3. Ecosystems                                                  |       |       |
| Concept of Ecosystem                                                 |       |       |
| Structure and functions of ecosystem                                 | 01    | 04    |
| • Energy flow in ecosystem                                           |       |       |
| Major ecosystems in the world                                        |       |       |
| Topic 4. Biodiversity and Its Conservation                           |       |       |
| Definition of Biodiversity                                           | 02    | 06    |
| Levels of biodiversity                                               | 02    | 00    |
| • Value of biodiversity                                              |       |       |

| Threats to biodiversity                                          |    |    |
|------------------------------------------------------------------|----|----|
| Conservation of biodiversity                                     |    |    |
| Topic 5. Environmental Pollution                                 |    |    |
| Definition                                                       |    |    |
| • Air pollution: Definition, Classification, sources, effects,   |    |    |
| prevention                                                       | 02 | 00 |
| • Water Pollution: Definition, Classification, sources, effects, | 03 | 08 |
| prevention                                                       |    |    |
| • Soil Pollution: Definition, sources, effects, prevention       |    |    |
| • Noise Pollution: Definition, sources, effects, prevention      |    |    |
| Topic 6. Social Issues and Environment                           |    |    |
| Concept of development, sustainable development                  |    |    |
| • Water conservation, Watershed management, Rain water           |    |    |
| harvesting: Definition, Methods and Benefits                     | 02 | 10 |
| Climate Change, Global warming, Acid rain, Ozone Layer           | 05 | 10 |
| Depletion, Nuclear Accidents and Holocaust: Basic concepts       |    |    |
| and their effect on climate                                      |    |    |
| Concept of Carbon Credits and its advantages                     |    |    |
| Topic 7. Environmental Protection                                |    |    |
| Brief description of the following acts and their provisions:    |    |    |
| Environmental Protection Act                                     |    |    |
| • Air (Prevention and Control of Pollution) Act                  |    |    |
| • Water (Prevention and Control of Pollution) Act                | 02 | 08 |
| Wildlife Protection Act                                          | 02 | 08 |
| Forest Conservation Act                                          |    |    |
| Population Growth: Aspects, importance and effect on             |    |    |
| environment                                                      |    |    |
| Human Health and Human Rights                                    |    |    |
| Total                                                            | 16 | 50 |

## **Practical:** Skills to be developed:

## Intellectual Skills:

- 1. Collection of information, data
- 2. Analysis of data
- 3. Report writing

## Motor Skills:

- 1. Presentation Skills
- 2. Use of multi media

## **List of Projects:**

**Note:** Any one project of the following:

- 1. Visit to a local area to document environmental assets such as river / forest / grassland / hill / mountain
- 2. Visit to a local polluted site: Urban/Rural/Industrial/Agricultural
- 3. Study of common plants, insects, birds
- 4. Study of simple ecosystems of ponds, river, hill slopes etc

Prepare a project report on the findings of the visit illustrating environment related facts, analysis and conclusion. Also suggest remedies to improve environment.

Learning Resources: Books:

| Sr.<br>No. | Author                                                | Title                                        | Publisher               |
|------------|-------------------------------------------------------|----------------------------------------------|-------------------------|
| 01         | Anindita Basak                                        | Environmental Studies                        | Pearson Education       |
| 02         | R. Rajgopalan                                         | Environmental Studies<br>from Crises to Cure | Oxford University Press |
| 03         | Dr. R. J. Ranjit Daniels, Dr.<br>Jagdish Krishnaswamy | Environmental Studies                        | Wiley India             |

Course Name : Electrical Engineering Group Course Code : EE / EP Semester : Fourth Subject Title : Elements of Mechanical Engineering Subject Code : 17413

### **Teaching and Examination Scheme**

| Teaching Scheme |    |    |              |    | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH | PR        | OR        | TW  | TOTAL |
| 02              |    | 02 | 02           | 50 |           |           | 25@ | 75    |

### NOTE:

> Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.

# Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)

#### **Rationale:**

Electrical engineering is the basic engineering branch. Electric power supply is needed for running of mechanical and the chemical process equipment for which different electric motors are used, so in mech industry, the electrical engineer has to take care of various electrical installations with its maintenance.

The electrical engineer has to look after various aspects related to electrical engineering in respect of mechanical equipment. (Boilers, Steam turbine, steam engines)

There are the equipments that are used for generation of electrical power.

The content on boiler, steam turbine, and stem engine will enable the electrical engineer to adopt appropriate electrical engineering support for the efficient use of these equipments.

Topics on air compressors and pumps, turbine also provide necessary guide line in respect of electrical engineer. For trouble free working of these equipment with saving ion energy consumption.

### **General Objectives:**

Students should be able to

- 1. Know the function of different mechanical equipment along with their location.
- 2. Understand working of high pressure boilers and steam turbine and thermal power plant.
- 3. Know the operation and control of fuel and steam supply.
- 4. Enlist sources of waste heat from boiler, IC engine.
- 5. Describe internal combustion engine.


| Topic and Contents                                                   | Hours | Marks |
|----------------------------------------------------------------------|-------|-------|
| Topic 1: Boilers, Steam turbines, Steam engine                       |       |       |
| Specific Objectives:                                                 |       |       |
| Calculate the properties of two phase system by using steam table    |       |       |
| Explain construction & working of boilers                            |       |       |
| ➢ Identify the heat losses & malfunctioning of boilers               |       |       |
| Contents:                                                            |       |       |
| 1.1 Construction and working of critical and super critical boilers. | 10    | 16    |
| 1.2 Boiler efficiency                                                |       | -     |
| 1 3 Boiler Act (for remedial measure)                                |       |       |
| 1 4 Classification of turbines                                       |       |       |
| 1.5 Impulse and reaction turbine                                     |       |       |
| 1.6 Power developed by turbine                                       |       |       |
| 1.7 Different power losses in turbine                                |       |       |
| Topics 2: I C Engines                                                |       |       |
| Spacific Objectives:                                                 |       |       |
| Specific Objectives.                                                 |       |       |
| Calculate performance of engine Identify the molfunctioning Causes   |       |       |
| Contentar                                                            |       |       |
| Contents:                                                            |       |       |
| 2.1 Classification of I.C. engines.                                  | 06    | 10    |
| 2.2 Testing and performance of I. C. engines.                        |       |       |
| Break power                                                          |       |       |
| Indicated power                                                      |       |       |
| > Frictional power                                                   |       |       |
| 2.3 Fault finding and remedial action.                               |       |       |
| 2.4 Starting motor of I.C. engine.                                   |       |       |
| Topic 3: Air Compressor                                              |       |       |
| Specific Objectives:                                                 |       |       |
| Know the working principles of air compressor                        |       |       |
| Identify Methods of energy saving                                    |       |       |
| Identify the fault & suggest remedies                                |       |       |
| Contents:                                                            |       |       |
| 3.1 Introduction                                                     | 08    | 12    |
| 3.2 Definition : Compression ratio, Compressor capacity, Free air    |       |       |
| Deliver, swept volume.                                               |       |       |
| 3.3 Reciprocating and rotory air compressor, their working and       |       |       |
| Construction.                                                        |       |       |
| 3.4 Methods of energy saving in compressor.                          |       |       |
| 3.5 Fault finding and remedial action.                               |       |       |
| Topic 4: Pumps                                                       |       |       |
| Specific Objectives:                                                 |       |       |
| Selection of pumps for various applications                          |       |       |
| ➢ Know the construction & working of pumps                           |       |       |
| Identify the trouble shooting of IC engines                          | 00    | 10    |
| Contents:                                                            | 08    | 12    |
| 4.1 Classification of pumps.                                         |       |       |
| 4.2 Type of pumps and their working.                                 |       |       |
| 4.3 Power required to run the pump.                                  |       |       |
| 4.4 Fault finding and remedial action.                               |       |       |
| Total                                                                | 32    | 50    |

#### Practical: Skills to be developed:

#### Intellectual Skills:

- 1. Understand vapour process of steam boilers & different mountings & accesories
- 2. Analyze the performance of pumps& turbines

#### Motor Skills:

- 1. Use pressure & temp measuring device
- 2. Operate I C Engine & know the working of dynometers

#### **List of Practicals:**

- (1)Write a report on visit to Sugar factory/steam power plant consisting of
  - (a)Working of boiler (b) Working of turbine (c) Foundation of boiler.
- (2) Write a report on visit to Sugar factory/steam power plant to observe

(a) Operation of condenser (b) Operation of cooling tower.

- (3) To determine brake power of single cylinder diesel engine by conducting trial on it.
- (4) To determine overall efficiency of a centrifugal pump by conducting a trial test on it and observe foundation of pump.
- (5) Observe the operation of air compressor for identification of sources of air leakage.
- (6) Observe the operation of reciprocating pump and identify types of faults and suggest remedial measures.

#### Learning Resources: 1. Books:

| Sr.<br>No. | Author           | Title                                  | Publisher                           |
|------------|------------------|----------------------------------------|-------------------------------------|
| 1          | Domkundwar V. M  | A Course In Thermal Engg.              | Dhanpat Rai & Co.                   |
| 2          | R. K. Bansal     | Fluid Mechanics & Hydraulic<br>Machine | Laxmi Publication                   |
| 3          | T. S. Rajan      | Basic Mechanical Engg.                 | New Age International               |
| 4          | Dr. Kripal Singh | Automobile Engineering                 | Standard Publishers<br>Distributers |
| 5          | R. S. Khurmi     | A Text Book Of Thermal<br>Engineering  | S Chand & Co. Ltd                   |
| 6          | C. M. Agrwal     | Atext Book Of Thermal Engg             | Wiley Precise Text Book             |

Course Name: Electrical Engineering GroupCourse Code: EE/EPSemester: FourthSubject Title: Industrial InstrumentationSubject Code: 17414

#### **Teaching and Examination Scheme:**

| Tea | ching Sch | neme | Examination Scheme |     |     |    |     |       |
|-----|-----------|------|--------------------|-----|-----|----|-----|-------|
| TH  | TU        | PR   | PAPER<br>HRS       | TH  | PR  | OR | TW  | TOTAL |
| 04  |           | 02   | 03                 | 100 | 50# |    | 25@ | 125   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

A diploma engineer is required to work in various capacities such as development, innovation & maintenance engineer, in today's highly automated industrial environment. Therefore the basic knowledge of industrial instrumentation and control is a necessary prerequisite.

He should be conversant with the basic principles of transduction of physical variables into electrical signals, signal conditioning circuits, basic data acquisitions systems.

#### **General Objectives:**

- 1. Identify different components of instrumentation system.
- 2. Understand different qualitative parameters of instruments.
- 3. Identify appropriate transducers for different physical variables.
- 4. Understand different signal conditioning circuits.
- 5. Understand different Data Acquisition System types and their use.
- 6. Design of complete system for measurement of process variables.



| Topic and Detailed Content                                                         | Hours | Marks |
|------------------------------------------------------------------------------------|-------|-------|
| Topic 1: Introduction to Instrumentation System                                    |       |       |
| Specific Objectives:                                                               |       |       |
| State basic block diagram of instrumentation system.                               |       |       |
| Identify static and dynamic characteristics of instruments                         |       |       |
| Contents:                                                                          |       |       |
| 1.1 Basic instrumentation system                                                   |       |       |
| Basic block diagram of generalized Instrumentation system                          |       |       |
| • Need of each block.                                                              |       |       |
| 1.2 Static characteristics of instruments                                          |       |       |
| Accuracy and measurement uncertainty                                               |       |       |
| • Precision repeatability and reproducibility                                      |       |       |
| Tolerance                                                                          |       |       |
| • Range and span                                                                   |       |       |
|                                                                                    | 00    | 16    |
| • Consitivity resolution                                                           | 08    | 10    |
| <ul> <li>Sensitivity, resolution</li> <li>Zero drift, consitivity drift</li> </ul> |       |       |
| • Zero drift ,sensitivity drift                                                    |       |       |
| • Hysteresis effect                                                                |       |       |
| • Dead zone                                                                        |       |       |
| 1.3 Dynamic characteristics of instruments                                         |       |       |
| Characteristic equation of an instrument in general form                           |       |       |
| • Zero order, first order and second order representation of instruments           |       |       |
| • Response of first, second order instruments to step, ramp and sinusoidal         |       |       |
| inputs                                                                             |       |       |
| • Dynamic error, settling time                                                     |       |       |
| 1.4 Calibration                                                                    |       |       |
| Principles of calibration                                                          |       |       |
| Calibration chain and traceability                                                 |       |       |
| Topics 2: Transducers                                                              |       |       |
| Specific Objectives:                                                               |       |       |
| Classify the transducers on the basis their application                            |       |       |
| Select appropriate transducer as per application                                   |       |       |
|                                                                                    |       |       |
| Contents:                                                                          |       |       |
| 2.1: Transducers                                                                   |       |       |
| • Transducers: Definition, classification of electrical transducers.               |       |       |
| 2.2: Measurement of strain                                                         |       |       |
| Definition of stress and strain                                                    | 20    | 37    |
| Operation of resistance strain gauge                                               | 20    | 52    |
| Construction of bonded metal foil strain gauge                                     |       |       |
| • Strain gauge circuits: Wheatstone bridge full bridge configuration,              |       |       |
| temperature compensation                                                           |       |       |
| 2.3 Measurement of Force and Torque                                                |       |       |
| Force measurement using load cell                                                  |       |       |
| • Types of load cells: column type and beam type                                   |       |       |
| 2.4 Measurement of torque using torque cell                                        |       |       |
| 2.5 Temperature Measurement                                                        |       |       |
| Thermistor-working principle, characteristics, sources of error                    |       |       |

| • Thermocouple- Seebeck effect, Cold Junction compensation (CJC), CJC by electronic means, thermocouple types and their ranges.  |    |    |
|----------------------------------------------------------------------------------------------------------------------------------|----|----|
| <ul> <li>Resistance thermometer (RTD): working principle, characteristics</li> </ul>                                             |    |    |
| ranges of common RTD elements, self heating effect, advantages of                                                                |    |    |
| platinum resistance thermometer, three wire and four wire                                                                        |    |    |
| configurations.                                                                                                                  |    |    |
| 2.6 Displacement measurement                                                                                                     |    |    |
| • Linear variable differential transformer (LVDT)- working principle,                                                            |    |    |
| characteristics, null voltage phase sensitive demodulation.                                                                      |    |    |
| <ul> <li>Rotary motion measurement using optical rotary encoder</li> </ul>                                                       |    |    |
| 2.7 Pressure measurement                                                                                                         |    |    |
| • Definition of pressure and its units                                                                                           |    |    |
| <ul> <li>Absolute, differential and gauge pressure</li> </ul>                                                                    |    |    |
| <ul> <li>Absolute pressure measurement using bourdon tube gauge</li> </ul>                                                       |    |    |
| • Diaphragm type pressure transducer using four element strain gauge                                                             |    |    |
| rosettes.                                                                                                                        |    |    |
| 2.8 Flow measurement                                                                                                             |    |    |
| • Difference between mass flow rate and volumetric flow rate                                                                     |    |    |
| • Volumetric flow rate measurement using electromagnetic flow meter,                                                             |    |    |
| turbine type flow meter and hot wire anemometer                                                                                  |    |    |
| 2.9 Measurement of magnetic field                                                                                                |    |    |
| • Hall effect and hall effect transducer                                                                                         |    |    |
| • Measurement of ac current by hall effect transducer                                                                            |    |    |
| 2.10 Level measurement                                                                                                           |    |    |
| • Float type, capacitive and ultrasome level measurement.                                                                        |    |    |
| Ontigel sensing inductive and magnetic type pulse pickups                                                                        |    |    |
| <ul> <li>Optical sensing, inductive and magnetic type pulse pickups</li> <li>Analog tashometers (DC and AC)</li> </ul>           |    |    |
| Analog factionine (DC and AC)     Signal Conditioning Circuits                                                                   |    |    |
| Snecific Objectives:                                                                                                             |    |    |
| <ul> <li>Draw basic block diagram of OP-AMP</li> </ul>                                                                           |    |    |
| <ul> <li>Identify different applications of OP-AMP in signal conditioning</li> </ul>                                             |    |    |
| circuits.                                                                                                                        |    |    |
| Contents:                                                                                                                        |    |    |
| 3.1. Operational Amplifier and its characteristic parameters                                                                     |    |    |
| • Block diagram and features of OPAMP (all stages) Circuit Symbols<br>and Terminals OPAMP IC's: 741 pin diagram and pin function |    |    |
| <ul> <li>Ideal on amp: electrical characteristics. Ideal voltage transfer curve</li> </ul>                                       |    |    |
| <ul> <li>Definitions of parameters of on-amp: Input offset voltage. Input offset</li> </ul>                                      |    |    |
| current Input hias current Differential input resistance Input                                                                   | 12 | 16 |
| canacitance CMMR SVRR large signal voltage gain output voltage                                                                   | 12 | 10 |
| swing, output resistance, slew rate, gain bandwidth product, output short                                                        |    |    |
| circuit current.                                                                                                                 |    |    |
| 3.2 OP-AMP basic circuits                                                                                                        |    |    |
| • Open loop and closed loop configuration of op-amp, its comparison.                                                             |    |    |
| Virtual ground concept                                                                                                           |    |    |
| Open loop configuration                                                                                                          |    |    |
| Close loop configuration: Inverting, non- inverting, differential                                                                |    |    |
| amplifier, unity gain amplifier (voltage follower), inverter(sign changer),                                                      |    |    |
| Adders, Subtractor, Integrator, Differentiator                                                                                   |    |    |
| • Instrumentation amplifier (using one two and three op-amps)                                                                    |    |    |

| • Voltage to current converter (with floating load, with grounded load),                                                          |           |     |
|-----------------------------------------------------------------------------------------------------------------------------------|-----------|-----|
| • Sample and hold circuit (IC LE 308 Pin diagram specification and pin                                                            |           |     |
| • Sample and hold circuit (IC LF 398, Fin diagram, specification and pin functions)                                               |           |     |
| • Concept of comparator: zero crossing detector, Schmitt trigger, window                                                          |           |     |
| detector,                                                                                                                         |           |     |
| • Phase detector, active peak detector, peak to peak detector                                                                     |           |     |
| • Classification of filters, Concept of passive & active filters                                                                  |           |     |
| Survey of commercially available op-amps (Any Three)                                                                              |           |     |
| Specific Objectives:                                                                                                              |           |     |
| <ul> <li>Draw generalized block diagram of data acquisition system (DAS)</li> </ul>                                               |           |     |
| <ul> <li>State different types of DAS</li> </ul>                                                                                  |           |     |
| <ul> <li>State various techniques of input signal conditioning in DAS</li> </ul>                                                  |           |     |
| State working principle of analog-to-digital and digital-to-analog                                                                |           |     |
| conversion.                                                                                                                       |           |     |
| Contents:                                                                                                                         | 08        | 12  |
| 4.1 Generalized Data acquisition system                                                                                           | 00        | 12  |
| • Generalized Data acquisition system: Block diagram. & explanation.                                                              |           |     |
| Signal conditioning in DAS, Ratio metric conversion, Logarithmic conversion                                                       |           |     |
| CONVERSION<br>DAS Types Single channel multi channel DAS only block diagram                                                       |           |     |
| 4.2 Analog-to-digital and digital-to-analog conversion                                                                            |           |     |
| <ul> <li>Study of different techniques of Analog to Digital convertors ADC and</li> </ul>                                         |           |     |
| Digital to Analog converters DAC only working principle.                                                                          |           |     |
| Topic 5. Operation of Instrumentation System                                                                                      |           |     |
| Specific Objectives                                                                                                               |           |     |
|                                                                                                                                   |           |     |
| State different factors to be considered in transducer selection                                                                  |           |     |
| Draw block diagrams and circuit diagrams for instrumentation system<br>for different physical variables.                          |           |     |
| for unreferit physical variables.                                                                                                 |           |     |
| Contents:                                                                                                                         |           |     |
| 5.1 Transducer selection                                                                                                          |           |     |
| • Points to be considered while selecting a transducer for its intended                                                           |           |     |
| applications.                                                                                                                     | 16        | 24  |
| 5.2 Working of Instrumentation system for                                                                                         |           |     |
| • Temperature Measurement by RTD, thermistor, Thermocouple.                                                                       |           |     |
| • Force measurement using load cell.                                                                                              |           |     |
| • Pressure measurement using diaphragm type transuder.                                                                            |           |     |
| • Speed measurement by non-contact type transducer                                                                                |           |     |
| • Displacement measurement by LVDT.                                                                                               |           |     |
| • Rotary motion using optical encoder.                                                                                            |           |     |
| • Flow measurement by turbine flow meter.                                                                                         |           |     |
| <ul> <li>Liquid level measurement by resistive sensor.</li> <li>AC current PMS indication using Hall Effect transducer</li> </ul> |           |     |
| AC current Kivis indication using Hall Effect transducer.     Total                                                               | 64        | 100 |
| 1 Utal                                                                                                                            | <b>UT</b> | 100 |

#### **Practical:** Skills to be developed:

#### **Intellectual Skills:**

- 1) Selection of transducer for given physical variable.
- 2) Analysis of the transducer characteristics.
- 3) Selection of signal conditioning circuit.

#### **Motor Skills:**

Testing and calibration of the given instrument.

#### List of Practicals:

- 1. Measure output voltage and Displacement in LVDT and draw a graph to verify the characteristics of Output Voltages Vs Displacement
- 2. Measure output Voltage and Force in Strain Guage nd draw graph to verify the characteristics of Force Vs Output Volatage
- 3. Verify the relation between the output voltage and temperature by using a RTD (PT 100) thermistor and Thermocouple
- 4. Use a Level measuring transducer to measure level and output voltage & verify the characteristics of the transducer.
- 5. Plot the graph and verify the characteristics of LDR/Photo diode and photo transistor
- 6. Pressure measurement using diaphragm type Pressure gauge
- 7. Verify the function of OPAMP as inverting/non inverting amplifier, adder, subtractor.
- 8. Verify the function of OPAMP as comparator, Schmitt trigger
- 9. Plot characteristics of primary and secondary current for a current transformer.
- 10. Measure angular velocity using optical tachometer.

| 1. B00l    | KS:             |                                                                                          |                  |
|------------|-----------------|------------------------------------------------------------------------------------------|------------------|
| Sr.<br>No. | Author          | Title                                                                                    | Publisher        |
| 1          | Alok Barua      | Fundamentals of Industrial Instrumentation                                               | Wiley India      |
| 2          | H.S.Kalsi Tata  | Electronic Instrumentation                                                               | McGraw Hill      |
| 3          | William Dunn    | Fundamentals of Industrial Instrumentation and process control                           | McGraw-Hill      |
| 4          | A.K.Sawhney     | Electrical and Electronics<br>Measurement and Instrumentation (19 <sup>th</sup> Edition) | Dhanpat Rai & co |
| 5          | Cooper Helfrick | Modern electronic instrumentation and measurement techniques                             | Prentice Hall    |
| 6          | Ramakant        | Op-AMPs and linear integrated circuits ( 4 <sup>th</sup>                                 | Prentice –Hall   |
| 0          | Gaikwad         | Edition)                                                                                 | India            |

### **Learning Resources:**

### 2. IS, BIS and International Codes:

**ISO/IEC 17025** General requirements for the competence of testing and calibration laboratories.

### 3. Websites:

- 1. Free video lectures by Prof. Alok Barua, IIT Kharagpur
- 2. http://freevideolectures.com/Course/2347/Industrial-Instrumentation

Course Name : Electrical Engineering Group Course Code : EE /EP Semester : Fourth Subject Title : D. C. Machine and Transformer Subject Code : 17415

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    | Examination Scheme |     |     |    |     |       |
|-----------------|----|----|--------------------|-----|-----|----|-----|-------|
| TH              | TU | PR | PAPER<br>HRS       | TH  | PR  | OR | TW  | TOTAL |
| 04              |    | 02 | 03                 | 100 | 50# |    | 25@ | 175   |

#### NOTE:

> Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.

# > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

This subject is intended to teach the student facts, concepts, principles and procedures for the operations, testing and maintenance of electric machines such as dc motors, generators and transformers. Students will also be able to analyze characteristics of electric machines and transformers.

These machines are used in power system for generation, transmission & distribution, utilization systems and also in traction systems. Knowledge gained by the students will be used in the study of technological subjects such as power system operation & control, utilization system, switchgear & protection, testing and maintenance of electrical equipment and modern electric traction.

The students will be able to know the use of transformer in measurement, use of CT's and PT's in control circuits, fault locations etc. The knowledge and skill gained by the student will be used while working as technicians in discharging technical functions such as electrical supervisor, testing engineer and procurement engineer.

#### **General Objectives:**

#### Students will be able to-

- 1. Understand the laws governing the operation of electrical machines.
- 2. Understand the working principles of different DC machines and transformer.
- 3. Know the constructional details of the DC machines and transformer.
- 4. Know the areas of application of the various dc machines and different types of transformers.



|      | Topic and Contents                                                          | Hours | Marks |
|------|-----------------------------------------------------------------------------|-------|-------|
| Торі | c 1: DC Generators                                                          |       |       |
| Spec | ific Objectives:                                                            |       |       |
|      | Identify the different parts of DC Machines.                                |       |       |
|      | Identify different types of DC generators from connection diagram.          |       |       |
| Cont | tents:                                                                      |       |       |
| 1.1  | Introduction                                                                |       |       |
|      | • Principle of operation of DC generator                                    |       |       |
|      | • Fleming's right hand rule                                                 | 06    | 08    |
| 1.2  | Construction of DC machine                                                  | 00    | 00    |
|      | • Parts and functions                                                       |       |       |
|      | • Different materials used for different parts.                             |       |       |
| 1.3  | E.m.f. equation of generator (derivation)                                   |       |       |
|      | • Numericals on e.m.f. equation                                             |       |       |
| 1.4  | Types of DC generators                                                      |       |       |
|      | <ul> <li>Connection diagrams of different types of DC generators</li> </ul> |       |       |
|      | Applications of DC generators                                               |       |       |
| Торі | cs 2: DC Motors                                                             |       |       |
| Spec | ific Objectives:                                                            |       |       |
|      | Plot different characteristics of DC motors.                                |       |       |
|      | Control the speed of DC motors.                                             |       |       |
|      | Determine the efficiency of DC motor.                                       |       |       |
|      | Select DC motor for particular industrial applications.                     |       |       |
| Cont | ents:                                                                       |       |       |
| 2.1  | Introduction                                                                |       |       |
|      | Principle of operation of DC motor                                          |       |       |
|      | • Fleming's left hand rule                                                  |       |       |
|      | • Back e.m.f. and its significance                                          |       |       |
|      | <ul> <li>Voltage equation and power equation of DC motor</li> </ul>         |       |       |
|      | • Types of DC motors                                                        |       |       |
| 2.2  | DC Motor Torque and Speed                                                   |       |       |
|      | • Armature torque (derivation)                                              |       |       |
|      | • Shaft torque                                                              | 12    | 18    |
|      | Brake horse power                                                           |       |       |
|      | <ul> <li>Numericals on torque and speed.</li> </ul>                         |       |       |
| 2.3  | Efficiency of DC Motor                                                      |       |       |
|      | • Losses in DC motor                                                        |       |       |
|      | • Power stages                                                              |       |       |
|      | Efficiency of DC motor                                                      |       |       |
|      | Condition for maximum efficiency                                            |       |       |
|      | • Numericals on efficiency.                                                 |       |       |
| 2.4  | DC motor characteristics                                                    |       |       |
|      | Torque verses armature current                                              |       |       |
|      | Speed verses armature current                                               |       |       |
|      | Speed verses torque                                                         |       |       |
|      | • Selection of motors for particular applications.                          |       |       |
| 2.5  | Speed control of DC series motor                                            |       |       |
|      | • Flux control method                                                       |       |       |

|         | • Armature resistance control method (No numerical)                    |    |    |
|---------|------------------------------------------------------------------------|----|----|
| 2.6     | DC motor starters                                                      |    |    |
|         | <ul> <li>Necessity of DC motor starters</li> </ul>                     |    |    |
| 2.7     | Brushless DC Motor                                                     |    |    |
| 2.7     | • Introduction                                                         |    |    |
|         | • Working                                                              |    |    |
|         | Applications                                                           |    |    |
| Topic   | 3: Single Phase Transformer.                                           |    |    |
| Specif  | ic Objectives:                                                         |    |    |
| > P     | Draw phasor diagram of transformer for different load conditions.      |    |    |
|         | Perform various tests on transformers                                  |    |    |
| $\succ$ | Evaluate parameters of transformer under different loading conditions. |    |    |
| $\succ$ | Determine regulation and efficiency of single-phase transformer.       |    |    |
| Conte   | nts:                                                                   |    |    |
| 3.1     | Introduction                                                           |    |    |
|         | Principle of operation                                                 |    |    |
|         | • Faradays law of electromagnetic induction.                           |    |    |
| 3.2     | Construction of single phase transformer.                              |    |    |
|         | Magnetic circuit                                                       |    |    |
|         | Electric circuit                                                       |    |    |
|         | Dielectric circuit                                                     |    |    |
| 3.3     | Types of transformers                                                  |    |    |
|         | • Shell type and core type- their comparison                           |    |    |
|         | • Step up and step down transformer                                    |    |    |
|         | Amorphous Core type Distribution Transformer                           |    |    |
| 3.4     | EMF equation of transformer                                            |    |    |
|         | • Derivation                                                           |    |    |
|         | • Voltage transformation ratio                                         |    |    |
|         | • Numericals on above.                                                 | 26 | 12 |
| 3.5     | Ideal transformer                                                      | 20 | 72 |
|         | Characteristics of ideal transformer.                                  |    |    |
|         | Phasor diagram                                                         |    |    |
| 3.6     | Practical Transformer                                                  |    |    |
|         | • Transformer on no load-phasor diagram                                |    |    |
|         | • Leakage reactance                                                    |    |    |
|         | • Transformer on load- phasor diagram                                  |    |    |
|         | Numericals on above.                                                   |    |    |
| 3.7     | Equivalent circuit of transformer                                      |    |    |
|         | • Equivalent resistance and reactance                                  |    |    |
|         | • Numericals on above.                                                 |    |    |
| 3.8     | Voltage regulation and Efficiency of transformer                       |    |    |
|         | • Why transformer rating is in KVA?                                    |    |    |
|         | • Voltage regulation of transformer                                    |    |    |
|         | • Losses in transformer                                                |    |    |
|         | • Efficiency of transformer                                            |    |    |
|         | Condition for maximum efficiency                                       |    |    |
|         | • All day efficiency                                                   |    |    |
|         | Numericals on above.                                                   |    |    |
| 3.9     | Tests on Single phase Transformer                                      |    |    |
|         | • Polarity test                                                        |    |    |

|         | Direct loading test                                                                                            |    |    |
|---------|----------------------------------------------------------------------------------------------------------------|----|----|
|         | Open circuit test                                                                                              |    |    |
|         | Short circuit test                                                                                             |    |    |
|         | <ul> <li>Voltage regulation and efficiency based on OC &amp; SC tests</li> </ul>                               |    |    |
|         | <ul> <li>Voltage regulation and enterency based on occ &amp; Se tests.</li> <li>Numericals on above</li> </ul> |    |    |
| 3 10    | Authenticals off above.  Parallal operation of transformer                                                     |    |    |
| 5.10    | Adventeges of perallel operation of transformer                                                                |    |    |
|         | Advantages of parallel operation of transformer.                                                               |    |    |
|         | • Conditions for parallel operation of transformer.                                                            |    |    |
|         | • Load sharing with equal turn ratio                                                                           |    |    |
|         | • Concept of load sharing with unequal turn ratio                                                              |    |    |
|         | Numericals on above.                                                                                           |    |    |
| Topic   | 4: Three Phase Transformer.                                                                                    |    |    |
| Specifi | c Objectives:                                                                                                  |    |    |
| ~       | To identify different parts of three-phase transformer.                                                        |    |    |
| >       | To identify polarity and phases of three-phase transformer.                                                    |    |    |
|         | To select three-phase transformer for particular applications.                                                 |    |    |
| Conter  | its:<br>Introduction                                                                                           |    |    |
| 4.1     | Introduction                                                                                                   |    |    |
|         | Bank of three single phase transformer                                                                         |    |    |
|         | • Single unit of three phase transformer                                                                       |    |    |
|         | • Construction, different parts and their functions                                                            |    |    |
|         | Types of transformer cooling                                                                                   |    |    |
|         | • Three phase transformers connections as per IS:2026 (part IV)-<br>1977                                       |    |    |
|         | • Three phase to two phase conversion (Scott Connection)                                                       |    |    |
|         | Comparison between Distribution transformer and Power transformer                                              | 12 | 16 |
| 4.2     | Selection of transformer as per IS: 10028 (Part I)-1985                                                        |    | 10 |
|         | Criteria for selection of distribution transformer                                                             |    |    |
|         | <ul> <li>Criteria for selection of power transformer</li> </ul>                                                |    |    |
| 43      | Parallel operation of three phase transformer                                                                  |    |    |
| 110     | Conditions for parallel operation                                                                              |    |    |
|         |                                                                                                                |    |    |
| 4.4     | Specification of three-phase distribution transformer as per IS:1180 (part D-1989                              |    |    |
| 4.5     | Tests on Three-phase Transformer                                                                               |    |    |
|         | Polarity test                                                                                                  |    |    |
|         | • Phasing out test                                                                                             |    |    |
| 4.6     | Three- phase auto transformer                                                                                  |    |    |
|         | • Construction                                                                                                 |    |    |
|         | Operation                                                                                                      |    |    |
|         | Application                                                                                                    |    |    |
| Tonic   | 5: Special Transformers                                                                                        |    |    |
| Specifi | c Objectives:                                                                                                  |    |    |
| >       | To use various special transformers for particular applications.                                               |    |    |
| Conter  | ts:                                                                                                            |    |    |
| 5.1     | Single phase auto transformer                                                                                  | 08 | 16 |
|         | Construction and working                                                                                       |    |    |
|         | • Comparison with two winding transformer                                                                      |    |    |
|         | Advantages and disadvantages of auto transformer                                                               |    |    |

| 5.2 | <ul> <li>Applications of auto transformer</li> <li>Instrument Transformers</li> <li>Current transformer- construction working and applications</li> </ul> |    |     |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
|     | <ul> <li>Potential transformer- construction working and applications</li> </ul>                                                                          |    |     |
| 5.3 | Isolation transformer                                                                                                                                     |    |     |
|     | Features and applications                                                                                                                                 |    |     |
| 5.4 | Single phase welding transformer                                                                                                                          |    |     |
|     | • Features and applications.                                                                                                                              |    |     |
|     | Total                                                                                                                                                     | 64 | 100 |

#### Practical: Skills to be developed:

#### Intellectual Skills:

- 1. To understand the concepts of DC machines and transformers.
- 2. To identify different parts and windings of DC machines and transformers.
- 3. Ability to test, plot and verify the characteristics.
- 4. Ability to interpret the test results.

#### Motor Skills:

- 1. To draw the circuit diagram.
- 2. To measure different parameters using different meters.
- 3. To connect different meters according to circuit diagram.
- 4. To follow sequence of operations.
- 5. To measure the values and note down the readings.
- 6. To operate DC machines and transformers.

#### **List of Practicals:**

- 1. Observe and identify different constructional parts of D. C machine and identify different windings by resistance measurement.
- 2. Start a D. C shunt motor and reverse its direction of rotation.
- 3. Control the speed of D.C series motor by flux control and armature resistance control.
- 4. Perform load test on D. C series motor and plot its performance characteristics.
- 5. Perform brake test on D. C shunt motor and plot speed Torque characteristics.
- 6. Determine transformation ratio, regulation and efficiency of single phase transformer by direct loading.
- 7. Perform open circuit and short circuit test on single phase transformer and determine equivalent circuit constants, regulation and efficiency.
- 8. Perform parallel operation of single phase transformer and determine the load sharing.
- 9. Visit a transformer manufacturing unit /repairing workshop and observe the constructional details of a three phase distribution transformer and identify various parts.
- 10. Perform polarity test and phasing out test on a three phase transformer.

#### Learning Resources:

#### 1. Books:

| Sr.<br>No. | Author                          | Title                        | Publisher                                         |
|------------|---------------------------------|------------------------------|---------------------------------------------------|
| 1.         | V. N. Mittle & Arvind<br>Mittal | Basic Electrical Engineering | Tata McGraw Hill Education Pvt.<br>Ltd. New Delhi |
| 2.         | D. P. Kothari &                 | Electrical Machines          | Tata McGraw Hill Education Pvt.                   |

|    | I. J.Nagrath                  |                                      | Ltd. New Delhi                                    |
|----|-------------------------------|--------------------------------------|---------------------------------------------------|
| 3. | S. K. Bhattacharya            | Electrical Machines                  | Tata McGraw Hill Education Pvt.<br>Ltd. New Delhi |
| 4. | V. K. Mehta & Rohit<br>Mehta, | Principles of Electrical<br>Machines | S.Chand and Co.Ltd., New Delhi                    |
| 5. | K. Murungesh Kumar            | DC Machines and Transformers         | Vikas Publishing House Pvt. Ltd.<br>New Delhi.    |
| 6. | Tarnekar &                    | Laboratory Course in Electrical      | S.Chand and Co.Ltd., New Delhi                    |
|    | Kharabanda.                   | Engineering                          |                                                   |
| 7  | B. L. Theraja                 | Electrical Technology                | S.Chand and Co.Ltd., New Delhi                    |
| 8  | Edward Hughes                 | Electrical and Electronics           | FI BS Publication                                 |
| 0  | Laward Hughes                 | Technology                           | EEDS I doneddon.                                  |
| 9  | M N Dandyanadhyay             | Electrical Machines theory and       | PHI Learning Pvt. Ltd., New                       |
|    | wi. w. Danuyopaunyay          | practice                             | Delhi                                             |

#### 2. CDs, PPTs, Models, Charts etc.:

#### Videos-

- 1. http://www.youtube.com/watch?v=RAc1RYilugI
- 2. http://www.youtube.com/watch?v=Ue6S8L4On-Y&feature=related
- 3. http://www.youtube.com/watch?v=d\_aTC0iKO68&feature=related
- 4. http://www.youtube.com/watch?v=Xi7o8cMPI0E&feature=related
- 5. http://www.youtube.com/watch?v=VucsoEhB0NA&feature=related
- 6. http://www.youtube.com/watch?v=A951LRFRL\_M&feature=related

#### 3. IS, BIS and International Codes:

- IS: 2026 (Part IV)-1977 Indian standard specification for power transformers PART IV Terminal markings, tappings and connections
- IS: 10028 (Part I )-1981 Indian standard code of practice for selection, installation and maintenance of transformers, PART I selection
- IS: 1180 (Part I)-1977 Indian standard specification for power transformer

#### 4. Websites:

- www.standardsbis.in/
- www.bis.org.in/
- www.youtube.com/watch
- www.google.co.in

Course Name : Electrical Engineering Group Course Code : EE/EP Semester : Fourth Subject Title : Industrial Electrical Systems - I Subject Code : 17416

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |     |    | Examination | on Scheme |       |
|-----------------|----|----|--------------|-----|----|-------------|-----------|-------|
| TH              | TU | PR | PAPER<br>HRS | TH  | PR | OR          | TW        | TOTAL |
| 03              | 01 | 02 | 03           | 100 |    | 25#         | 25@       | 150   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- ➢ Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

A diploma engineer is required to work as supervisor & knowledge worker in different organizations and is responsible to provide electrification. Maintain supply prepare design, estimates, read drawing, IE rules, data tables, specification, for all types electrical installation, Provision & maintaining earthing & all protective devices like MCCB,ELCB etc. Also Knowledge of maintenance, LT Lines, transformers, types of cables & wires are essential. Hence this core subject has been included at fourth semester in this curriculum.

#### **General Objectives:**

#### The Students will be able to: -

- 1. Read & interprets Electrical Installation drawings.
- 2. Understand & apply IE rules.
- 3. Make use of data tables & specification of wire, cables, LT lines & Distribution Transformer, MCCB, ELCB.
- 4. Understand principles & procedures of earthing.
- 5. Know basic terms to prepare design & estimate of installation.
- 6. Understand & apply procedures for contracts & tenders.

#### **Application:**



| Topics and Contents                                                                                             | Hours | Marks |
|-----------------------------------------------------------------------------------------------------------------|-------|-------|
| 1. Drawings and IE rules                                                                                        |       |       |
| Specific Objectives                                                                                             |       |       |
| Understand different types of electrical Installation                                                           |       |       |
| Know and read Electrical drawings & symbols                                                                     |       |       |
| ➤ Know IE rules                                                                                                 |       |       |
| Classification of electrical installations                                                                      | 04    | 10    |
| General requirements of electrical installation                                                                 |       |       |
| • Reading & interpretation of electrical engineering drawings & symbols                                         |       |       |
| related to installations                                                                                        |       |       |
| • Representation of different types of diagrams, such as schematic, circuit,                                    |       |       |
| wiring diagram and its single line representation as per IS code.                                               |       |       |
| IE rules related to electrical installation                                                                     |       |       |
| 2. Service connections                                                                                          |       |       |
| Specific Objectives                                                                                             |       |       |
| <ul> <li>Select appropriate method for service connection</li> </ul>                                            |       |       |
| Differentiate between various service connections                                                               |       |       |
| Concept of service connection                                                                                   | 04    | 10    |
| • Types of service connections and their features                                                               |       |       |
| Methods of installation of service connection                                                                   |       |       |
| • Differentiate between underground and overhead service connection                                             |       |       |
| • Service connection for 11 KV H. T. Consumer                                                                   |       |       |
| 3. Electrification of residential Installation                                                                  |       |       |
| Specific Objectives                                                                                             |       |       |
| Select wires and wiring methods as per the requirement                                                          |       |       |
| Prepare comparison chart of various wiring accessories                                                          |       |       |
| Use given guidelines for residential installation                                                               |       |       |
| Calculate total electrical load                                                                                 |       |       |
| • Types of wires and wiring methods as per IS No.                                                               |       |       |
| • General rules and guidelines for installation of residential electrification<br>and positioning of equipments |       |       |
| <ul> <li>Calculation of total electrical load in the residential installation</li> </ul>                        |       |       |
| • Procedure for the design of number of sub circuits                                                            |       |       |
| • Method of drawing single line diagram                                                                         |       |       |
| <ul> <li>Selection of type of wire and wiring method</li> </ul>                                                 | 12    | 24    |
| <ul> <li>Load calculation and selection of size of wire by considering overload and</li> </ul>                  |       |       |
| future expansion                                                                                                |       |       |
| • Determine length of batten and length of wire                                                                 |       |       |
| • Selection of rating for main switch, distribution board, MCB, ELCB, and                                       |       |       |
| wiring accessories                                                                                              |       |       |
| • Purpose of earthing and types of earthing                                                                     |       |       |
| • Determine length and size of earth wire                                                                       |       |       |
| • Prepare list of material for residential installation with their costing                                      |       |       |
| • Total estimation and costing of overall residential installation with proper                                  |       |       |
| cost of material, labour charges, contingencies charges                                                         |       |       |
| Determine per point charges                                                                                     |       |       |
| • Wiring diagram for residential installation: Single Line and multiline                                        |       |       |

| representation.                                                                                                               |    |
|-------------------------------------------------------------------------------------------------------------------------------|----|
| 4. Electrification of Commercial Installation                                                                                 |    |
| Specific Objectives                                                                                                           |    |
| Difference between residential and commercial installation                                                                    |    |
| Prepare comparative chart for different ratings, size & other technical                                                       |    |
| specifications from manufactures/ dealers.                                                                                    |    |
| Use given guideline for commercial installation                                                                               |    |
| Collect various specifications of wiring material                                                                             |    |
| Concept of commercial installation                                                                                            |    |
| Difference between residential and commercial installation                                                                    |    |
| Difference between wires and cables                                                                                           |    |
| • Types of cables required for commercial installations according to size and                                                 |    |
| core                                                                                                                          |    |
| • General requirements and selection factors for commercial installation                                                      |    |
| • Load calculation and selection of size of service connection and nature of 12                                               | 20 |
| supply                                                                                                                        | 20 |
| <ul> <li>Decide number of lighting and power sub circuits as per the IE rule</li> </ul>                                       |    |
| <ul> <li>Decide number of fighting and power sub circuit us per the fighting and power sub circuit</li> </ul>                 |    |
| <ul> <li>Decide length of wire required for every sub-circuit</li> </ul>                                                      |    |
| <ul> <li>Decide length of whe required for every sub-circuit</li> <li>Draw the single line diagram</li> </ul>                 |    |
| <ul> <li>Draw the single fine diagram</li> <li>Deside ratings of wiring accessories, main switch hus her MCD, ELCD</li> </ul> |    |
| • Decide ratings of wiring accessories, main switch, bus bar MCB, ELCB                                                        |    |
| ett.                                                                                                                          |    |
| • Decide proper method of eartning for commercial instantion                                                                  |    |
| • Prepare list of material for commercial installation with their costing                                                     |    |
| • Draw the single line diagram                                                                                                |    |
| • Find out the estimation chart with proper cost of material, cost of labour,                                                 |    |
| contingencies charges and profit margin                                                                                       |    |
| Draw the circuit diagram                                                                                                      | _  |
| 4. Electrification of Industrial Installation                                                                                 |    |
| Specific Objectives                                                                                                           |    |
| Based on criteria for selection decide if the installation is industrial                                                      |    |
| installation                                                                                                                  |    |
| State difference between power wiring and actual industrial wiring                                                            |    |
| Guideline for industrial installation                                                                                         |    |
| Calculate detail estimate and costing of industrial installation                                                              |    |
|                                                                                                                               |    |
| Concept of industrial load                                                                                                    |    |
| Concept of motor wiring circuit and single line diagram                                                                       |    |
| Guidelines about power wiring and motor wiring                                                                                | 24 |
| Design considerations of electrical installation in small                                                                     | 24 |
| industry/factory/workshop                                                                                                     |    |
| Machine current calculations                                                                                                  |    |
| • selection of size for wires, cables required for the machines and its                                                       |    |
| controlling unit                                                                                                              |    |
| • Decide length and size of cable required for the every industrial load                                                      |    |
| • Decide ratings of wiring accessories, main switch. bus bar MCB. ELCB                                                        |    |
| etc. for every industrial load.                                                                                               |    |
| • Decide proper method of earthing for industrial installation                                                                |    |
| • Prepare list of material for industrial installation with their costing                                                     |    |
| • Find out the estimation chart with proper cost of material . cost of labour.                                                |    |

| Total                                                                   | 48 | 100 |
|-------------------------------------------------------------------------|----|-----|
| Billing of executed works.                                              |    |     |
| Principles of execution of work                                         |    |     |
| <ul> <li>Comparative statements for selection of contractors</li> </ul> |    |     |
| <ul> <li>Procedure for submission and opening of tenders</li> </ul>     |    |     |
| • Tender notice                                                         |    |     |
| <ul> <li>Requirements of valid contract and good contractor</li> </ul>  |    |     |
| • Types of tenders                                                      |    |     |
| <ul> <li>Types of contracts and contractors</li> </ul>                  | 04 | 12  |
| Concept of contract and tenders                                         |    |     |
| Prepare billing                                                         |    |     |
| and act as per the requirements and rules while opening of the tender.  |    |     |
| Fill tender documents following appropriate procedure and be present    |    |     |
| Draft tender documents                                                  |    |     |
| Specific Objectives                                                     |    |     |
| 6. Contracts, Tenders and Execution                                     |    |     |
| • Draw the circuit diagram                                              |    |     |
| contingencies charges and profit margin                                 |    |     |

#### **Tutorials:**

- 1. Electrical installation scheme for small bungalow or house. Draw wiring diagram and prepare detailed estimation and costing.
- 2. Electrical installation scheme for commercial building/ floor mill. Draw wiring diagram and prepare detailed estimation and costing.
- 3. Electrical installation scheme for small industry/factory/workshop/agriculture pump . Draw single line diagram and prepare detailed estimation and costing. Draw the circuit diagram

#### **Assignments:**

Skills to be developed:

#### **Intellectual Skills:**

- 1. Identify and apply different designing methods as per the requirements
- 2. Select proper ratings
- 3. Ability to analyse and select appropriate methods for estimation and costing

#### Motor Skills:

- 1. Drawing skill.
- 2. Measuring dimensions

#### List of Assignments: Problems & sheets on following topics.

- 1) Electrical estimation & design of residential consumers (for flats/Bungalows/Row houses)
- 2) Electrical estimation & design of Commercial consumers (for Malls/Colleges/Hospitals, Banks)

- 3) Electrical estimation & design of Agricultural consumers (Pump jets/submersible pump)
- 4) Electrical estimation & design of small & medium Industrial consumers.
- 5) Electrical Installation & layout preparation of your college campus.
- 6) Preparation of a NIT (Notice Inviting Tender)

Note: Estimations be made for loads up to 100 KVA

#### **Learning Resources:**

1. Books:

| Sr.<br>No. | Name of the Author       | Title of the book                            | Name of the Publisher        |
|------------|--------------------------|----------------------------------------------|------------------------------|
| 1          | J.B.Gupta                | Electrical Installation Estimating & costing | S.K.Kataria & sons New Delhi |
| 2          | Raina Bhattachraya       | Estimating dsign & costing                   | New Age                      |
| 3          | Allasappan &<br>Ekambarm | Estimating design & costing                  | Tata McGraw hill             |
| 4          | S L Uppal                | Estimating & costing                         | Khanna Publiser              |
| 5          | Surjit Singh             | Electrical Estimating & costing              | Dhanpat Rai & co.            |

- 2. ISO, IS, BS standards, Data Sheets, IE Rules Handbook IS/International code: IS5909, 7733, 2174, 732, 4648
- 3. Charts, Models, CDs, Transparencies,

#### 4. Websites:

http://www.bestestimatepro.com/ bieap.gov.in/estimatingandcosting.pdf http://indiacatalog.com/web\_directory/electrical/electrical.html Course Name : Electrical Engineering Group Course Code : EE / EP Semester : Fourth Subject Title : Transmission & Distribution of Electrical Power Subject Code : 17417

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |     | Examinati | on Scheme |    |       |
|-----------------|----|----|--------------|-----|-----------|-----------|----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH  | PR        | OR        | TW | TOTAL |
| 04              |    |    | 03           | 100 |           |           |    | 100   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Electrical Diploma Engineers should know Transmission Voltages, Distribution Voltage. They should be able to identify various components & there functions. They will be able to measure system performance. They will use this knowledge in studying Switchgear & Protection on completing the study of Generation, Transmission, Distribution, Switchgear, Protection & utilization of electrical energy, Students will be work as electrical engineer in power industry.

#### General Objectives: Student will be able to: -

- 1. Know various types of Transmission & distribution system.
- 2. Identify various components & know their functions.
- 3. Know types of conductors used in transmission and distribution circuits
- 4. Know the effect of changes in parameters on performance of the lines
- 5. Draw substation layout as per the requirements.

#### Applications



|                                                                                         | 1  |    |
|-----------------------------------------------------------------------------------------|----|----|
| circuit, Voltage levels.                                                                |    |    |
| <ul> <li>Advantages, Disadvantages &amp; Application of Steel Tower.</li> </ul>         |    |    |
| Line Insulators : 10 marks                                                              |    |    |
| • Electrical, Mechanical, Chemical, Thermal & General Properties of                     |    |    |
| Insulating Material.                                                                    |    |    |
| • Selection of material for line insulators, standard dielectric strengths              |    |    |
| of insulating materials used.                                                           |    |    |
| • Types of Insulators used in Transmission and Distribution: Pin type,                  |    |    |
| Suspension type, Strain type, Shackle type, Stay Insulator and their                    |    |    |
| Applications.                                                                           |    |    |
| • Causes of Insulator failure.                                                          |    |    |
| <ul> <li>String Insulator: Constructional features and applications.</li> </ul>         |    |    |
| • Self Capacitance, Shunt Capacitance & Factor 'K' or 'M', Effect of                    |    |    |
| factor 'K': Definition and effect on voltage distribution in the units of               |    |    |
| the string.                                                                             |    |    |
| • Distribution of Potential over a string of Three Suspension Insulator.                |    |    |
| <ul> <li>Define String Efficiency and develop its Mathematical Expression</li> </ul>    |    |    |
| (Simple Numericals)                                                                     |    |    |
| Methods of Improving String efficiency.                                                 |    |    |
| <b>Topics 3: Transmission Line Parameters</b>                                           |    |    |
| Specific Objectives:                                                                    |    |    |
| Use appropriate method for reducing skin effect                                         |    |    |
| Prepare schedule for transposition of line                                              |    |    |
|                                                                                         |    |    |
| Contents:                                                                               |    |    |
| • Concept of R, L & C of Transmission Line, State their Effect on                       |    |    |
| performance of Transmission line (No Derivation & Numericals)                           |    |    |
| • Skin Effect: Meaning of the term, its dependence on conductor size                    |    |    |
| and configuration and material, Methods used to reduce the skin                         | 08 | 12 |
| effect.                                                                                 |    |    |
| <ul> <li>Proximity Effect: Meaning of the term, its effect on performance of</li> </ul> |    |    |
| line, methods of reducing the effect.                                                   |    |    |
| Ferranti Effect                                                                         |    |    |
| • Phenomenon of Corona, Disruptive Critical Voltage and Visual                          |    |    |
| Critical Voltage, Conditions affecting Corona, Power loss due to                        |    |    |
| Corona, Methods of reducing Corona, Advantages & Disadvantages of                       |    |    |
| Corona.                                                                                 |    |    |
| Concept of Transposition of Conductors and its necessity.                               |    |    |
| <b>Topics 4: Performance of Transmission Line</b>                                       |    |    |
| Specific Objectives:                                                                    |    |    |
| Determine performance of the line based on efficiency and regulation                    |    |    |
| Representation of line based on A, B, C, D constants                                    |    |    |
|                                                                                         |    |    |
| Contents:                                                                               |    |    |
| • Classification of Transmission line according to distance such as                     | 10 | 20 |
| Short, Medium & long Transmission Line.                                                 |    |    |
| • Definition of efficiency & Regulation of Transmission line.                           |    |    |
| • Effect of Power Factor on Transmission efficiency and Regulation,                     |    |    |
| Draw Vector diagram for Lag, Lead & Unity Power factor.                                 |    |    |
| <ul> <li>Derivation of Regulation Short Transmission line.</li> </ul>                   |    |    |
| Numericals on 1-phase & 3-phase Short Transmission line:                                |    |    |

| Calculate Efficiency & Percentage Regulation                                                                                 |            |    |  |
|------------------------------------------------------------------------------------------------------------------------------|------------|----|--|
| • Analysis of Short transmission line: Equivalent Circuit & Vec                                                              | or         |    |  |
| Diagram (No Mathematical Treatment)                                                                                          | .01        |    |  |
|                                                                                                                              | - 1        |    |  |
| • Analysis of Medium transmission line: Equivalent Circuit w                                                                 | th         |    |  |
| Nominal T', Nominal $\pi$ , and End Condenser Method, its Phase                                                              | or         |    |  |
| diagram (No Mathematical Treatment)                                                                                          |            |    |  |
| • Concept and Basic Equations of generalized circuit constants 'A', 'B', 'C', 'D' (No Derivation and Numericals)             |            |    |  |
| Topics 5: Extra High Voltage Transmission                                                                                    |            |    |  |
| Specific Objectives:                                                                                                         |            |    |  |
| ▶ Understand the concept of HV Transmission                                                                                  |            |    |  |
| <ul> <li>Know the use of HV Lines for Transmission and National Grid</li> </ul>                                              |            |    |  |
| Compare EHV A C and HV D C lines for performance                                                                             |            |    |  |
| Contents:                                                                                                                    |            |    |  |
| Contents:                                                                                                                    |            |    |  |
| • Demittion of EHV line, its necessity and importance.                                                                       | ~          |    |  |
| <ul> <li>Advantages, Limitations and Applications of Extra High Voltage A<br/>(EHVAC) Transmission Line.</li> </ul>          | AC 06      | 08 |  |
| • Advantages, Limitation & Application of High Voltage DC (HVDC)                                                             |            |    |  |
| Transmission Line.                                                                                                           |            |    |  |
| Layout of HVDC Transmission Line: Monopolar, Bi-Polar & Hom<br>Polar                                                         | 0-         |    |  |
| • UVDC Transmission Line Doutes in India                                                                                     |            |    |  |
| • HVDC Transmission Line Routes in India,                                                                                    |            |    |  |
| • Comparison of EHVAC & HVDC Transmission line.                                                                              |            |    |  |
| Topics 6: A.C Distribution System                                                                                            |            |    |  |
| Specific Objectives:                                                                                                         |            |    |  |
| Decide type of distributer to be used based on requirements                                                                  |            |    |  |
| Determine performance of Distributer with given parameters                                                                   |            |    |  |
| Contents:                                                                                                                    |            |    |  |
|                                                                                                                              |            |    |  |
| Components of Distribution System.                                                                                           |            |    |  |
| Classification of distribution System                                                                                        |            |    |  |
| Requirements of an ideal Distribution System                                                                                 |            |    |  |
| • Magning of Drimory & Sacondary Distribution System.                                                                        | 12         | 16 |  |
| • Meaning of Finnary & Secondary Distribution System with the voltage level and Number of conductors.                        | 511        |    |  |
| <ul> <li>Comparison between Feeder &amp; Distributor.</li> </ul>                                                             |            |    |  |
| • Factors to be considered while designing Feeder & Distributor.                                                             |            |    |  |
| • Types of different distribution Scheme such as Radial, Ring, and Gr                                                        | id.        |    |  |
| Layout, Advantages, Disadvantages & Applications.                                                                            |            |    |  |
| • Numericals on 1-phase A.C Distribution System to Calculate Volta                                                           | ge         |    |  |
| dron & Voltage at sending end / Receiving end with Power fact                                                                | or         |    |  |
| referred to Voltage at receiving and                                                                                         | .01        |    |  |
| Tonics 7. Drimory and Socondary Distribution Sub Station                                                                     |            |    |  |
| Specific Objectives:                                                                                                         |            |    |  |
| Deputity components of sub-stations with their actives                                                                       |            |    |  |
| <ul> <li>Identify components of sub-stations with their ratings</li> <li>Identify components for a single line di</li> </ul> |            |    |  |
| r Identify components from single line diagram                                                                               |            |    |  |
| Contents:                                                                                                                    | 10         | 12 |  |
| • Definition and Classification of Sub-Station according to Nature                                                           | of         | 12 |  |
| duty, Application (Service), Construction                                                                                    |            |    |  |
| • Site Selection for Sub-Station.                                                                                            |            |    |  |
| Advantages, Disadvantages & Applications of Indoor & Outdoor Su                                                              | <b>b</b> - |    |  |
| Station.                                                                                                                     |            |    |  |

| • Single Line diagram (layout of ) 33/11KV Sub-Station.           |       |     |
|-------------------------------------------------------------------|-------|-----|
| • Single Line diagram (layout of) 11KV/400V Distribution          |       |     |
| Transformer.                                                      |       |     |
| • Symbols & Functions of components of 33/11KV Sub-Station        | 1:    |     |
| Incoming Feeder, Busbar, Power Transformer, Lightning Arreste     | r,    |     |
| Earth Switch Insulator (No Load Switch), Circuit Breaker, Horn Ga | ıр    |     |
| Fuse, Instrumental Transformer (CT & PT), Control Panel, Control  | ol    |     |
| Room and Outgoing Line,                                           |       |     |
| • Symbols & Functions of 11KV/400V Distribution Transformer Sul   | D-    |     |
| Station: Functions of Incoming line, AB Switch, Drop down Fus     | e,    |     |
| Distribution Transformer, Cross Brasing, Anti climbing devic      | e,    |     |
| Danger board, Sub Station Earthing and Distribution box.          |       |     |
| Tot                                                               | al 64 | 100 |

#### NOTES:

- 1. Visit to 33 / 11 KV Substation.
- 2. Visit to11KV/400V Distribution Substation in Campus.
- 3. Observe Samples of ACSR Conductors and Insulators.

These visits may be arranged under Professional Practice.

#### **Learning Resources:**

1. Books:

| Sr.<br>No. | Author          | Title                                                 | Publisher    |  |  |
|------------|-----------------|-------------------------------------------------------|--------------|--|--|
| 1.         | V.K.Mehta       | Principles of Power System                            | S.Chand      |  |  |
| 2.         | V. Kamraju      | Electrical Power Distribution System                  | Mc.GrawHill  |  |  |
| 3          | S.Sivanagaraju  | Electrical Power Transmission and                     | Pearson      |  |  |
| 5.         | S.Satyanarayana | Distribution                                          |              |  |  |
| 4          | Soni,Gupta,     | A Course in Floatrical Power                          | Dhannat Dai  |  |  |
| 4.         | Bhatnagar       | A Course in Electrical Fower                          | Dhalipat Kai |  |  |
| 5.         | S.L.Uppal       | A Course in Electrical Power                          | S.K.Khanna   |  |  |
| 6.         | J.B.Gupta       | Transmission and Distribution of<br>Electrical Energy | S.K.Khanna   |  |  |

#### 2. IS, BIS and International Codes:

1. IS 2713 (Part I, II, III) - 1980 for Specifications of Tubular Steel poles for

Over Head Power Lines.

- 2. Standard Clearances as per BS: 162-1961 and BS: 159-1957
- 3. IS 398-1961 Technical data of AAC and ACSR Conductors.
- 4. IS 398 (Part -4)-1994 Technical data of AAAC

#### 3. Websites:

1. Sonaversity \_ org 2. www.animations.physics.unsw.edu.au 3.phy-clips

Course Name : Electrical Engineering Group Course Code : EE / EP Semester : Fourth Subject Title : Professional Practices-II Subject Code : **17038** 

#### **Teaching and Examination Scheme:**

| Teac | hing Scl | heme | Examination Scheme |    |    |    |     |       |  |
|------|----------|------|--------------------|----|----|----|-----|-------|--|
| TH   | TU       | PR   | PAPER<br>HRS       | TH | PR | OR | TW  | TOTAL |  |
|      |          | 03   |                    |    |    |    | 50@ | 50    |  |

#### **Rationale:**

Most of the diploma holders join industries. Due to globalization and competition in the industrial and service sectors the selection for the job is based on campus interviews or competitive tests.

While selecting candidates a normal practice adopted is to see general confidence, ability to communicate and attitude, in addition to basic technological concepts.

The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

#### **Objectives:**

Student will be able to:

- 1. Acquire information from different sources.
- 2. Prepare notes for given topic.
- 3. Present given topic in a seminar.
- 4. Interact with peers to share thoughts.
- 5. Prepare a report on industrial visit, expert lecture.



| Activity | Contents                                                                                                                                                                | Hours |  |  |  |  |  |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--|--|--|--|--|
|          | <b>Industrial Visits</b><br>Structured industrial visits be arranged and report of the same should be<br>submitted by the individual student, as part of the term work. |       |  |  |  |  |  |
|          | The industrial visits may be arranged in the following areas / industries :                                                                                             |       |  |  |  |  |  |
|          | i) Visit to HT Sub Station (Compulsory)                                                                                                                                 |       |  |  |  |  |  |
| 01       | ii) Visit to Transformer Manufacturing Industry                                                                                                                         | 16    |  |  |  |  |  |
| 01       | iii) Visit to Electronics Industry                                                                                                                                      | 10    |  |  |  |  |  |
|          | iv) Visit to Design Office of MSEDCL, MSEGENCOL                                                                                                                         |       |  |  |  |  |  |
|          | v) visit to industry to observe:-                                                                                                                                       |       |  |  |  |  |  |
|          | a) Function of DAS and Data logger<br>b) Electrical quantities, non electrical quantities by recorder                                                                   |       |  |  |  |  |  |
|          | vi) Adarsh Gram                                                                                                                                                         |       |  |  |  |  |  |
|          | Lectures by Professional / Industrial Expert / Student Seminars based                                                                                                   |       |  |  |  |  |  |
|          | on information search, expert lectures to be organized from any of the                                                                                                  |       |  |  |  |  |  |
|          | following areas:                                                                                                                                                        |       |  |  |  |  |  |
|          | i) Interview Techniques.                                                                                                                                                |       |  |  |  |  |  |
| 02       | ii) Effect of Transmission and Distribution Losses on cost of                                                                                                           | 08    |  |  |  |  |  |
| 02       | Energy Generation                                                                                                                                                       | 00    |  |  |  |  |  |
|          | iii) Recent Trends in Transformer Manufacturing                                                                                                                         |       |  |  |  |  |  |
|          | iv) Electrical Safety in Industry                                                                                                                                       |       |  |  |  |  |  |
|          | v) Applications of D. C. Motors : Present and Future Trends                                                                                                             |       |  |  |  |  |  |
|          | VI) Any other suitable topic                                                                                                                                            |       |  |  |  |  |  |
|          | Information search can be done through manufacturers, catalogue, internet                                                                                               |       |  |  |  |  |  |
|          | mormation search call be done through manufacturers, catalogue, internet,                                                                                               |       |  |  |  |  |  |
|          | Following tonics are suggested :                                                                                                                                        |       |  |  |  |  |  |
| 03       | i) Recent Trends in Insulation Material and Insulators                                                                                                                  | 08    |  |  |  |  |  |
|          | ii) Electrical Wiring Accessories                                                                                                                                       |       |  |  |  |  |  |
|          | iii) Non Conventional Energy Sources with focus on solar energy                                                                                                         |       |  |  |  |  |  |
|          | iv) Elevators installation and maintenance                                                                                                                              |       |  |  |  |  |  |
|          | v) Any other suitable areas                                                                                                                                             |       |  |  |  |  |  |
|          | Seminar:                                                                                                                                                                |       |  |  |  |  |  |
| 04       | Seminar topic should be related to the subjects of fourth semester. Each                                                                                                |       |  |  |  |  |  |
| 04       | student shall submit a report of at least 10 pages and deliver a seminar                                                                                                |       |  |  |  |  |  |
|          | (Presentation time – 10 minutes)                                                                                                                                        |       |  |  |  |  |  |
|          | Mini Projects:                                                                                                                                                          |       |  |  |  |  |  |
|          | A group of 6to8 students be formed for group discussion;                                                                                                                |       |  |  |  |  |  |
| 05       | 1. Prepare a report on Electrification of multi storied building                                                                                                        |       |  |  |  |  |  |
|          | 2. Market Survey of Power Converters on the basis of Rating, Cost,                                                                                                      |       |  |  |  |  |  |
|          | Enciency, Battery quanty                                                                                                                                                | 10    |  |  |  |  |  |
|          | lotal                                                                                                                                                                   | 40    |  |  |  |  |  |

# Course Name : All Branches of Diploma in Engineering & Technology Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG Industrial Training (Optional) after 4<sup>th</sup> semester examination.

Note:- Examination in Professional Practices of 5<sup>th</sup> Semester.

#### INDUSTRIAL TRAINING (OPTIONAL)

#### Rational:-

There was a common suggestion from the industry as well as other stakeholders that curriculum of Engineering and Technology courses should have Industrial training as part of the curriculum. When this issue of industrial training was discussed it was found that it will be difficult to make industrial training compulsory for all students of all courses as it will be difficult to find placement for all the students. It is therefore now proposed that this training can be included in the curriculum as optional training for student who is willing to undertake such training on their own. The institutes will help them in getting placement or also providing them requisite documents which the student may need to get the placement.

Details:- Student can undergo training in related industries as guided by subject teachers / HOD.

- The training will be for four weeks duration in the summer vacation after the fourth semester examination is over.
- The student undergoing such training will have to submit a report of the training duly certified by the competent authority from the industry clearly indicating the achievements of the student during training. This submission is to be made after joining the institute for Fifth semester.
- The student completing this training will have to deliver a seminar on the training activities based on the report in the subject Professional Practices at Fifth Semester.
- The student undergoing this training will be exempted from attending activities under Professional Practices at Fifth semester except the seminar. The report, the delivery of the seminar and actual experience in training will be evaluated as term work and will be given marks out of 50.
- The students who will not undergo such training will have to attend Professional Practices Classes/activities of fifth semester and will have to complete the tasks given during the semester under this head.
- There work will be evaluated on their submissions as per requirement and will be given marks out of 50. Or student may have to give seminar on training in Industry he attended.
- Institute shall encourage and guide students for Industry training.

(C) Sah

| w.e.f Academic Year 2012-13 'G' Scheme                                                                                                                                  |                                                                                                                                                                              |            |             |         |        |         |                       |          |         |           |               |               |         |         |        |               |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-------------|---------|--------|---------|-----------------------|----------|---------|-----------|---------------|---------------|---------|---------|--------|---------------|
|                                                                                                                                                                         | MAHA                                                                                                                                                                         | RASHTR     | RA STAT     | E BO    | ARD    | OF T    | ECHNIC                | CAL ED   | UCAT    | ION, N    | AUMB          | AI            |         |         |        |               |
|                                                                                                                                                                         | <b>TEACHIN</b>                                                                                                                                                               | G AND E    | XAMINA      | TIO     | N SCI  | HEMI    | E FOR P               | OST S.S  | S.C. DI | PLOM      | A CO          | URSES         | 5       |         |        |               |
| COURSE NAME : ELECTRONICS ENGINEERING GROUP                                                                                                                             |                                                                                                                                                                              |            |             |         |        |         |                       |          |         |           |               |               |         |         |        |               |
| COURSE CODE : EJ/ET/EX/EN/ED/EI                                                                                                                                         |                                                                                                                                                                              |            |             |         |        |         |                       |          |         |           |               |               |         |         |        |               |
| DURATION OF COURSE : 6 SEMESTERS for ET/EN/EX/EJ and 8 SEMESTERS for ED/EI       WITH EFFECT FROM 2012-13                                                               |                                                                                                                                                                              |            |             |         |        |         |                       |          |         |           |               |               |         |         |        |               |
| SEM                                                                                                                                                                     | ESTER : FOURTH                                                                                                                                                               |            |             |         |        |         |                       |          |         | Ι         | DURA'         | TION :        | 16 W    | EEKS    |        |               |
| FULI                                                                                                                                                                    | L TIME / PART TIME : FULL T                                                                                                                                                  | TIME       | -           | -       |        |         |                       |          |         | 5         | <b>SCHE</b> I | ME : G        |         |         |        |               |
|                                                                                                                                                                         | SUBJECT TITLE                                                                                                                                                                |            |             | ТЕ      | ACHI   | NG      |                       |          | EXA     | MINAT     | TION SO       | CHEME         |         |         |        |               |
| SR.<br>NO                                                                                                                                                               |                                                                                                                                                                              | Abbrevi    | SUB<br>CODE | S       | CHEM   | E       | PAPER                 | ТН       | (1)     | PR        | (4)           | OR            | (8)     | TW      | (9)    | SW<br>(17400) |
| 110.                                                                                                                                                                    |                                                                                                                                                                              | auon       | CODE        | ТН      | TU     | PR      | HRS.                  | Max      | Min     | Max       | Min           | Max           | Min     | Max     | Min    | (17400)       |
| 1                                                                                                                                                                       | Environmental Studies \$                                                                                                                                                     | EST        | 17401       | 01      |        | 02      | 01                    | 50#*     | 20      |           |               |               |         | 25@     | 10     |               |
| 2                                                                                                                                                                       | Industrial Measurements β                                                                                                                                                    | IME        | 17434       | 03      |        | 02      | 03                    | 100      | 40      |           |               |               |         | 25@     | 10     |               |
| 3                                                                                                                                                                       | Analog Communication                                                                                                                                                         | ACO        | 17440       | 03      |        | 02      | 03                    | 100      | 40      | 25#       | 10            |               |         | 25@     | 10     |               |
| 4                                                                                                                                                                       | Power Electronics                                                                                                                                                            | PEL        | 17444       | 03      |        | 02      | 03                    | 100      | 40      | 25#       | 10            |               |         | 25@     | 10     | 50            |
| 5                                                                                                                                                                       | Linear Integrated Circuits $\beta$                                                                                                                                           | LIC        | 17445       | 04      |        | 02      | 03                    | 100      | 40      | 50#       | 20            |               |         | 25@     | 10     |               |
| 6                                                                                                                                                                       | Visual Basic β                                                                                                                                                               | VBA        | 17043       | 01      |        | 02      |                       |          |         |           |               |               |         | 25@     | 10     |               |
| 7                                                                                                                                                                       | Professional Practices-II β                                                                                                                                                  | PPT        | 17044       |         |        | 03      |                       |          |         |           |               |               |         | 50@     | 20     |               |
|                                                                                                                                                                         |                                                                                                                                                                              |            | TOTAL       | 15      |        | 15      |                       | 450      |         | 100       |               |               |         | 200     |        | 50            |
| **                                                                                                                                                                      | Industrial Training (Optional)                                                                                                                                               |            |             | Exam    | ninati | on in a | 5 <sup>th</sup> Semes | ter Prof | fession | al Prac   | tices-I       | II            |         |         |        |               |
| Stude                                                                                                                                                                   | nt Contact Hours Per Week: <b>30 Hr</b>                                                                                                                                      | S.         |             |         |        |         |                       |          |         |           |               |               |         |         |        |               |
| THE                                                                                                                                                                     | URY AND PRACTICAL PERIO                                                                                                                                                      | DS OF 60   | MINUT       | ES EA   | АСН.   |         |                       |          |         |           |               |               |         |         |        |               |
| Total                                                                                                                                                                   | Marks: <b>800</b>                                                                                                                                                            | assmant [  |             | No      | Thoo   | w Evo   | mination              | ¢ Con    | mon t   | a all bro | nchos         | #* 0          | nlina T | boory E | Ivomir | ation         |
| @- m<br>β - Co                                                                                                                                                          | mmon to DE / EV / MU                                                                                                                                                         |            |             |         | Theor  | ГУ ЦЛА  | innination,           | φ - Con  | mon u   |           | unenes,       | #* <b>-</b> O | inne i  | neory L | ланнн  | ation,        |
| p 00                                                                                                                                                                    |                                                                                                                                                                              |            |             |         |        |         |                       |          |         |           |               |               |         |         |        |               |
| Abbre                                                                                                                                                                   | eviations: TH-Theory, TU- Tutorial                                                                                                                                           | , PR-Pract | ical, OR-   | Oral, 7 | [W- ]  | Cerm V  | Work, SW              | - Sessio | nal Wo  | rk.       |               |               |         |         |        |               |
| ** Ind                                                                                                                                                                  | ** Industrial Training (Optional) - Student can undergo Industrial Training of four weeks after fourth semester examination during summer vacation.                          |            |             |         |        |         |                       |          |         |           |               |               |         |         |        |               |
| Assess                                                                                                                                                                  | Assessment will be done in Fifth semester under Professional Practices-III. They will be exempted from activities of Professional Practices-III of 5 <sup>th</sup> Semester. |            |             |         |        |         |                       |          |         |           |               |               |         |         |        |               |
| Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subjects is to be converted out of 50 marks as sessional work (SW) |                                                                                                                                                                              |            |             |         |        |         |                       |          |         |           |               |               |         |         |        |               |
| Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.                                           |                                                                                                                                                                              |            |             |         |        |         |                       |          |         |           |               |               |         |         |        |               |
| Þ                                                                                                                                                                       | Code number for TH, PR, OR and TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.                                                                     |            |             |         |        |         |                       |          |         |           |               |               |         |         |        |               |
|                                                                                                                                                                         |                                                                                                                                                                              |            |             |         |        |         |                       |          |         |           |               |               |         |         |        |               |
|                                                                                                                                                                         |                                                                                                                                                                              |            |             |         |        |         |                       |          |         |           |               |               |         |         |        |               |

Course Name : All Branches of Diploma in Engineering & Technology Course Code : AE/CE/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/

#### ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG/AU

Semester : Fourth

Subject Title : Environmental Studies

Subject Code : 17401

**Teaching and Examination Scheme:** 

| Teac | ching Scl | heme | Examination Scheme |      |    |    |     |       |  |  |
|------|-----------|------|--------------------|------|----|----|-----|-------|--|--|
| TH   | TU        | PR   | PAPER<br>HRS       | TH   | PR | OR | TW  | TOTAL |  |  |
| 01   |           | 02   | 01                 | 50#* |    |    | 25@ | 75    |  |  |

#### **#\* Online Theory Examination**

NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Environment essentially comprises of our living ambience, which gives us the zest and verve in all our activities. The turn of the twentieth century saw the gradual onset of its degradation by our callous deeds without any concern for the well being of our surrounding we are today facing a grave environmental crisis. The unceasing industrial growth and economic development of the last 300 years or so have resulted in huge ecological problems such as overexploitation of natural resources, degraded land, disappearing forests, endangered species, dangerous toxins, global warming etc.

It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

The curriculum covers the aspects about environment such as Environment and Ecology, Environmental impacts on human activities, Water resources and water quality, Mineral resources and mining, Forests, etc.

General Objectives: The student will be able to,

- 1. Understand importance of environment
- 2. Know key issues about environment
- 3. Understands the reasons for environment degradation
- 4. Know aspects about improvement methods
- 5. Know initiatives taken by the world bodies to restrict and reduce degradation



| Topic and Contents                                                                                                   | Hours | Marks |
|----------------------------------------------------------------------------------------------------------------------|-------|-------|
| Topic 1: Nature of Environmental Studies                                                                             |       |       |
| Specific Objectives:                                                                                                 |       |       |
| Define the terms related to Environmental Studies                                                                    |       | 04    |
| State importance of awareness about environment in general public                                                    | 01    |       |
| Contents:                                                                                                            | 01    | 04    |
| • Definition, Scope and Importance of the environmental studies                                                      |       |       |
| Importance of the studies irrespective of course                                                                     |       |       |
| Need for creating public awareness about environmental issues                                                        |       |       |
| <b>Topic 2: Natural Resources and Associated Problems</b>                                                            |       |       |
| Specific Objectives:                                                                                                 |       |       |
| Define natural resources and identify problems associated with                                                       |       |       |
| them                                                                                                                 |       |       |
| Identify uses and their overexploitation                                                                             |       |       |
| Identify alternate resources and their importance for environment                                                    |       |       |
| Contents:                                                                                                            |       |       |
| 2.1 Renewable and Non renewable resources                                                                            |       |       |
| • Definition                                                                                                         |       |       |
| • Associated problems                                                                                                |       |       |
| 2.2 Forest Resources                                                                                                 |       |       |
| • General description of forest resources                                                                            |       |       |
| • Functions and benefits of forest resources                                                                         |       |       |
| • Effects on environment due to deforestation, l'imber                                                               |       |       |
| extraction, Building of dams, waterways etc.                                                                         | 04    | 10    |
| 2.5 Water Resources<br>Hydrosphere: Different sources of water                                                       |       |       |
| Hydrosphere. Different sources of water                                                                              |       |       |
| Ose and overexploitation of surface and ground water     Effect of floods, drought, doms ato, on water resources and |       |       |
| • Effect of floods, draught, dams etc. on water resources and                                                        |       |       |
| 2.4 Mineral Resources:                                                                                               |       |       |
|                                                                                                                      |       |       |
| Categories of mineral resources                                                                                      |       |       |
| Basics of mining activities                                                                                          |       |       |
| • Mine safety                                                                                                        |       |       |
| • Effect of mining on environment                                                                                    |       |       |
| 2.5 Food Resources:                                                                                                  |       |       |
| • Food for all                                                                                                       |       |       |
| • Effects of modern agriculture                                                                                      |       |       |
| World food problem                                                                                                   |       |       |
| Topic 3. Ecosystems                                                                                                  |       |       |
| Concept of Ecosystem                                                                                                 |       |       |
| Structure and functions of ecosystem                                                                                 | 01    | 04    |
| • Energy flow in ecosystem                                                                                           |       |       |
| <ul> <li>Major ecosystems in the world</li> </ul>                                                                    |       |       |
| Topic 4. Biodiversity and Its Conservation                                                                           |       |       |
| Definition of Biodiversity                                                                                           | 02    | 06    |
| • Levels of biodiversity                                                                                             |       | ~~    |
| 08 |
|----|
| 08 |
| 08 |
| 08 |
|    |
|    |
|    |
|    |
|    |
|    |
|    |
|    |
| 10 |
| 10 |
|    |
|    |
|    |
|    |
|    |
| 08 |
| 00 |
|    |
|    |
|    |
|    |
|    |
| -  |

#### Practical: Skills to be developed:

# Intellectual Skills:

- 1. Collection of information, data
- 2. Analysis of data
- 3. Report writing

# **Motor Skills:**

- 1. Presentation Skills
- 2. Use of multi media

# List of Projects:

Note: Any one project of the following:

- 1. Visit to a local area to document environmental assets such as river / forest / grassland / hill / mountain
- 2. Visit to a local polluted site: Urban/Rural/Industrial/Agricultural
- 3. Study of common plants, insects, birds

5

4. Study of simple ecosystems of ponds, river, hill slopes etc

Prepare a project report on the findings of the visit illustrating environment related facts, analysis and conclusion. Also suggest remedies to improve environment.

Learning Resources: Books:

| Sr.<br>No. | Author                                                | Author Title                                 |                         |
|------------|-------------------------------------------------------|----------------------------------------------|-------------------------|
| 01         | Anindita Basak                                        | Environmental Studies                        | Pearson Education       |
| 02         | R. Rajgopalan                                         | Environmental Studies<br>from Crises to Cure | Oxford University Press |
| 03         | Dr. R. J. Ranjit Daniels, Dr.<br>Jagdish Krishnaswamy | Environmental Studies                        | Wiley India             |

| Course Name   | : Electronics Engineering Group |
|---------------|---------------------------------|
| Course Code   | : EJ/EX/ET/EN/IS/IC/IE/IU       |
| Semester      | : Fourth                        |
| Subject Title | : Industrial Measurements       |
| Subject Code  | : 17434                         |
|               |                                 |

**Teaching and Examination Scheme:** 

| Teaching Scheme |    |    |              |     | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|-----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH  | PR        | OR        | TW  | TOTAL |
| 03              |    | 02 | 03           | 100 |           |           | 25@ | 125   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

The science of instrumentation system plays vital role in the development of technology. An electronic system has prime importance in the field of instrumentation. Most of the physical parameters can be converted into electrical signal with the use of transducers. The obtained electrical signal can be conditioned, processed, displayed and controlled with the use of advanced control system.

With the background of measuring instruments, this subject deals with measurement of different physical parameters like temperature, pressure etc. covering the entire gamut of industrial measurement. Different types of transducers used for measurement of different physical quantities with their construction, working principle, advantages, and disadvantages are studied through this subject.

#### **General Objectives:**

After studying this subject the students will be able to:

- 1) Understand the nature and working of instrumentation system used in industrial & general applications.
- 2) Classify the physical parameters with their proper units
- 3) Understand the concepts of different types of transducers

## **Learning Structure:**



# **Theory Contents:**

| Topic<br>No | Theory                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Hrs. | Marks |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|
|             | <ul> <li>Transducers:</li> <li>Specific Objectives:</li> <li>Draw and describe the block diagram of Instrumentation system.</li> <li>Compare different Transducers</li> <li>Draw and describe different Electronic Transducers.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |       |
| 1           | <ul> <li>Contents <ul> <li>Instrumentation System:<br/>Block diagram of Instrumentation system: Function of each<br/>block, Explanation of basic instrumentation systems</li> <li>Transducer:<br/>Need of Transducer:<br/>Classification of transducers: Active and Passive, Analog and<br/>Digital, Primary and Secondary.</li> <li>Electrical Transducers:<br/>Resistive transducers- Linear &amp; Angular potentiometers<br/>Capacitive transducer<br/>Inductive transducer –LVDT, RVDT (As a displacement<br/>transducer)<br/>Piezoelectric transducer<br/>(Principle of operation and applications of above)</li> <li>Selection criterion of transducers</li> </ul> </li> </ul>                                                                                                                                              | 08   | 16    |
| 2           | <ul> <li>Pressure measurement</li> <li>Draw and describe the non-elastic and elastic pressure transducers.</li> <li>Draw and describe electronic pressure transducers.</li> <li>Write procedure of calibration of elastic pressure gauges using dead weight tester.</li> <li>Contents <ul> <li>Pressure:</li> <li>Definition</li> <li>Types - Absolute, Gauge, Atmospheric, Vacuum( Definition, Units)</li> </ul> </li> <li>Classification of Pressure measuring devices</li> <li>Non elastic pressure transducer:</li> <li>U tube</li> <li>Inclined Tube</li> <li>Well type manometer</li> <li>Elastic pressure transducer:</li> <li>Bourdon Tube</li> <li>Bellows</li> <li>Diaphragm</li> <li>Capsule</li> <li>Electronic pressure transducers:</li> <li>Bourdon tube with LVDT</li> <li>Diaphragm with Strain gauge</li> </ul> | 08   | 20    |

| 1 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |    |    |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|
|   | • Calibration of pressure gauge using dead weight tester<br><u>Note:</u> Each transducer should be studied on the basis of working                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |    |    |
|   | principle, construction, advantages, disadvantages and applications.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ļ  |    |
|   | <ul> <li>Flow Measurement</li> <li>List 0f different types of flow.</li> <li>List of different types of flow measuring transducers.</li> <li>Draw and describe construction and working of different Flow measuring transducers.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |    |    |
| 3 | <ul> <li>Contents <ul> <li>Flow:</li> <li>Definition</li> <li>Types of Flow –Laminar, turbulent, Reynolds number</li> </ul> </li> <li>Classification of flow measuring transducers : <ul> <li>Variable head flow meter- Venturimeter, orifice plate meter</li> <li>Variable area flow meter – Rota meter</li> <li>Electromagnetic Flow meter</li> <li>Ultrasonic flow meter- Doppler Type</li> </ul> </li> <li>Note: Each transducer should be studied on the basis of working</li> </ul>                                                                                                                                                                                                                                                                                                                                   | 06 | 14 |
| 4 | <ul> <li>Interple, construction, advantages, disadvantages and applications.</li> <li>Level Measurement</li> <li>State the need of level measurement.</li> <li>List of different level measuring methods.</li> <li>Draw the construction and describe working of Level measuring transducers.</li> <li>Contents         <ul> <li>Level:</li> <li>Definition</li> <li>Need of level measurement</li> <li>Classification of level measurement methods:</li> <li>Float type – linear &amp; rotary potentiometer (Contact type)</li> <li>Capacitive type (Contact type)</li> <li>Ultrasonic type (Non-contact type)</li> <li>RADAR type (Non-contact type)</li> </ul> </li> <li>Note: Each transducer should be studied on the basis of working principle, construction, advantages, disadvantages and applications.</li> </ul> | 08 | 16 |
| 5 | <ul> <li>Temperature measurement</li> <li>List different temperature measuring scales and its conversions.</li> <li>List different temperature measuring transducers.</li> <li>Draw the construction and describe working of different temperature transducers.</li> <li>Contents <ul> <li>Temperature :</li> <li>Definition and units</li> <li>Different temperature scales &amp; their conversions</li> </ul> </li> <li>Classification of temperature measuring transducers:</li> </ul>                                                                                                                                                                                                                                                                                                                                   | 10 | 20 |

|   | Bimetallic thermometer<br>Thermistors<br>RTD – (PT-100), 2 wire systems ( circuit diagram only )<br>Thermocouple – Seeback & Peltier effect, Types J, K, R, S, T (<br>Based on material, temperature ranges)<br>Pyrometer - Optical, Radiation                                                                                                                                                                                                                                                                                                                       |    |     |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
|   | principle, construction, advantages, disadvantages and applications.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |    |     |
|   | Special Transducers and Measurements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |    |     |
| б | <ul> <li>List different types of humidity and its units.</li> <li>Draw the construction and describe working of Humidity transducers.</li> <li>Draw the construction and describe working of Speed measuring transducers.</li> <li>Contents         <ul> <li>Humidity: Definition Types - Absolute, relative</li> <li>Humidity measurement devices: Psychrometer - Dry &amp; wet Bulb thermometer type Hygrometer- hair type ,</li> <li>Speed Definition Classification of speed measurement methods Photoelectric pick-up (Non contact type)</li> </ul> </li> </ul> | 08 | 14  |
|   | <b><u>INOLE:</u></b> Each transducer should be studied on the basis of working principle construction advantages disadvantages and                                                                                                                                                                                                                                                                                                                                                                                                                                   |    |     |
|   | applications.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |    |     |
|   | Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 48 | 100 |

# Practical: Skills to be developed:

# **Intellectual Skills:**

- Selection of transducer based on application.
- > Interpretation of results.

# **Motor Skills:**

- > Connection of different transducers with measuring system.
- > Measurement of various physical parameters using transducers.
- > Observation and plotting the characteristics.

#### List of Practicals:

| Sr. No. | Title of the Experiment                                                     |  |  |  |
|---------|-----------------------------------------------------------------------------|--|--|--|
| 1       | Measure displacement using LVDT                                             |  |  |  |
| 2       | Measure weight using strain gauge pressure transducer with cantilever setup |  |  |  |
| 3       | Measure pressure using Bourdon tube pressure gauge                          |  |  |  |

| 4  | Calibrate pressure gauge using Dead weight pressure gauge tester             |
|----|------------------------------------------------------------------------------|
| 5  | Determine the rate of flow of liquid in pipe using Rotameter                 |
| 6  | Calculate flow through pipe using orifice meter                              |
| 7  | Measure temperature of liquid using Resistance Temperature Detector (PT 100) |
| 8  | Measure temperature of liquid using thermocouple                             |
| 9  | Observe and interpret humidity of air using wet and dry bulb Hygrometer      |
| 10 | Measure speed of motor using non contact type photo electric tachometer.     |

# **Learning Resources:**

#### 1. Books:

| Sr.<br>No. | Author                         | Title                                                         | Publisher                                         |  |
|------------|--------------------------------|---------------------------------------------------------------|---------------------------------------------------|--|
| 01         | A.K.Sawhney                    | Electrical and Electronic<br>Measurements and Instrumentation | Dhanpat Rai & Sons.                               |  |
| 02         | S.K.Singh                      | Industrial Instrumentation & Control                          | Tata McGraw Hill Publishing<br>Co. Ltd; N. Delhi  |  |
| 03         | D. Patranabis                  | Principles of Industrial Instrumentation                      | Tata McGraw Hill Publishing<br>Co. Ltd; N. Delhi  |  |
| 04         | Rangan Mani<br>Sharma          | Instrumentation Systems and Devices                           | Tata McGraw Hill Publishing<br>Co. Ltd; N. Delhi  |  |
| 05         | Bela Liptak<br>Kriszta Venczel | Process Measurement<br>Instrument Engineers Handbook          | Chilton Book Co.                                  |  |
| 06         | B.C.Nakra<br>K.K.Chaudhry      | Instrumentation Measurement and Analysis                      | Tata McGraw Hill Publishing<br>Co. Ltd; N. Delhi. |  |

# 2. CD/ PPTs etc.:

- www.proprofs.com/webschool
- ➤ www.osvn.com

### 3. Websites

- http://en.wikipedia.org/wiki/
- > www.youtube.com/ "here type name of instrument"
- ➢ www.controlnet.com

| Course Name   | : Electronics Engineering Group |
|---------------|---------------------------------|
| Course Code   | : EJ/EX/ET/EN/IS/IC/IE/IU       |
| Semester      | : Fourth                        |
| Subject Title | : Analog Communication          |
| Subject Code  | : 17440                         |

**Teaching and Examination Scheme:** 

| Teaching Scheme |    |    |              |     | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|-----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH  | PR        | OR        | TW  | TOTAL |
| 03              |    | 02 | 03           | 100 | 25#       |           | 25@ | 150   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Electronic Communication plays vital role in our lives. Development of communication Technology has increased its application in allied field of electronics including Telephony, telegraphy, satellite, Mobile, RADAR, industrial controls, online application like internet banking, ATM machine, Wireless network, optical communication, Mobile communication system.

Analog communication is a foundation for all advanced subjects in communication engineering. This subject will focus on the operation of analog transmission and reception techniques. This subject also deals with pulse modulation and their different types.

Study of Elements of Electronics, Electronic Devices and Circuits is prerequisite for Analog communication subject.

#### **General Objectives:**

The student will able to

- 1. Know different electronic communication systems.
- 2. Understand concept of modulation and demodulation of AM / FM.
- 3. Understand the operation of AM/ FM transmitter and receiver.
- 4. Understand the concept of radio wave propagation.

## **Learning Structure:**



# **Theory Contents:**

| Topic | Theory                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Hrs. | Marks |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|
| 110   | Basics of Electronic Communication                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |       |
| 1     | <ul> <li>Basics of Electronic Communication.</li> <li>Specific Objectives:</li> <li>Student will be able to-</li> <li>&gt; Draw block diagram of electronic communication system</li> <li>&gt; Identify types of electronic communication systems.</li> <li>&gt; Draw electromagnetic spectrum.</li> <li>Contents: <ul> <li>The importance of electronic communication.</li> <li>Definition: Analog signal, Digital signal, Baseband signal</li> <li>The elements of basic electronic communication system (Draw block diagram and explain each block.):</li> <li>Noise in communication system and types</li> <li>Types of electronic communication. Simplex, Duplex- full /</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 04   | 06    |
|       | <ul> <li>half.</li> <li>The electromagnetic spectrum.</li> <li>Concept of transmission bandwidth.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |       |
| 2     | <ul> <li>Modulation Techniques</li> <li>Specific Objectives:</li> <li>State the importance of modulation.</li> <li>Explain the process of different modulation techniques.</li> <li>Compute the modulation index.</li> <li>Differentiate between CW and pulse modulation techniques.</li> <li>Contents:</li> <li>2.1 Basics of Modulation [04]</li> <li>Need for modulation [04]</li> <li>Need for modulation [06]</li> <li>Modulation index-definition, waveforms</li> <li>2.2 Amplitude Modulation [06]</li> <li>Modulation index-definition, its effect on modulated signal, simple numerical.</li> <li>Mathematical representation of amplitude modulated wave &amp; its meaning., concepts of side band (SSB,DSB)</li> <li>Bandwidth requirement</li> <li>Block diagram of AM transmitter and its operation</li> <li>Representation of AM signal in time &amp; frequency domain</li> <li>Power relations in AM wave, simple numerical</li> <li>Circuit and operation of AM modulators using BJT/FET</li> <li>2.3 Frequency modulation [08]</li> <li>Deviation ratio, maximum deviation ratio, mathematical representation of FM &amp; its meaning</li> <li>Representation of FM signal in time domain &amp; frequency domain</li> <li>Bandwidth requirements and simple numerical</li> <li>Concept of Pre-emphasis &amp; De-emphasis</li> <li>Generation of FM -Reactance modulator, varactor diode modulator, Armstrong: circuit diagram and its working</li> <li>FM signal generation using ICs 566,564</li> <li>2.4 Pulse Modulation Techniques. [06]</li> </ul> | 12   | 24    |

|   | Need of Pulse Modulation                                                                     |    |    |
|---|----------------------------------------------------------------------------------------------|----|----|
|   | <ul> <li>DAM DWM DDM Block diagram wavaforms advantages &amp;</li> </ul>                     |    |    |
|   | • I AW, I WW, I I W- DIOCK diagram, waveforms, advantages & disadvantages & their comparison |    |    |
|   | Concretion of DAM transisterized circuit. Concretion of                                      |    |    |
|   | • Generation of PAM transitionized circuit, Generation of<br>DWM, DDM using IC 555           |    |    |
|   | P w M, PP W using IC 333.                                                                    |    |    |
|   | Radio Receiver                                                                               |    |    |
|   | Specific Objectives:                                                                         |    |    |
|   | State super neterodyne principle Compare TDE 8 compare bottom down and income.               |    |    |
|   | Furlain the terms Automatic Encourage Control (AEC) and                                      |    |    |
|   | Automatia Cain Control (ACC)                                                                 |    |    |
|   | Contents:                                                                                    |    |    |
|   | 2.1 Dadio Daggiyor Types:                                                                    |    |    |
|   | 5.1. Radio Receiver Types. [06]                                                              |    |    |
|   | • Block diagram of luned Radio Frequency receiver and its                                    |    |    |
|   | working with waveforms.                                                                      |    |    |
|   | • Block diagram of AM superheterodyne receiver and its                                       |    |    |
|   | working with waveforms.                                                                      |    |    |
|   | • RF Section and Characteristics of AM radio receiver                                        |    |    |
| 3 | Sensitivity, selectivity, fidelity.                                                          | 14 | 24 |
| 5 | • Image frequency and its rejection, Double spotting                                         | 11 | 21 |
|   | • Frequency changing and tracking.                                                           |    |    |
|   | 3.2. Demodulation of AM signal. [04]                                                         |    |    |
|   | • Diode detector, practical diode detector.                                                  |    |    |
|   | • Need of AGC & its types – simple, delayed.                                                 |    |    |
|   | 3.3 FM receiver : [06]                                                                       |    |    |
|   | Block diagram and explanation of FM Super heterodyne radio                                   |    |    |
|   | receiver with waveforms.                                                                     |    |    |
|   | Circuit diagram and working of limiter                                                       |    |    |
|   | 3.4 FM detector Types : [06]                                                                 |    |    |
|   | Balanced slope detector                                                                      |    |    |
|   | Phase Discriminator                                                                          |    |    |
|   | • Ratio detector.                                                                            |    |    |
|   | • PLL as FM demodulator.                                                                     |    |    |
|   | Topic.4 Transmission line                                                                    |    |    |
|   | Specific Objectives:                                                                         |    |    |
|   | Explain the theory of transmission line in general.                                          |    |    |
|   | Calculate characteristics impedance of transmission line.                                    |    |    |
|   | > Define the terms standing wave, SWR, VSWR.                                                 |    |    |
|   | Analyze the properties of impedance matching stubs.                                          |    |    |
|   | Contents:                                                                                    |    |    |
|   | 4.1 Fundamentals of transmission line. [04]                                                  |    |    |
| 4 | • Equivalent circuit of transmission line (general, RF                                       | 08 | 18 |
|   | equivalents.)                                                                                |    | -0 |
|   | • Characteristics impedance and its method of calculation,                                   |    |    |
|   | simple inumerical.                                                                           |    |    |
|   | • Losses in transmission line.                                                               |    |    |
|   | 4.2 Standing waves [08]                                                                      |    |    |
|   | • with load terminals open circuited & short circuited                                       |    |    |
|   | • SWR, VSWR, Reflection coefficient, simple Numerical.                                       |    |    |
|   | • Quarter wave & half wave length line.                                                      |    |    |
|   | • Impedance inversion by quarter wave length line.                                           |    |    |

|   | <ul> <li>Quarter wave transformer &amp; impedance matching</li> <li>Properties of line of various lengths.</li> <li>4.3 Impedance Matching <ul> <li>Stub: single &amp; double.</li> <li>Baluns</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |    |     |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
| 5 | <ul> <li>Wave Propagation</li> <li>Specific Objectives:</li> <li>Explain the theory of electromagnetic radiation.</li> <li>State different types of wave propagation.</li> <li>Define the various atmospheric layers</li> <li>Define the terms maximum usable frequency, critical frequency, skip distance &amp; fading.</li> <li>Contents:</li> <li>5.1 Fundamental of electromagnetic waves , Transverse electromagnetic wave, polarization [04]</li> <li>5.2 Types of Wave Propagation [08]</li> <li>Ground Wave.</li> <li>Sky wave, ionosphere &amp; its effect.</li> <li>Space Wave , Duct propagation</li> <li>Troposphere scatter propagation</li> <li>Concept of actual height &amp; virtual weight</li> <li>Critical frequency, skip distance &amp; fading, maximum usable frequency.</li> </ul>                                                                                                                                                         | 04 | 12  |
| 6 | <ul> <li>Antennas.</li> <li>Specific Objectives: <ul> <li>Define antenna.</li> <li>Define the term related with the antenna.</li> <li>Draw the structure, radiation pattern of antennas.</li> <li>State application of different antennas.</li> </ul> </li> <li>Contents: <ul> <li>Antenna fundamentals :</li> <li>Resonant antenna and Non-resonant antennas</li> <li>Definition : Radiation pattern , polarization, bandwidth, beam width, antenna resistance, directivity &amp; power gain, antenna gain</li> </ul> </li> <li>Beine the term for Dipole antenna (Resonant Antenna) &amp; its Radiation pattern.</li> <li>Folded dipole antenna &amp; its radiation pattern.</li> <li>Radiation pattern for Dipole Antenna of different length.</li> </ul> <li>6.3 Structure, radiation pattern &amp; application of antennas. <ul> <li>Icoop antenna.</li> <li>Yagi-Uda antenna</li> <li>Micro wave antenna – Dish antenna &amp; Horn antenna</li> </ul> </li> | 06 | 16  |
|   | Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 48 | 100 |

# Practical: Intellectual Skills:

1. Interpret the output results

# **Motor Skills:**

- 1. Testing and observing the waveforms at various stages
- 2. Fault finding
- 3. Measurement of different parameters like sensitivity, selectivity, fidelity
- 4. Small circuit development

# List of Practical's

| Sr.<br>No. | Title of the Experiment                                                                                    |  |
|------------|------------------------------------------------------------------------------------------------------------|--|
| 01         | Observe and draw the waveform of AM and calculate modulation index of AM.                                  |  |
| 02         | Observe and draw input / output waveforms of AM detector.                                                  |  |
| 03         | Observe and draw the waveform of FM and calculate modulation index of FM.                                  |  |
| 04         | Observe and draw the waveforms of FM modulator using IC 566.                                               |  |
| 05         | Observe and draw the waveforms of FM demodulator using IC 564 / IC 565.                                    |  |
| 06         | Observe the waveforms at various points in AM receiver. Trouble shooting and fault finding in AM receiver. |  |
| 07         | Observe and plot the graph of RF characteristics of Radio Receiver: Sensitivity & Fidelity                 |  |
| 08         | Generate PAM and observe the waveforms of PAM.                                                             |  |
| 09         | Generate PWM, PPM and observe the waveforms of PWM, PPM using IC's.                                        |  |
| 10         | Plot the radiation pattern of dipole and Yagi-Uda antenna.                                                 |  |
| 11         | Measure the characteristic impendence of co-axial cable. Find the impendence and VSWR.                     |  |
| 12         | Visit to the Radio Transmitter station and write a Transmitter specification.                              |  |

# Learning Resources:

# 1. Books:

| Sr.<br>No. | Author                                            | Title                            | Publisher                                    |
|------------|---------------------------------------------------|----------------------------------|----------------------------------------------|
| 01         | George Kennedy,<br>Bernard Davis,<br>SRM Prasanna | Electronic Communication Systems | TATA Mc-Graw Hill 5 <sup>th</sup><br>Edition |
| 02         | Louis E Frenzel                                   | Communication Electronics        | TATA Mc-Graw Hill 5 <sup>th</sup><br>Edition |
| 03         | V Chandra Sekar                                   | Analog Communication             | Oxford University Press                      |
| 04         | Roddy Collen                                      | Electronic Communication         | Prentice Hall India                          |
| 05         | Wayne Tomasi                                      | Electronic Communication Systems | Pearson                                      |

- 1) en.wikipedia.org
- 2) www.masd .k12.pa.us ( Electromagnetic Spectrum)
- 3) www.staff.ncl.ac.uk (modulation & demodulation)
- 4) circuitdiagram.net/am-radio-receiver.html (AM radio receiver circuit diagram)
- 5) http://www.circuitdiagram.org/am-radio-receiver-with-mk484.html
- 6) www.circuitstoday.com/single-chip-fm-radio-circuit

# List of equipments:

- 1. CRO, Function generator, spectrum analyzer, DMM
- 2. AM,FM,PAM,PWM,PPM Modulation/ Demodulation trainer kits
- 3. Transmission line trainer kit/ Coaxial cable e.g. (RG174) -100mtrs.
- 4. Antenna demonstration kit/ Antenna for measuring its parameters

| Course Name   | : Electronics Engineering Group    |
|---------------|------------------------------------|
| Course Code   | : ET/EN/EX/EJ/DE/ED/EI/IS/IC/IE/IU |
| Semester      | : Fourth                           |
| Subject Title | : Power Electronics                |
| Subject Code  | : 17444                            |

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |     | Examination | on Scheme |     |       |
|-----------------|----|----|--------------|-----|-------------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH  | PR          | OR        | TW  | TOTAL |
| 03              |    | 02 | 03           | 100 | 25#         |           | 25@ | 150   |

# NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Day by day the change in Electronics Industry is dynamic. The role of Diploma engineers changed over the years. Engineers should have concepts of industrial electronics. Electronic control circuits have major role in Industries for which study of power devices is essential.

Concepts of electronic devices and circuits along with their applications are necessary. Industrial electronic is the foundation subject to study industrial drives, and advanced industrial electronics.

#### **Objectives:**

Students will be able to:

- 1. Understand construction and operating principle of various power electronic devices.
- 2. Study construction and operation of controlled rectifiers, choppers and inverter and industrial control circuits.

## **Learning Structure:**



# Theory:

| Topic<br>No | Contents                                                                      | Hours | Marks |
|-------------|-------------------------------------------------------------------------------|-------|-------|
|             | Power Electronics                                                             |       |       |
|             | Specific Objectives:                                                          |       |       |
|             | Realize construction, working principle of different Power                    |       |       |
|             | Devices.                                                                      |       |       |
|             | > To select proper power device for particular applications.                  |       |       |
|             | Contents:                                                                     |       |       |
|             | • Introduction to power electronics.                                          |       |       |
| 1           | • Power transistor: Construction Operating Principle V-I                      | 04    | 10    |
|             | characteristics and Uses of power transistors.                                |       |       |
|             | • Power MOSFET- Construction Operating Principle V-I                          |       |       |
|             | characteristics and Uses of Depletion and Enhancement type                    |       |       |
|             | nower MOSFET                                                                  |       |       |
|             | • IGBT- Construction Operating Principle V-I characteristics                  |       |       |
|             | and Uses of IGBT                                                              |       |       |
|             | Thyristor Family Devices                                                      |       |       |
|             | Snecific Objectives                                                           |       |       |
|             | <ul> <li>Classify different nower devices.</li> </ul>                         |       |       |
|             | <ul> <li>Identify thyristors and triggering devices</li> </ul>                |       |       |
|             | <ul> <li>Describe the operation of thyristor.</li> </ul>                      |       |       |
|             | <ul> <li>Describe the operation of different nower devices.</li> </ul>        |       |       |
|             | Contents:                                                                     |       |       |
|             | • SCR: Construction Operating Principle with Two transistor                   |       |       |
| 2           | analogy V-I characteristics I atching Current (I <sub>1</sub> ) and           | 10    | 20    |
| 2           | Holding Current (I <sub>u</sub> ) Applications of SCR LASCR SCS               | 10    | 20    |
|             | GTO and TRIAC                                                                 |       |       |
|             | • Thyristor family devices LASCR SCS GTO and TRIAC                            |       |       |
|             | Construction Operating Principle V-I characteristics and                      |       |       |
|             | applications                                                                  |       |       |
|             | <ul> <li>Triggering Devices- Construction Operating Principle, V-I</li> </ul> |       |       |
|             | characteristics and applications of UIT PUT SUS SBS and                       |       |       |
|             | DIAC                                                                          |       |       |
|             | Turn ON and Turn OFF methods of SCR                                           |       |       |
|             | Specific Objectives:                                                          |       |       |
|             | Classify Turn ON and Turn OFF circuits.                                       |       |       |
|             | > Compare low power and high power triggering circuits                        |       |       |
|             | Contents:                                                                     |       |       |
|             | • Concept of Turn ON mechanism of SCR: High Voltage                           |       |       |
|             | triggering, thermal triggering, Illumination triggering, dv/dt                |       |       |
|             | triggering Gate triggering of SCR.                                            |       |       |
| 3           | • Gate trigger circuits –Resistance triggering circuit, Resistance            | 08    | 16    |
| _           | Capacitance triggering circuit (Operation, applications and                   |       | _     |
|             | limitations)                                                                  |       |       |
|             | • SCR triggering using UJT, PUT-Relaxation Oscillator circuit                 |       |       |
|             | and Synchronized UJT triggering circuit: (Operation and                       |       |       |
|             | applications).                                                                |       |       |
|             | • Pulse transformer used in triggering circuit (Operation and                 |       |       |
|             | applications).                                                                |       |       |
|             | • Concept of Turn OFF mechanism and methods of - Class A-                     |       |       |

|   | Series resonant commutation circuit,<br>Class B-Shunt resonant commutation circuit.                 |          |    |
|---|-----------------------------------------------------------------------------------------------------|----------|----|
|   | Class C-Complimentary Symmetry commutation circuit                                                  |          |    |
|   | Phase controlled Rectifiers                                                                         |          |    |
|   | Specific Objectives:                                                                                |          |    |
|   | Draw and explain concept of phase control.                                                          |          |    |
|   | Draw and interpret the phase control waveforms.                                                     |          |    |
|   | Derive the expression of average voltage of control                                                 |          |    |
|   | rectifier.                                                                                          |          |    |
|   | Solve the numerical examples on control rectifier.                                                  |          |    |
|   | Contents:                                                                                           |          |    |
|   | • Concept of phase control. (Firing Angle $\alpha$ and conduction                                   |          |    |
|   | angle $(\mathbf{\emptyset})$                                                                        |          |    |
| 4 | • Circuit diagram, working, equations for and Waveforms of V <sub>DC</sub> of following rectifiers. | 16       | 24 |
|   | • Single phase half wave controlled rectifier with R. RL load.                                      |          |    |
|   | Effect of freewheeling diode.                                                                       |          |    |
|   | • Single phase centre tapped full wave controlled rectifier with                                    |          |    |
|   | R, RL load. Effect of freewheeling diode.                                                           |          |    |
|   | • Single phase Bridge type full wave controlled rectifier with R,                                   |          |    |
|   | RL load. Effect of freewheeling diode.                                                              |          |    |
|   | • Basic three phase half wave uncontrolled and controlled                                           |          |    |
|   | rectifier.                                                                                          |          |    |
|   | Need and Uses of Polyphase rectifier.                                                               |          |    |
|   | Converters                                                                                          |          |    |
|   | Specific Objectives:                                                                                |          |    |
|   | Understand the concept of Chopper.                                                                  |          |    |
|   | Realize the concept of Inverter.                                                                    |          |    |
|   | Explain operation of Chopper and Inverter.                                                          |          |    |
|   | > List different applications of Chopper and Inverter.                                              |          |    |
| _ | Contents:                                                                                           | <u>.</u> |    |
| 5 | • Concept of Choppers                                                                               | 04       | 14 |
|   | • Chopper: basic circuit and its operation using MOSFET                                             |          |    |
|   | • Step Up and Step down Chopper using MOSFET basic circuits.                                        |          |    |
|   | <ul> <li>Inverters-Need of an inverter, Classification of inverters</li> </ul>                      |          |    |
|   | Important applications of inverter.                                                                 |          |    |
|   | • Working principle of single phase half bridge inverter.                                           | ļ        |    |
|   | • Definitions of performance parameters of inverter.                                                |          |    |
|   | Industrial Control Circuits.                                                                        |          |    |
|   | Specific Objectives:                                                                                |          |    |
|   | Understand the concept of Industrial Control Circuits.                                              |          |    |
|   | Draw the Circuit diagram and explain working of                                                     |          |    |
|   | Industrial control circuits.                                                                        |          |    |
| 6 | Draw the Block diagram and explain working of SMPS                                                  | 06       | 16 |
|   | and UPS.                                                                                            |          |    |
|   | Contents:                                                                                           |          |    |
|   | Urcuit diagram, working and applications of :                                                       |          |    |
|   | • Low power DU Hasher.                                                                              |          |    |
|   | • Light dimmer circuit using DIAC-TRIAC.                                                            |          |    |
|   | • Electronic timer using SCR.                                                                       |          |    |

| · Block diagram and concept of SMI 5.                 | Total | 48 | 100 |
|-------------------------------------------------------|-------|----|-----|
| <ul> <li>Block diagram and Concept of SMPS</li> </ul> |       |    |     |
| <ul> <li>Block diagram and Concept of UPS.</li> </ul> |       |    |     |
| • Speed Control of fan using TRIAC.                   |       |    |     |
| • Temperature Controller using SCR.                   |       |    |     |
| Emergency Lighting System.                            |       |    |     |
| • Battery charger using SCR.                          |       |    |     |

#### **Practical:**

Skills to be developed:

# **Intellectual Skills:**

- 1) Selection of proper devices and instruments.
- 2) Interpretation of characteristics under various conditions.

# **Motor Skills:**

- 1) Make accurate measurements.
- 2) Adjust proper firing angle.
- 3) Observe and draw the output waveforms
- 4) Conduct test on control circuits.

# **List of Practicals:**

- 1) Plot output characteristics of power transistor.
- 2) Plot V-I characteristics of IGBT.
- 3) Determine the break over voltage using of DIAC.
- 4) Determine latching current and holding current using I-V characteristics of SCR.
- 5) Effect of variation of R, C in R and RC triggering circuits on firing angle of SCR.
- 6) Effect of variation of R in UJT Triggering technique.
- 7) Draw the output waveforms of three phase half wave Rectifier using diodes.
- 8) Draw the output waveform of half wave controlled rectifier with resistive load and determine load voltage.
- Draw the output waveform of full wave controlled rectifier with resistive load, resistive-Inductive load, freewheeling Diode and determine load voltage.
- 10) Determine the effect of firing angle using DIAC and TRIAC on output power (using different loads such as bulb, motor or heater).

#### Learning Resources:

# 1. Books:

| Sr.<br>No | Author                        | Title                                                  | Publisher                                            |
|-----------|-------------------------------|--------------------------------------------------------|------------------------------------------------------|
| 01        | Alok Jain                     | Power Electronics and Its<br>Applications              | Penram International<br>Publishing (India) Pvt. Ltd. |
| 02        | S. K. Bhattacharya            | Fundamentals of Power<br>Electronics                   | ISTE Learning materials centre.                      |
| 03        | M D Singh<br>K B Khanchandani | Power Electronics                                      | Tata McGraw-Hill                                     |
| 04        | Muhammad H. Rashid            | Power Electronics Circuits<br>Devices and Applications | Prentice Hall of India                               |

# 2. Websites:

www.vikaspublishing.com www.scitechpublications.com www.tatamegrahill.com www.Phindia.com www.pearsoned.co.in www.wileyindia.com

| Course Name   | : Electronics Engineering Group          |
|---------------|------------------------------------------|
| Course Code   | : ET/EN/EX/EJ/IE/IS/IC/DE/EV/MU/IU/ED/EI |
| Semester      | : Fourth                                 |
| Subject Title | : Linear Integrated Circuits             |
| Subject Code  | : 17445                                  |

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              | Examinati | on Scheme |    |     |       |
|-----------------|----|----|--------------|-----------|-----------|----|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH        | PR        | OR | TW  | TOTAL |
| 04              |    | 02 | 03           | 100       | 50#       |    | 25@ | 175   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Modern age technology has developed on high density and high speed electronics circuits. Integrated circuits are basis of these high density circuits enabled to reduce size, weight and cost of equipments. They have intrinsic features such as low power consumption, low noise and ease of design.

Today the growth of any industry depends upon electronics to great extent. Contents of this subject are the basic building blocks of different analog circuits.

Basic operating and designing principle of such a large collection of circuits establishes a foundation for understanding new development in the electronics field, instrumentation and power control. This subject acquaints student with general analog principles and design methodologies using integrated circuit for system design.

Prerequisites various devices and circuits studied in elements of electronics and electronic devices and circuits. Prospects- LSI, MSI, VLSI.

#### **General Objectives:**

Students will be able to:

- Understand working principle of Op-Amp and IC555
- Develop electronics circuits using timer IC555 and Op-Amp

• Analyze the response of frequency selective circuits such as PLL with respect to the incoming signal.

# **Learning Structure:**

# **Application:**



# **Contents: Theory**

| Topic | Content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Hours | Marks |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
|       | <b>Operational Amplifier (Op-Amp):</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |       |
|       | Specific Objectives :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |       |
|       | Draw labeled block diagram of Op-Amp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |
|       | Specify and define Different parameters of Op-Amp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |       |
|       | Interpret ideal transfer characteristics of Op-Amp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |       |
|       | Contents:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |       |
|       | • Importance of Op-Amp:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |       |
|       | Block diagram of Op-Amp and function of each block with the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |       |
|       | circuit such as balanced, Unbalanced, differential amplifiers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |       |
|       | with simple current source, level shifter and complementary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |       |
| 1     | push-pull amplifier. Equivalent Circuit, Circuit Symbols And                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 12    | 10    |
|       | Terminals. Op-Amp IC-741 pin diagram and function.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |       |
|       | • Parameters of Op-Amp:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |       |
|       | Input offset voltage, Input offset current, Input bias current,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |       |
|       | differential input resistance, Input capacitance, Input voltage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |       |
|       | range, offset voltage adjustment range, Common Mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |       |
|       | Rejection Ratio (CMRR), Supply Voltage Rejection Ratio                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |       |
|       | (SVRR), large signal voltage gain and transfer characteristics,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |       |
|       | supply voltages, supply current, output voltage swing, output                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |       |
|       | resistance, slew rate, gain bandwidth product, output short                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |       |
|       | circuit current.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |       |
|       | <b>Op-Amp Configuration:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |       |
|       | Specific Objectives: Students will be able to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |       |
|       | Differentiate open and close loop configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |       |
|       | Identify inverting and non-inverting configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |       |
|       | Construct integrator and differentiator.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |       |
|       | <b>1</b> One of the state of the sta |       |       |
|       | 2.1 Open loop and closed loop configuration of Op-Amp, [08]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |       |
|       | its comparison. Virtual ground, virtual snort concept.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |       |
|       | Open loop configuration – inverting, Non-inverting                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |       |
| 2     | differential emplifier unity gain emplifier (voltage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 10    | 10    |
| 2     | follower) inverter(sign changer)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 12    | 10    |
|       | Tonower), inverter(sign changer)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |       |
|       | <b>2.2</b> Inverting and non-inverting configuration of [10]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |       |
|       | Adders (summing amplifier scaling Amplifier averaging                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |       |
|       | amplifier) Subtractor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |       |
|       | Basic Integrator                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |       |
|       | Basic Differentiator                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |
|       | Basic concept of frequency compensation of On-Amp and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |       |
|       | Offset nulling                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       |       |
|       | Numerical based on designing of above circuit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |       |
|       | Applications of Op-Amp:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |       |
|       | Specific Objectives:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |
|       | <ul> <li>Compute component values for instrumentation amplifier.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |       |
| 3     | Explain IC LM-324                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 12    | 22    |
|       | Explain different applications of Op-Amp.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |       |
|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |       |
|       | <b>3.1</b> Need for signal conditioning and signal processing. [08]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |       |

|   | Circuit diagram, operation, derivation of output voltage<br>Equation. advantages and applications of Instrumentation<br>amplifier.<br>Pin diagram pin functions and specifications of IC LM 324<br>Voltage to current converter (with floating load, with grounded<br>load). Current to voltage converter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |    |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|
|   | <b>3.2</b> Sample and hold circuit [16]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |    |    |
|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |    |
|   | Logarithmic and antilogarithmic amplifiers (using Diodes)<br>Analog divider and analog multiplier<br>Comparator: Circuit diagrams and operation of<br>• Zero crossing detector,<br>• Schmitt trigger                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |    |    |
|   | <ul> <li>Window detector</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |    |    |
|   | <ul> <li>Phase detector</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |    |    |
|   | <ul> <li>Active peak detector.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |    |
|   | • Peak to peak detector                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |    |    |
| 4 | <ul> <li>Filters:</li> <li>Specific Objectives:</li> <li>&gt; Distinguish the types of filter</li> <li>&gt; Explain active and passive filter</li> <li>&gt; Explain different parameters of filter.</li> <li>Contents: <ul> <li>Introduction to filters ,Classification of filters,</li> <li>Concept of passive and active filters</li> <li>Merits and demerits of active filters over passive filters</li> <li>Ideal and actual characteristics, terms: - cut off frequency, Pass band, Stop band, center frequency, roll off rate, BW, Q-factor, first order and second order Butterworth filters, order of filter, Low pass filter, high pass filter, band pass filter ( wide band pass , narrow band pass filter) Band reject filter(wide band reject, narrow band reject filter), all pass filter. Numerical based on design of different filters.</li> </ul> </li> </ul> | 10 | 16 |
| 5 | <ul> <li>Timers</li> <li>Specific Objectives:</li> <li>Draw block diagram of IC 555</li> <li>Understand industrial applications of IC 555 ,565</li> <li>5.1 Introduction to timer IC 555 [10]</li> <li>Block diagram of IC 555 and its pin diagram and function of each pin.</li> <li>Concepts of different timer circuits used in industries: water level controller, Touch plate switch, frequency divider.</li> <li>Numericals based on timers.</li> <li>5.2 Phase Lock Loop</li> <li>Principle of operation, block diagram of PLL. [08]</li> <li>Applications of PLL as multiplier, FM demodulator.</li> <li>Pin diagram and pin functions of IC 565(PLL)</li> </ul>                                                                                                                                                                                                       | 10 | 18 |

|   | Oscillators:                                                                                                          |     |     |
|---|-----------------------------------------------------------------------------------------------------------------------|-----|-----|
|   | Specific Objectives:                                                                                                  |     |     |
|   | Explain concept of oscillators                                                                                        |     |     |
|   | Explain different types of oscillators                                                                                |     |     |
|   | Develop multivibrators and oscillators for given values.                                                              |     |     |
| 6 | Contents:                                                                                                             | 0.0 | 16  |
| 6 | Concept of oscillators,                                                                                               | 08  | 10  |
|   | • Types of oscillators: Phase shift oscillators, Wien bridge oscillators using IC-741                                 |     |     |
|   | • Types of Multivibrators: Monostable, Astable, Bistable using IC-555 and IC-741. Schmitt trigger, voltage controlled |     |     |
|   | oscillator (VCO) using IC-555.                                                                                        |     |     |
|   | Total                                                                                                                 | 64  | 100 |

# Practical:

# **Intellectual Skills:**

- 1. Interpret the waveforms.
- 2. Find faults in circuits.

#### Motor Skill:

1. Testing and Measurement.

# **List of Practicals:**

| Sr. No. | Title of the Experiment                                                                 |
|---------|-----------------------------------------------------------------------------------------|
|         | Determine the op-amp parameters:                                                        |
| 01      | • Input Offset Voltage (V <sub>io</sub> )                                               |
| 01      | • Output Offset Voltage (V <sub>oo</sub> )                                              |
|         | Common mode rejection ratio (CMRR)                                                      |
| 02      | Determine the gain of Inverting and Non-inverting amplifier using op-amp and            |
| 02      | compare it with theoretical gain.                                                       |
| 03      | Verify the operation of Adder and Subtractor circuit using op-amp IC 741.               |
|         | Verify the working of active integrator and differentiator circuits using op-amp IC 741 |
|         | for following inputs:                                                                   |
| 04      | • Sine waveform                                                                         |
|         | • Square waveform                                                                       |
|         | Rectangular waveform                                                                    |
| 05      | Assemble V to I converter and I to V converter using IC 741 and measure the             |
| 03      | respective output.                                                                      |
|         | Verify the working of following comparator circuits using op-amp IC 741 and draw the    |
| 06      | input-output waveforms                                                                  |
| 00      | • Zero crossing detector                                                                |
|         | Active peak detector                                                                    |
| 07      | Assemble first order low pass Butterworth filter using op-amp and plot the frequency    |
| 07      | response and determine its cutoff frequency.                                            |
| 08      | Assemble Astable multivibrator circuit using IC 741. Plot the output waveform and       |
|         | determine the frequency of oscillations and duty cycle.                                 |
| 00      | Assemble Monostable multivibrator circuit using IC 555. Plot the output waveform        |
| 07      | and determine the on-time.                                                              |
| 10      | Assemble Schmitt trigger circuit using IC 555. Plot the output waveform and             |

|    | determine UTP and LTP                                                             |
|----|-----------------------------------------------------------------------------------|
| 11 | Assemble Instrumentation amplifier circuit using IC 324 and determine the overall |
|    | gain.                                                                             |
| 12 | Verify the operation of frequency Multiplier using PLL IC 565 and determine the   |
|    | output frequency.                                                                 |

# Learning Resources: Books:

| Sr.<br>No. | Author            | Title                                                              | Publisher        |
|------------|-------------------|--------------------------------------------------------------------|------------------|
| 01         | K.R. Botkar       | Integrated Circuit                                                 | Khanna           |
| 02         | Ramakant Gayakwad | Op-Amps and Linear Integrated Circuit                              | PHI              |
| 03         | Serigo Franco     | Design with Operational Amplifier and<br>Analog Integrated Circuit | Tata-McGraw Hill |
| 04         | Willam D. Stanley | Operation Amplifier with Linear<br>Integrated Circuit              | Person           |

**Course Name : Electronics Engineering and & Video Engineering Group** 

Course Code : ET/EJ/IE/IS/EN/EX/IC/MU/EV/DE/IU/ED/EI

Semester : Fourth

Subject Title : Visual Basic

Subject Code : 17043

#### **Teaching and Examination Scheme**:

| Teaching Scheme |    |    |              | Examinati | on Scheme |    |     |       |
|-----------------|----|----|--------------|-----------|-----------|----|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH        | PR        | OR | TW  | TOTAL |
| 01              |    | 02 |              |           |           |    | 25@ | 25    |

#### **Rationale:**

Today's most of the electronically operated devices, integrated circuits, controllers, equipments, gadgets are run by specific drivers/software. To understand design, develop and write drivers programming knowledge is required. To run the devices software has to be user friendly. New approach is to use graphical user interface. Graphical user interface can be implemented using visual software's.

Traditionally visual basic is the most popular, versatile, suitable, simple and commonly used visual programming language to write efficient, compact and portable interfaces, drivers/ software's.

The subject will enable the students to inculcate visual programming concepts and methodology used to write, debug, compile and execute simple visual basic programs using different powerful data types, built in visual controls and integrated visual basic environment (IDE) provided by Microsoft visual studio. Students will be exposed to event driven programming and bottom up approached used in objects oriented programming.

Students will understand how a complex interface can be easily implemented in visual basic with almost no programming expertise.

This course will lay the basic foundation of visual programming which will enable students to develop simple to complex programmable systems interfaces in the real world of work

#### **General Objectives**

Students will able to.

- 1. Learn visual programming development environment, concepts and methodology.
- 2. Use essential components (visual tools ) of Visual software's
- 3. Develop the skill of visual basic programming to build custom standalone applications
- 4. Develop applications with Multiple documents interface (MDI) using common dialog, menus and graphics
- 5. Use ADO for database connectivity with different databases.
- 6. Create simple reports using data report, Seagate crystal reports and integrating it with visual basic
- 7. Develop applications using class modules

# **Learning Structure:**



# Theory

| Name of Topics                                                                                                                                      | Hours |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| Topic 1] Introduction to Visual Environment                                                                                                         |       |
| Specific Objectives:                                                                                                                                |       |
| Familiar with IDE of Visual basic                                                                                                                   |       |
| Use concepts of object based language                                                                                                               |       |
| <ul> <li>Use basic elements of visual interface</li> </ul>                                                                                          |       |
| Use properties, events and methods at design time and runtime                                                                                       |       |
| <ul> <li>Create objects, place them on forms</li> </ul>                                                                                             | 02    |
| Contents:                                                                                                                                           |       |
| 1.1 Concepts of visual programming object features properties methods events                                                                        |       |
| 1.7 Environment of VB – Menu har toolbar project explorer toolbox properties.                                                                       |       |
| window form designer form layout immediate window                                                                                                   |       |
| 1.3 Concept of project elements of projects form their properties methods and events                                                                |       |
| Tonic 21 Introduction to Visual Basic                                                                                                               |       |
| Specific Objectives.                                                                                                                                |       |
| > Use different data types                                                                                                                          |       |
| <ul> <li>Use nowerful features of arrays and collections</li> </ul>                                                                                 |       |
| <ul> <li>Write procedures and functions</li> </ul>                                                                                                  |       |
| <ul> <li>Call procedures and functions</li> </ul>                                                                                                   |       |
| <ul> <li>Can procedures and functions</li> <li>Differentiate between procedure and functions</li> </ul>                                             |       |
| <ul> <li>Use library functions for math and string operations</li> </ul>                                                                            | 02    |
| <ul> <li>Use Inputbox and Msgbox functions</li> </ul>                                                                                               | 02    |
| Contents                                                                                                                                            |       |
| 2.1 Data types variables constants arrays collections                                                                                               |       |
| 2.1 Data types, variables, constants, arrays, concertoins                                                                                           |       |
| 2.2 procedures, Arguments, function, feturin values, control now statements, loop                                                                   |       |
| 2.2 Math operators & formulas logical operators string functions spacial functions                                                                  |       |
| 2.5 Wall operators & formulas, logical operators, suring functions, special functions<br>available in VP like Input Pox () Massage Pox () Format () |       |
| Topic 21 Controls and Events                                                                                                                        |       |
| Topic 5] Controls and Events                                                                                                                        |       |
| Specific Objectives:                                                                                                                                |       |
| <ul> <li>Use Dasic controls</li> <li>Salast appropriate controls for given data</li> </ul>                                                          |       |
| Select appropriate controls for given data                                                                                                          |       |
| Set properties of uniferent basic controls Coll methods and events of basic controls                                                                |       |
| Call methods and events of basic controls Demonstrate the use of each control with simple community                                                 |       |
| Contents                                                                                                                                            | 02    |
| Contents:                                                                                                                                           |       |
| 5.1 Basic controls: Text box, list Box, Combo Box, Scroll Bar, Irame, Option button,                                                                |       |
| checkbox, command button, OLE controls                                                                                                              |       |
| 3.2 File, Drive, directory, Picture box, image and timer controls .Designing a form                                                                 |       |
| using controls, concepts of event & properties, changing properties (runtime &                                                                      |       |
| design time) important events of each control & creating applications using                                                                         |       |
| Controls.                                                                                                                                           |       |
| 1 opic 4] Advance Controls & Events                                                                                                                 |       |
| Specific Objectives:                                                                                                                                |       |
| Add extrinsic controls in an application                                                                                                            |       |
| Use common dialog box control and its properties such open, save as, font,                                                                          | 03    |
| color, print and neip                                                                                                                               |       |
| ➤ Use rich text box to design simple ms-word like application                                                                                       |       |
| ➤ Use and create explorer like utilities using tree view and list controls                                                                          |       |
| ramilar with windows common controls                                                                                                                |       |

| Contents:                                                                               |    |
|-----------------------------------------------------------------------------------------|----|
| 4.1 Common Dialog Box controls, The Tree view and List, View controls, the rich         |    |
| textbox controls                                                                        |    |
| 4.2 Windows common controls – status Bar, Tab control, image list control, Important    |    |
| properties, changing properties at design or run time, event handling.                  |    |
| Topic 5] Module, Class Module, Mdi, Menu Graphics                                       |    |
| Specific Objectives:                                                                    |    |
| Write class modules                                                                     |    |
| Define functions and procedures in class module                                         |    |
| Access functions and procedures from class module                                       |    |
| Use multiple document interface                                                         |    |
| Design menu based applications such as notepad editor                                   |    |
| Work with graphic functions and methods                                                 | 03 |
| Contents:                                                                               |    |
| 5.1 Concept of module, class module, using class module to define functions,            |    |
| procedures, variables and accessing them using objects                                  |    |
| 5.2 MDI- MDI form and child form, Creation and use in                                   |    |
| 5.3 Menu: Creating own menu using menu editor, popup menu.                              |    |
| 5.3 Graphics: Basic controls – Line & shape control, line method, circle method, Pset   |    |
| method, RGB () Functions, Paint picture () method, Load picture () function.            |    |
| Topic 6] Database and Report                                                            |    |
| Specific Objectives:                                                                    |    |
| Create database                                                                         |    |
| Use ADO and its properties, methods and events                                          |    |
| Select appropriate concepts such as back-end and front-end                              |    |
| Make database connectivity with different databases                                     |    |
| Generate report using Data Report and Crystal Report                                    |    |
| Contents:                                                                               | 04 |
| 6.1 Concept of database, Record, Record set, Data control & its important properties    | 04 |
| 6.2 validating data, entering data, visual data manager.                                |    |
| 6.3 Programming with ADO ( Active data objects ), using ADO Objects at design time-     |    |
| connection, command, record set, parameter, Creating & closing a connection;            |    |
| executing a command,                                                                    |    |
| 6.4 Using ADO Objects at run time, attaching visual controls to record set at run time, |    |
| Using delete, save, search, update exit, new, add, methods.                             |    |
| 6.5 Report generation using data report and crystal report                              |    |
| Total                                                                                   | 16 |

# **TERM WORK:-**

| Sr<br>No. | Name of the Experiments                                                                    |
|-----------|--------------------------------------------------------------------------------------------|
|           | a) Study and Understand Visual                                                             |
|           | Basic Environment                                                                          |
| 1         | b) Develop VB Project which                                                                |
| 1         | accepts User Name & Password                                                               |
|           | using three forms Login Form1                                                              |
|           | and Form2 to accept data, and                                                              |
|           | Form3 to display data.                                                                     |
| 2         | Design simple calculator to perform mathematical function using Control array like Windows |
| Z         | Calculator.                                                                                |
| 3         | Design GUI to Find Resistor Value from it's color code.                                    |
| 4         | Display student data using structure in loop. Implement it using Class module & Procedures |
| MCDT      |                                                                                            |

|    | •                                                                                                                                                                                                                                                              |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5  | Demonstrate list boxes features with sorted list and selected item transfer facility.                                                                                                                                                                          |
| 6  | <ul><li>a) Design Color box using RGB function to observe color change using H- scroll bar.</li><li>b) Design project to demonstrate file, folder &amp; drive controls to explore drive &amp; folders.</li></ul>                                               |
| 7  | Design GUI for Testing AC series Circuit                                                                                                                                                                                                                       |
|    | Practice Experiment / Exercise                                                                                                                                                                                                                                 |
| 8  | <ul><li>a) Design project to implement Common Dialog box controls such as open, save, Color, Font,<br/>Printer &amp; Help</li><li>b) Design a menu structure like notepad using menu editor</li></ul>                                                          |
| 9  | Design MDI application with 4 child forms & arrange forms with cascade, Tile Horizontal,<br>Tile Vertical arrangements                                                                                                                                         |
| 10 | Design student database project using ADO connectivity in design time and runtime and MS access as backend database engine, with basic features such as add, edit, update, save, cancel, delete feature and generate Report using Data Report / Crystal Report |
| 11 | Develop mini VB Project                                                                                                                                                                                                                                        |

# **Reference Books**:

| Sr.<br>No. | Author                            | Title                             | Publisher                   |
|------------|-----------------------------------|-----------------------------------|-----------------------------|
| 01         | MSDN library on Line<br>Reference |                                   | From Microsoft MSDN Library |
| 02         | Evangelos Petroustus              | Mastering VB6                     | WILEY India                 |
| 03         | Steven Holzner                    | Visual basic 6                    | Dream Tech. Press           |
| 04         | Content Development<br>Group      | Visual Basic 6.0<br>Programming   | Tata McGraw Hill            |
| 05         | Mohammed Azam                     | Programming with visual basic 6.0 | Vikas Publishers            |
| 06         | Nel Jerka                         | The complete referenceVB6         | Tata McGraw Hill Publishing |

Course Name : Electronics Engineering Group Course Code : ET/EJ/EN/EX/IE/IS/IC/DE/EV/MU/IU/ED/EI Semester : Fourth Subject Title : Professional Practices-II

Subject Code : 17044

### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    | Examination Scheme |    |    |    |     |       |
|-----------------|----|----|--------------------|----|----|----|-----|-------|
| TH              | TU | PR | PAPER<br>HRS       | TH | PR | OR | TW  | TOTAL |
|                 |    | 03 |                    |    |    |    | 50@ | 50    |

# **Rationale:**

Most of the diploma holders join industries. Due to globalization and competition in the industrial and service sectors the selection for the job is based on campus interviews or competitive tests.

While selecting candidates a normal practice adopted is to see general confidence, ability to communicate and attitude, in addition to basic technological concepts.

The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

# **Objectives:**

To develop the following skills:

# Intellectual skills:

- 1) Analyze information from different sources.
- 2) Prepare reports.

# Motor skills:

- 1) Present given topic in a seminar.
- 2) Interact with peers to share thoughts.
- 3) Prepare a report on industrial visit, expert lecture.

# **Learning Structure:**



# **Contents:**

| Activity | Content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Hours |  |  |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--|--|
| 1        | <ul> <li>Industrial Visits</li> <li>Structured industrial visits be arranged and report of the same should be submitted by the individual student to form a part of the term work.</li> <li>Minimum two industrial visits may be arranged in the following areas/ industries : <ul> <li>i) Electronic equipment manufacturing unit</li> <li>ii) Resistance welding unit</li> <li>iii) Industrial automation unit</li> <li>iv) Sugar mill, Paper mill, Cement Industry.</li> <li>v) Railway station control room.</li> <li>vi) Telephone Exchange.</li> <li>vii) Any other suitable Industry.</li> </ul> </li> </ul>                                       | 16    |  |  |
| 2        | Lectures by Professional / Industrial Expert to be organized from any<br>of the following areas (Any three)<br>i) Cyber laws.<br>ii) Fiber optics communication system<br>iii) Disaster management<br>iv) Atomic energy<br>v) Industrial Safety<br>vi) Computer security systems/Ethical hacking.<br>vii) Any other suitable topic<br>viii) Introduction to Apprenticeship Training Scheme<br>Information Search :<br>Information search can be done through manufacturers, catalogue, internet,<br>magazines; books etc. and submit a report on one of the<br>following topics:<br>i) GPS<br>ii) Market survey for motors used in electronic application | 08    |  |  |
|          | <ul> <li>iii) Electronic billing system.</li> <li>iv) Elevators installation and maintenance</li> <li>v) Any other suitable areas</li> </ul> Seminar :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |  |  |
| 4        | Seminar topic should be related to the subjects of fourth semester. Each student shall submit a report of at least 10 pages and deliver a seminar (Presentation time – 10 Minutes)                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 10    |  |  |
| 5        | Group Discussion:<br>The students should discuss in group of six to eight students and write a<br>brief report on the same as a part of term work. The topic of group<br>discussion may be selected by the faculty members.                                                                                                                                                                                                                                                                                                                                                                                                                               |       |  |  |
|          | Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 48    |  |  |

# Learning Resources:

# 1. Books:

| Sr.<br>No. | Author               | Title                  | Publisher                     |  |
|------------|----------------------|------------------------|-------------------------------|--|
| 01         | NRDC, Publication Bi | Invention Intelligence | National Research Development |  |

|    | Monthly Journal                                                                                               | Journal                                            | Corporation, GOI. |  |
|----|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------|-------------------|--|
|    |                                                                                                               |                                                    |                   |  |
| 02 | DK Publishing                                                                                                 | How things works encyclopedia                      | DK Publishing     |  |
| 03 | Trott                                                                                                         | Innovation mgmt.& new product development          | Pearson Education |  |
| 04 | E.H. McGrath, S.J.                                                                                            | Basic Managerial Skills<br>for All – Ninth Edition | РНІ               |  |
| 05 | Apprenticeship Training Scheme:- Compiled By – BOAT (Western Region), Mumbai,<br>Available on MSBTE Web Site. |                                                    |                   |  |

# 2. Web sites

www.engineeringforchange.org www.wikipedia.com www.slideshare.com www.teachertube.com
# Course Name : All Branches of Diploma in Engineering & Technology Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG Industrial Training (Optional) after 4<sup>th</sup> semester examination.

Note:- Examination in Professional Practices of 5<sup>th</sup> Semester.

# INDUSTRIAL TRAINING (OPTIONAL)

# Rational:-

There was a common suggestion from the industry as well as other stakeholders that curriculum of Engineering and Technology courses should have Industrial training as part of the curriculum. When this issue of industrial training was discussed it was found that it will be difficult to make industrial training compulsory for all students of all courses as it will be difficult to find placement for all the students. It is therefore now proposed that this training can be included in the curriculum as optional training for student who is willing to undertake such training on their own. The institutes will help them in getting placement or also providing them requisite documents which the student may need to get the placement.

Details:- Student can undergo training in related industries as guided by subject teachers / HOD.

- The training will be for four weeks duration in the summer vacation after the fourth semester examination is over.
- The student undergoing such training will have to submit a report of the training duly certified by the competent authority from the industry clearly indicating the achievements of the student during training. This submission is to be made after joining the institute for Fifth semester.
- The student completing this training will have to deliver a seminar on the training activities based on the report in the subject Professional Practices at Fifth Semester.
- The student undergoing this training will be exempted from attending activities under Professional Practices at Fifth semester except the seminar.
- The students who will not undergo such training will have to attend Professional Practices Classes/activities of fifth semester and will have to complete the tasks given during the semester under this head.
- There work will be evaluated on their submissions as per requirement and will be given marks out of 50. Or student may have to give seminar on training in Industry he attended.
- Institute shall encourage and guide students for Industry training.
- Evaluation:- Report of Training attended and delivery of seminar and actual experience in Industry will be evaluated in fifth semester under Profession Practices-III and marks will be given accordingly out of 50.

'G' Scheme

# MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI

# TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES

#### COURSE NAME : DIPLOMA IN ELECTRONICS & VIDEO ENGINEERING

#### **COURSE CODE : EV**

# **DURATION OF COURSE : 6 SEMESTERS**

#### **SEMESTER : FOURTH**

#### FULL TIME / PART TIME : FULL TIME

| 101        |                                                                                                   |                  |             |    |      |    |       |      |     |       |         |       |     |        |             |            |
|------------|---------------------------------------------------------------------------------------------------|------------------|-------------|----|------|----|-------|------|-----|-------|---------|-------|-----|--------|-------------|------------|
|            | SUBJECT TITLE                                                                                     |                  |             | ТЕ | ACHI | NG |       |      | EXA | MINAT | TION SO | CHEME |     |        |             |            |
| SR.<br>NO. |                                                                                                   | Abbrevi<br>ation | SUB<br>CODE | S  | CHEM | E  | PAPER | TH   | (1) | PR    | (4)     | OR    | (8) | TW (9) |             | SW (17400) |
| 110.       |                                                                                                   | ution            | CODE        | ТН | TU   | PR | HRS.  | Max  | Min | Max   | Min     | Max   | Min | Max    | Min (17400) | (17100)    |
| 1          | Environmental Studies \$                                                                          | EST              | 17401       | 01 |      | 02 | 01    | 50#* | 20  |       |         |       |     | 25@    | 10          |            |
| 2          | Electronic Instrumentation                                                                        | EIN              | 17435       | 03 |      | 02 | 03    | 100  | 40  | 25#   | 10      |       |     | 25@    | 10          |            |
| 3          | Radio Reception                                                                                   | RRE              | 17437       | 03 |      | 02 | 03    | 100  | 40  | 25#   | 10      |       |     | 25@    | 10          |            |
| 4          | TV Signal Transmission System                                                                     | TVS              | 17441       | 03 | 02   |    | 03    | 100  | 40  |       |         |       |     | 25@    | 10          | 50         |
| 5          | Linear Integrated Circuits β                                                                      | LIC              | 17445       | 04 |      | 02 | 03    | 100  | 40  | 50#   | 20      |       |     | 25@    | 10          |            |
| 6          | Visual Basic β                                                                                    | VBA              | 17043       | 01 |      | 02 |       |      |     |       |         |       |     | 25@    | 10          |            |
| 7          | Professional Practices-II β                                                                       | PPT              | 17044       |    |      | 03 |       |      |     |       |         |       |     | 50@    | 20          |            |
|            |                                                                                                   | ,                | TOTAL       | 15 | 02   | 13 |       | 450  |     | 100   |         |       |     | 200    |             | 50         |
| **         | Industrial Training (Optional) Examination in 5 <sup>th</sup> Semester Professional Practices-III |                  |             |    |      |    |       |      |     |       |         |       |     |        |             |            |

#### Student Contact Hours Per Week: 30 Hrs.

# THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.

Total Marks : 800

@- Internal Assessment, # - External Assessment,

No Theory Examination, \$ - Common to all branches, #\* - Online Theory Examination,

WITH EFFECT FROM 2012-13

**DURATION: 16 WEEKS** 

SCHEME : G

# $\beta$ - Common to ET / EJ / EN / EX / IE / IS / IC / EV / DE / IU / ED / EI.

Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work.

\*\* Industrial Training (Optional) - Student can undergo Industrial Training of four weeks after fourth semester examination during summer vacation.

Assessment will be done in Fifth semester under Professional Practices-III. They will be exempted from activities of Professional Practices-III of 5<sup>th</sup> Semester.

- Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subjects is to be converted out of 50 marks as sessional work (SW).
- > Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.
- > Code number for TH, PR, OR and TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.

MSBTE – Final Copy Dt. 30/08/2013

# Course Name : All Branches of Diploma in Engineering & Technology Course Code : AE/CE/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG/AU

Semester : Fourth

Subject Title : Environmental Studies

Subject Code : 17401

**Teaching and Examination Scheme:** 

| Teaching Scheme |    |    |              |      | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|------|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH   | PR        | OR        | TW  | TOTAL |
| 01              |    | 02 | 01           | 50#* |           |           | 25@ | 75    |

#### **#\* Online Theory Examination**

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Environment essentially comprises of our living ambience, which gives us the zest and verve in all our activities. The turn of the twentieth century saw the gradual onset of its degradation by our callous deeds without any concern for the well being of our surrounding we are today facing a grave environmental crisis. The unceasing industrial growth and economic development of the last 300 years or so have resulted in huge ecological problems such as overexploitation of natural resources, degraded land, disappearing forests, endangered species, dangerous toxins, global warming etc.

It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

The curriculum covers the aspects about environment such as Environment and Ecology, Environmental impacts on human activities, Water resources and water quality, Mineral resources and mining, Forests, etc.

General Objectives: The student will be able to,

- 1. Understand importance of environment
- 2. Know key issues about environment
- 3. Understands the reasons for environment degradation
- 4. Know aspects about improvement methods
- 5. Know initiatives taken by the world bodies to restrict and reduce degradation

# **Learning Structure:**



# Theory:

| Topic 1: Nature of Environmental Studies0Specific Objectives:> Define the terms related to Environmental Studies01Other Definition, Scope and Importance of the environmental studies01Importance of the studies irrespective of course01Need for creating public awareness about environmental issues01Topic 2: Natural Resources and Associated Problems01Specific Objectives:> Define natural resources and identify problems associated with them> Identify uses and their overexploitation> Identify alternate resources and their importance for environmentContents:2.1 Renewable and Non renewable resources0General description of forest resources0General description of forest resources0Effects on environment due to deforestation, Timber<br>extraction, Building of dams, waterways etc.2.3 Water Resources040Hydrosphere: Different sources of water0Effect of floods, draught, dams etc. on water resources and<br>community2.4 Mineral Resources:01Categories of mineral resources2.5 Food Resources:02.5 Food Resources:End for oll                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Specific Objectives:       > Define the terms related to Environmental Studies       > State importance of awareness about environment in general public       01       04         Contents:       • Definition, Scope and Importance of the environmental studies       • Importance of the studies irrespective of course       01       04         • Need for creating public awareness about environmental issues       01       04         Topic 2: Natural Resources and Associated Problems       Specific Objectives:       >         > Define natural resources and identify problems associated with them       >       Identify uses and their overexploitation         > Identify uses and their overexploitation       >       Identify uses and their overexploitation       >         2.1 Renewable and Non renewable resources       •       Definition       •       Associated problems         2.2 Forest Resources       •       General description of forest resources       04       10         2.3 Water Resources       •       Effect on environment due to deforestation, Timber extraction, Building of dams, waterways etc.       04       10         2.3 Water Resources       •       Effect of floods, draught, dams etc. on water resources and community       04       10         2.4 Mineral Resources:       •       Categories of mineral resources       04       10         •       Categories of m |
| <ul> <li>Define the terms related to Environmental Studies</li> <li>State importance of awareness about environment in general public</li> <li>Ontents: <ul> <li>Definition, Scope and Importance of the environmental studies</li> <li>Importance of the studies irrespective of course</li> <li>Need for creating public awareness about environmental issues</li> </ul> </li> <li>Topic 2: Natural Resources and Associated Problems Specific Objectives: <ul> <li>Define natural resources and identify problems associated with them</li> <li>Identify uses and their overexploitation</li> <li>Identify alternate resources and their importance for environment</li> </ul> Contents: <ul> <li>2.1 Renewable and Non renewable resources</li> <li>General description of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> </ul> 2.3 Water Resources <ul> <li>Mathematication of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> </ul> 2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> </ul></li></ul>                                                                                                                                                             |
| <ul> <li>State importance of awareness about environment in general public<br/>Contents:         <ul> <li>Definition, Scope and Importance of the environmental studies</li> <li>Importance of the studies irrespective of course</li> <li>Need for creating public awareness about environmental issues</li> </ul> </li> <li>Topic 2: Natural Resources and Associated Problems<br/>Specific Objectives:         <ul> <li>Definition resources and identify problems associated with them</li> <li>Identify alternate resources and their importance for environment</li> </ul> </li> <li>Contents:         <ul> <li>Identify alternate resources and their importance for environment</li> <li>Contents:</li> <li>I Renewable and Non renewable resources</li> <li>Definition                 <ul> <li>Associated problems</li> <li>Secific Objectives:</li> <li>General description of forest resources</li> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> <li>Water Resources</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> <li>Mineral Resources:</li></ul></li></ul></li></ul>                                                                                                                                    |
| Contents:       01       04         • Definition, Scope and Importance of the environmental studies       01       04         • Importance of the studies irrespective of course       Need for creating public awareness about environmental issues       01       04 <b>Topic 2: Natural Resources and Associated Problems</b> Specific Objectives:       01       04         > Define natural resources and identify problems associated with them       10       10         > Identify uses and their overexploitation       10       10         > Identify alternate resources and their importance for environment       10         Contents:       2.1 Renewable and Non renewable resources       04         • Definition       • Associated problems       10         2.2 Forest Resources       • General description of forest resources       04         • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.       04       10         2.3 Water Resources       04       10       10         • Hydrosphere: Different sources of water       04       10         • Hydrosphere: Different sources of water       04       10         • Effect of floods, draught, dams etc. on water resources and community       04       10         2.4 Mineral Resources:       • Gategories of mineral resources                                                                           |
| <ul> <li>Definition, Scope and Importance of the environmental studies</li> <li>Importance of the studies irrespective of course</li> <li>Need for creating public awareness about environmental issues</li> </ul> <b>Topic 2: Natural Resources and Associated Problems</b> Specific Objectives: <ul> <li>Define natural resources and identify problems associated with them</li> <li>Identify uses and their overexploitation</li> <li>Identify alternate resources and their importance for environment</li> </ul> <b>Contents:</b> <ul> <li>10 Associated problems</li> </ul> 2.1 Renewable and Non renewable resources <ul> <li>Definition</li> <li>Associated problems</li> </ul> 2.2 Forest Resources <ul> <li>General description of forest resources</li> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> </ul> 2.3 Water Resources <ul> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> </ul> 2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> </ul>                                                                                          |
| <ul> <li>Importance of the studies irrespective of course         <ul> <li>Need for creating public awareness about environmental issues</li> </ul> </li> <li>Topic 2: Natural Resources and Associated Problems         <ul> <li>Specific Objectives:</li> <li>Define natural resources and identify problems associated with them</li> <li>Identify uses and their overexploitation</li> <li>Identify alternate resources and their importance for environment</li> </ul> </li> <li>Contents:         <ul> <li>Identify alternate resources and their importance for environment</li> <li>Contents:</li> <li>I Renewable and Non renewable resources                 <ul> <li>Definition</li> <li>Associated problems</li> </ul></li> <li>General description of forest resources                     <ul> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> <li>Xuater Resources</li></ul></li></ul></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                               |
| <ul> <li>Need for creating public awareness about environmental issues</li> <li>Topic 2: Natural Resources and Associated Problems</li> <li>Specific Objectives:         <ul> <li>Define natural resources and identify problems associated with them</li> <li>Identify uses and their overexploitation</li> <li>Identify alternate resources and their importance for environment</li> </ul> </li> <li>Contents:         <ul> <li>Definition</li> <li>Associated problems</li> </ul> </li> <li>I Renewable and Non renewable resources         <ul> <li>Definition</li> <li>Associated problems</li> </ul> </li> <li>2.2 Forest Resources         <ul> <li>General description of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> </ul> </li> <li>3.3 Water Resources         <ul> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> </ul> </li> <li>2.4 Mineral Resources:         <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> </ul> </li> </ul>                                                                                                                                                                                                          |
| Topic 2: Natural Resources and Associated Problems         Specific Objectives:         > Define natural resources and identify problems associated with them         > Identify uses and their overexploitation         > Identify alternate resources and their importance for environment         Contents:         2.1 Renewable and Non renewable resources         • Definition         • Associated problems         2.2 Forest Resources         • General description of forest resources         • Functions and benefits of forest resources         • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.         2.3 Water Resources         • Use and overexploitation of surface and ground water         • Effect of floods, draught, dams etc. on water resources and community         2.4 Mineral Resources:         • Categories of mineral resources         • Mine safety         • Effect of mining on environment         2.5 Food Resources:                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Specific Objectives:       > Define natural resources and identify problems associated with them         > Identify uses and their overexploitation       > Identify alternate resources and their importance for environment         Contents:       2.1 Renewable and Non renewable resources       •         • Definition       • Associated problems         2.2 Forest Resources       •       General description of forest resources         • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.       04       10         2.3 Water Resources       04       10         • Hydrosphere: Different sources of water       •       04       10         • Effect of floods, draught, dams etc. on water resources and community       04       10         2.4 Mineral Resources:       •       Categories of mineral resources       •         • Basics of mining activities       •       Mine safety       •         • Effect of mining on environment       2.5 Food Resources:       •       Fored for all                                                                                                                                                                                                                                                                                                                                                                           |
| <ul> <li>Define natural resources and identify problems associated with them</li> <li>Identify uses and their overexploitation</li> <li>Identify alternate resources and their importance for environment</li> <li>Contents:</li> <li>2.1 Renewable and Non renewable resources <ul> <li>Definition</li> <li>Associated problems</li> </ul> </li> <li>2.2 Forest Resources <ul> <li>General description of forest resources</li> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> </ul> </li> <li>2.3 Water Resources <ul> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> </ul> </li> <li>2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                             |
| <ul> <li>Identify uses and their overexploitation</li> <li>Identify alternate resources and their importance for environment</li> <li>Contents:</li> <li>2.1 Renewable and Non renewable resources <ul> <li>Definition</li> <li>Associated problems</li> </ul> </li> <li>2.2 Forest Resources <ul> <li>General description of forest resources</li> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> </ul> </li> <li>2.3 Water Resources <ul> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> </ul> </li> <li>2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <ul> <li>Identify alternate resources and their importance for environment<br/>Contents:</li> <li>2.1 Renewable and Non renewable resources <ul> <li>Definition</li> <li>Associated problems</li> </ul> </li> <li>2.2 Forest Resources <ul> <li>General description of forest resources</li> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> </ul> </li> <li>2.3 Water Resources <ul> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> </ul> </li> <li>2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Contents:         2.1 Renewable and Non renewable resources         Definition         Associated problems         2.2 Forest Resources         General description of forest resources         Functions and benefits of forest resources         Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.         2.3 Water Resources         Use and overexploitation of surface and ground water         Effect of floods, draught, dams etc. on water resources and community         2.4 Mineral Resources:         Categories of mineral resources         Basics of mining activities         Mine safety         Effect of mining on environment         2.5 Food Resources:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <ul> <li>2.1 Renewable and Non renewable resources <ul> <li>Definition</li> <li>Associated problems</li> </ul> </li> <li>2.2 Forest Resources <ul> <li>General description of forest resources</li> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> </ul> </li> <li>2.3 Water Resources <ul> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> </ul> </li> <li>2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> </ul> </li> <li>2.5 Food Resources: <ul> <li>Eard for all</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <ul> <li>Definition <ul> <li>Associated problems</li> </ul> </li> <li>2.2 Forest Resources <ul> <li>General description of forest resources</li> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> </ul> </li> <li>2.3 Water Resources <ul> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> </ul> </li> <li>2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <ul> <li>Associated problems</li> <li>2.2 Forest Resources <ul> <li>General description of forest resources</li> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> </ul> </li> <li>2.3 Water Resources <ul> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> </ul> </li> <li>2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> </ul> </li> <li>2.5 Food Resources: <ul> <li>Food femall</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <ul> <li>2.2 Forest Resources <ul> <li>General description of forest resources</li> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> </ul> </li> <li>2.3 Water Resources <ul> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> </ul> </li> <li>2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> </ul> </li> <li>2.5 Food Resources: <ul> <li>Ford for all</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <ul> <li>General description of forest resources</li> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber<br/>extraction, Building of dams, waterways etc.</li> <li>2.3 Water Resources</li> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and<br/>community</li> <li>2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <ul> <li>Functions and benefits of forest resources</li> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> <li>2.3 Water Resources</li> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> <li>2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> </ul> </li> <li>2.5 Food Resources: <ul> <li>Food for all</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <ul> <li>Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> <li>2.3 Water Resources</li> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> <li>2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> </ul> </li> <li>2.5 Food Resources: <ul> <li>Each for all</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <ul> <li>extraction, Building of dams, waterways etc.</li> <li>2.3 Water Resources</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> <li>2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> </ul> </li> <li>2.5 Food Resources: <ul> <li>Food for all</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <ul> <li>2.3 Water Resources</li> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> <li>2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> </ul> </li> <li>2.5 Food Resources: <ul> <li>Food for all</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <ul> <li>Hydrosphere: Different sources of water</li> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> <li>2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> </ul> </li> <li>2.5 Food Resources: <ul> <li>Food for all</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <ul> <li>Use and overexploitation of surface and ground water</li> <li>Effect of floods, draught, dams etc. on water resources and community</li> <li>2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> </ul> </li> <li>2.5 Food Resources: <ul> <li>Food for all</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <ul> <li>Effect of floods, draught, dams etc. on water resources and community</li> <li>2.4 Mineral Resources: <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> </ul> </li> <li>2.5 Food Resources: <ul> <li>Food for all</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <ul> <li>2.4 Mineral Resources:</li> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> <li>2.5 Food Resources:</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <ul> <li>2.4 Mineral Resources:</li> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> <li>2.5 Food Resources:</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> <li>2.5 Food Resources:</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <ul> <li>Categories of mineral resources</li> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> <li>2.5 Food Resources:</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <ul> <li>Basics of mining activities</li> <li>Mine safety</li> <li>Effect of mining on environment</li> <li>2.5 Food Resources:</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Mine safety     Effect of mining on environment 2.5 Food Resources:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Effect of mining on environment 2.5 Food Resources:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 2.5 Food Resources:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| - East for all                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| • Effects of modern agriculture                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| • World food problem                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Topic 3. Ecosystems                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Concept of Ecosystem                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| • Structure and functions of ecosystem 01 04                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| • Energy flow in ecosystem                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| • Major ecosystems in the world                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Topic 4. Biodiversity and Its Conservation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Definition of Biodiversity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| • Levels of biodiversity 02 06                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Value of biodiversity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Threats to biodiversity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

| Conservation of biodiversity                                     |    |    |
|------------------------------------------------------------------|----|----|
| Topic 5. Environmental Pollution                                 |    |    |
| • Definition                                                     |    |    |
| • Air pollution: Definition, Classification, sources, effects,   |    |    |
| prevention                                                       | 02 | 00 |
| • Water Pollution: Definition, Classification, sources, effects, | 05 | 08 |
| prevention                                                       |    |    |
| • Soil Pollution: Definition, sources, effects, prevention       |    |    |
| • Noise Pollution: Definition, sources, effects, prevention      |    |    |
| Topic 6. Social Issues and Environment                           |    |    |
| Concept of development, sustainable development                  |    |    |
| • Water conservation, Watershed management, Rain water           |    |    |
| harvesting: Definition, Methods and Benefits                     | 02 | 10 |
| Climate Change, Global warming, Acid rain, Ozone Layer           | 05 | 10 |
| Depletion, Nuclear Accidents and Holocaust: Basic concepts and   |    |    |
| their effect on climate                                          |    |    |
| <ul> <li>Concept of Carbon Credits and its advantages</li> </ul> |    |    |
| Topic 7. Environmental Protection                                |    |    |
| Brief description of the following acts and their provisions:    |    |    |
| Environmental Protection Act                                     |    |    |
| • Air (Prevention and Control of Pollution) Act                  |    |    |
| • Water (Prevention and Control of Pollution) Act                | 02 | 08 |
| Wildlife Protection Act                                          | 02 | 08 |
| Forest Conservation Act                                          |    |    |
| Population Growth: Aspects, importance and effect on             |    |    |
| environment                                                      |    |    |
| Human Health and Human Rights                                    |    |    |
| Total                                                            | 16 | 50 |

#### Practical: Skills to be developed:

#### Skins to be developed

# Intellectual Skills:

- 1. Collection of information, data
- 2. Analysis of data
- 3. Report writing

# **Motor Skills:**

- 1. Presentation Skills
- 2. Use of multi media

# **List of Projects:**

Note: Any one project of the following:

- 1. Visit to a local area to document environmental assets such as river / forest / grassland / hill / mountain
- 2. Visit to a local polluted site: Urban/Rural/Industrial/Agricultural
- 3. Study of common plants, insects, birds
- 4. Study of simple ecosystems of ponds, river, hill slopes etc

Prepare a project report on the findings of the visit illustrating environment related facts, analysis and conclusion. Also suggest remedies to improve environment.

Learning Resources: Books:

| Sr.<br>No. | Author                                                | Title                                        | Publisher               |
|------------|-------------------------------------------------------|----------------------------------------------|-------------------------|
| 01         | Anindita Basak                                        | Environmental Studies                        | Pearson Education       |
| 02         | R. Rajgopalan                                         | Environmental Studies<br>from Crises to Cure | Oxford University Press |
| 03         | Dr. R. J. Ranjit Daniels, Dr.<br>Jagdish Krishnaswamy | Environmental Studies                        | Wiley India             |

| <b>Course Name</b> | : Diploma in Electronics & Video Engineering |
|--------------------|----------------------------------------------|
| Course Code        | : EV                                         |
| Semester           | : Fourth                                     |
| Subject Title      | : Electronic Instrumentation                 |
| Subject Code       | : 17435                                      |
|                    |                                              |

**Teaching and Examination Scheme:** 

| Teac | hing Scl | heme |              |     | Examinati | on Scheme |     |       |
|------|----------|------|--------------|-----|-----------|-----------|-----|-------|
| TH   | TU       | PR   | PAPER<br>HRS | TH  | PR        | OR        | TW  | TOTAL |
| 03   |          | 02   | 03           | 100 | 25#       |           | 25@ | 150   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Instrumentation is an emerging field used in data detection, acquisition, analysis and control in industrial applications. Analog and digital instruments are mainly used to determine different process parameters. These instruments present the desired information in visual indication either in analog or digital form. Further, instrumentation deals with conversion of different physical parameters into electrical signal using various transducers.

This subject presumes that the students are familiar with basic utilization of measuring instruments. The era of this subject consists of the information about concepts, principles and procedures of analog and digital electronic measuring instruments and measuring techniques. With the help of transducers measuring instruments different physical parameters like temperature, pressure etc. are measured. Different types of transducers used for measurement of different physical quantities with their construction, working principle, advantages, and disadvantages are studied through this subject.

# **General Objectives:**

#### The Students will be able to:

- 1. Understand the principle & operation of different measuring instruments.
- 2. Select the instrument for the measurement of specific electrical parameter.
- 3. Understand the procedure for fault finding in electronic systems.
- 4. Understand the nature and working of instrumentation system used in industries.

# **Learning Structure:**



# **Theory Contents:**

| Topic<br>No. | Theory                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Hrs. | Marks |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|
|              | Basics of Measurement:<br>Specific Objectives:<br>→ Define measurement and instrument.<br>→ Classify various instruments.<br>Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |      |       |
| 1            | <ul> <li>Classification of Instruments: Absolute, Secondary<br/>Instruments</li> <li>Definitions of Static characteristics of Instruments:<br/>Accuracy, Precision, Sensitivity, Resolution, Static error,<br/>Reproducibility, Drift, Dead Zone</li> <li>Definitions of dynamic characteristics of Instruments:<br/>Speed of response, Lag, fidelity, Dynamic error</li> <li>Types of Errors- Gross, Systemic, Random</li> <li>Units of measurement of fundamental quantity</li> </ul>                                                                                                                                                         | 06   | 10    |
| 2            | <ul> <li>Analog DC and AC Meters</li> <li>Draw the constructional diagram of PMMC meter.</li> <li>State the working principles of different types of DC/AC Voltmeter/Ammeter and list their specifications.</li> <li>Describe the working of analog multimeter</li> <li>Contents <ul> <li>Classification of analog ammeter and voltmeter</li> <li>Working principle and construction of PMMC instruments</li> <li>Analog DC Ammeter: Shunt resistor type, Ayrton Shunt type</li> <li>Analog DC Voltmeter (No derivation)- Half Wave rectifier type, Full wave rectifier type, Multirange type</li> <li>Analog AC Ammeter</li> </ul> </li> </ul> | 06   | 12    |
| 3            | <ul> <li>Digital Meters:</li> <li>Draw block diagram and describe operation of different digital meters.</li> <li>State the applications of digital meters</li> <li>Contents <ul> <li>Concepts of ADC &amp; DAC (Review) (No marks)</li> <li>Advantages and Disadvantages of Digital Instruments and comparison with analog instruments</li> <li>Block diagram, operation and applications of Digital Frequency meter Digital Voltmeter DMM LCR –Q meter</li> </ul> </li> </ul>                                                                                                                                                                 | 06   | 12    |

|   | Oscilloscope                                                                               |    |    |
|---|--------------------------------------------------------------------------------------------|----|----|
|   | > Draw the basic block diagram and describe the function of                                |    |    |
|   | each block of CRO.                                                                         |    |    |
|   | > List and describe different applications of CRO.                                         |    |    |
|   | Contents                                                                                   |    |    |
|   | • CRO: Basic Block diagram and function of each block                                      |    |    |
|   | • Function of delay line                                                                   |    |    |
|   | • Explanation of waveform generation                                                       |    |    |
| 4 | • Applications of CRO:                                                                     | 08 | 16 |
|   | Time & frequency measurement                                                               |    |    |
|   | Voltage measurement                                                                        |    |    |
|   | Lissagous patterns for Phase and Frequency measurement                                     |    |    |
|   | <ul> <li>Concept block diagram and Operation of: Single beam dual</li> </ul>               |    |    |
|   | trace & Dual beam Dual Trace CRO                                                           |    |    |
|   | <ul> <li>Block diagram operation and applications of digital storage</li> </ul>            |    |    |
|   | • Block diagram, operation and applications of digital storage<br>oscilloscope (DSO)       |    |    |
|   | Topic 5: Signal generator and Ways A polyzor                                               |    |    |
|   | $\sim$ Draw block diagram of signal generator and waveform                                 |    |    |
|   | P Draw block diagram of signal generator and waveform<br>analyzer and their working        |    |    |
|   | $\sim$ Test the faults and rectify the faults in T V using nattern                         |    |    |
|   | First the faults and feeling the faults in 1.v. using pattern<br>generator                 |    |    |
|   | Draw block diagram of harmonic distortion analyzer and                                     | 00 | 20 |
|   | Draw block utagram of narmonic distortion analyzer and<br>describe its working             | 08 |    |
|   | Contents                                                                                   |    |    |
|   | 5.1 Signal generators: 10 Marks                                                            |    |    |
|   | Definition and need of signal generator                                                    |    |    |
|   | Definition and need of signal generator     Disal diagram, operation and applications of t |    |    |
| 5 | • Block diagram, operation and applications of :                                           |    |    |
| 5 | Function concreter                                                                         |    |    |
|   | Square and Pulse generator                                                                 |    |    |
|   | Video pattern generator                                                                    |    |    |
|   | video patterni generator                                                                   |    |    |
|   | 5.2 Wave analyzer: 10 Marks                                                                |    |    |
|   | Definition and need of waveform analyzer                                                   |    |    |
|   | Block diagram operation and applications of :                                              |    |    |
|   | Frequency selective wave analyzer                                                          |    |    |
|   | Harmonic distortion analyzer                                                               |    |    |
|   | Logic analyzer                                                                             |    |    |
|   | Spectrum analyzer                                                                          |    |    |
|   | Transducers                                                                                |    |    |
|   | Specific Objectives:                                                                       |    |    |
|   | $\rightarrow$ Draw and describe the block diagram of Instrumentation                       |    |    |
|   | system.                                                                                    |    |    |
|   | Compare different Transducers                                                              |    |    |
| - | Contents                                                                                   |    |    |
| 6 | • Instrumentation System:                                                                  | 08 | 14 |
|   | Block diagram of Instrumentation system: Function of each                                  |    | -  |
|   | block, Explanation of basic instrumentation systems                                        |    |    |
|   | • Transducer:                                                                              |    |    |
|   | Need of Transducer:                                                                        |    |    |
|   | Classification of transducers: Active and Passive, Analog and                              |    |    |

|   | Inductive transducer –LVDT ,RVDT ( As a displacement              |    |     |
|---|-------------------------------------------------------------------|----|-----|
|   | transducer)                                                       |    |     |
|   | Piezoelectric transducer                                          |    |     |
|   | (Principle of operation and applications of above)                |    |     |
|   | Special Transducers and Measurements                              |    |     |
|   | > Draw the construction and describe working of flow              |    |     |
|   | transducers.                                                      |    |     |
|   | Draw the construction and describe working of                     |    |     |
|   | Temperature measuring transducers.                                |    |     |
|   | Contents                                                          |    |     |
|   | • Flow:                                                           |    |     |
|   | Definition                                                        |    |     |
|   | • Classification of flow measuring transducers:                   |    |     |
|   | Electromagnetic Flow meter                                        |    |     |
| 7 | Ultrasonic flow meter- Time difference and Doppler Type           | 06 | 16  |
|   | • Temperature :                                                   |    |     |
|   | Definition and units                                              |    |     |
|   | • Classification of temperature measuring transducers:            |    |     |
|   | Thermistors                                                       |    |     |
|   | RTD – (PT-100), 2/3/4 wire systems (circuit diagram only)         |    |     |
|   | Thermocouple – Seeback & Peltier effect, Types J, K, R, S, T etc. |    |     |
|   | (Based on material, temperature ranges)                           |    |     |
|   | Note: Each transducer should be studied on the basis of working   |    |     |
|   | principle, construction, advantages, disadvantages and            |    |     |
|   | applications.                                                     |    |     |
|   | Total                                                             | 48 | 100 |

## Practical Skills to be developed:

# **Intellectual Skills:**

- Selection of instruments based on applications
- > Interpretation of results.
- Selection of transducer based on application.

# Motor Skills:

- > Selection of proper instrument with respect to parameter and range
- Proper connections and interfacing
- > Testing of basic electronic circuits using these instruments
- > Connection of different transducers with measuring system.
- > Measurement of various physical parameters using transducers.

#### **List of Practicals:**

# (Attach a separate sheet in the Manual covering the specifications of instrument/ equipment studied)

- 1. Draw the block diagram of Function generator. Indentify the blocks from circuit. Test and verify function outputs as per specifications.
- 2. Understand the front panel controls of Dual trace CRO and to Measure frequency, voltage, phase difference (by time measurement) using CRO.
- 3. Measure time period and frequency of sine, square and triangular waves using CRO.
- Measure frequency and phase difference of unknown signals with the help of Lissagous pattern by using CRO.
- 4. Prepare the fault finding flow chart for Power supply using multimeter.
- 5. Measure frequency, voltage and modulation index of a signal from AF/RF standard signal generator using CRO.
- 6. Study different output patterns obtained from Pattern generator and use of these patterns to test the performance of different sections of T.V.
- 7. Draw the layout and test the circuit of PA system.
- 8. Displacement measurement using LVDT.
- 9. Flow measurement using electromagnetic flowmeter/ultrasonic flowmeter.
- 10. Temperature measurement using RTD (PT-100).
- 11. Temperature measurement using Thermocouple (using any one from R, J, K)

#### **Learning Resources:**

#### User's manuals of various instruments.

1. Books:

| Sr.<br>No. | Author                       | Title                                                      | Publisher                                                |
|------------|------------------------------|------------------------------------------------------------|----------------------------------------------------------|
| 01         | A.D. Helfrick<br>W.D. Cooper | Modern electronic instrumentation & Measurement techniques | PHI Learning Pvt. Ltd. New Delhi.                        |
| 02         | Kalsi .H.S.                  | Electronic Instrumentation                                 | Tata Mc-Graw Hill                                        |
| 03         | A.K Sawhney                  | Electrical & Electronic<br>Measurements & Instrumentation  | Dhanpat Rai & Sons                                       |
| 04         | S K Singh                    | Industrial Instrumentation and Control                     | Tata McGraw Hill Education<br>Private Limited, New Delhi |
| 05         | D. Patranabis                | Principles of Industrial<br>Instrumentation                | Tata McGraw Hill<br>Publishing Co. Ltd; N. Delhi         |
| 06         | Rangan Mani & Sharma         | Instrumentation Systems and Devices                        | Tata McGraw Hill<br>Publishing Co. Ltd; N. Delhi         |

#### w.e.f Academic Year 2012-13

#### 2. CD/ PPTs etc:

- > www.proprofs.com/webschool
- ➤ www.osvn.com

# 3. Websites

- http://en.wikipedia.org/wiki/
- ➤ www.youtube.com/ "here type name of instrument"
- ➤ www.controlnet.com

| Course Name : Diploma in Electronics & Vio | deo Engineering |
|--------------------------------------------|-----------------|
| Course Code : EV                           |                 |
| Semester : Fourth                          |                 |
| Subject Title : Radio Reception            |                 |
| Subject Code : 17437                       |                 |

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |     | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|-----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH  | PR        | OR        | TW  | TOTAL |
| 03              |    | 02 | 03           | 100 | 25#       |           | 25@ | 150   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Radio reception is important part of wireless communication system. It is necessary for students to understand the concepts of radio receiver and other related equipments and process of generation, radiation and propagation of radio waves.

The subject contains concept of radiation and propagation of radio waves, Transmission lines, Antennas, characteristics and operation of AM and FM radio receivers.

The study of this subject will be useful in understanding various telecommunication system such as TV receivers, Satellite & Radar systems and mobile communication.

#### **General Objectives:**

Students will able to

- 1) Understand propagation of electromagnetic waves
- 2) Understand basic principles of transmission lines.
- 3) Understand construction working principle & operation of various types of antennas.
- 4) Understand block diagram of AM & FM radio receivers and their operation.
- 5) Understand alignment procedure for AM & FM radio receiver.



# **Theory Contents:**

| Topic<br>No | Theory                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Hrs. | Marks |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|
| 1           | <ul> <li>Wave Propagation</li> <li>Specific objectives:</li> <li>Students will be able to <ul> <li>Explain the concept of electromagnetic waves.</li> <li>Explain different types of radio wave propagation.</li> </ul> </li> <li>Contents: <ul> <li>Fundamental of electromagnetic waves.</li> <li>Definition of radiation, reception, attenuation, absorption &amp; polarization.</li> </ul> </li> <li>Propagation of waves: Ground waves, Sky waves: ionosphere &amp; its effects, actual height, virtual height, skip distance, critical frequency, max usable frequency, Space waves-fading, Tropospheric scatter propagation.</li> </ul> | 08   | 16    |
| 2           | <ul> <li>Transmission Line</li> <li>Specific objective: <ul> <li>To state understand various characteristics of transmission line and losses.</li> </ul> </li> <li>Contents: <ul> <li>2.1 [10]</li> <li>Basic principle of transmission line.</li> <li>Equivalent circuit representation of transmission line.</li> <li>Characteristics impedance of transmission line.</li> <li>Losses in transmission line.</li> </ul> </li> <li>2.2 [08]</li> <li>Standing waves: <ul> <li>SWR</li> <li>VSWR</li> <li>Reflection coefficient.</li> <li>Quarter &amp; half wave length lines.</li> </ul> </li> </ul>                                         | 12   | 18    |
| 3           | Antenna         Specific objective: <ul> <li>To explain construction, working principle, operation and characteristics of various antennas.</li> <li>To plot radiation pattern of antenna</li> </ul> Contents:       [12] <ul> <li>Electromagnetic radiation.</li> <li>Hertzian Dipole.</li> <li>Resonant antenna, radiation pattern and antenna length calculation.</li> <li>Non resonant antenna (directional antenna).</li> <li>Definition: Antenna gain, effective radiated power, directivity, power gain (ERP), antenna resistance, bandwidth, beam width and polarization.</li> </ul> 3.2       [12]                                    | 10   | 24    |

|   | <ul> <li>dipole antenna, Yagi uda antenna</li> <li>UHF &amp; microwave antenna: Focal feed parabolic reflector,<br/>Cassegrain feed parabolic reflector, Horn antenna.</li> <li>Wideband &amp; special purpose antenna: Loop antenna, Phased<br/>array</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |    |     |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
|   | AM Radio Receiver.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |    |     |
|   | <ul> <li>Specific objective:</li> <li>Explain operation TRF and super heterodyne receivers.</li> <li>Define characteristics of AM radio receiver.</li> <li>State the procedure for alignment of TV receiver</li> <li>To understand concept of AGC.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |    |     |
|   | Contents:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |    |     |
| 4 | <ul> <li>4.1 AM Receiver [12]</li> <li>Block diagram of tuned radio receiver and its working.</li> <li>Block diagram of superhyterodyne receiver, function of each block and its working.</li> <li>Characteristics of AM radio receiver: Sensitivity, Selectivity. Adjacent channel selectivity, image signal rejection ratio Frequency changing &amp; tracking.</li> <li>4.2 A M Receiver Alignment [12]</li> <li>Choice of intermediate frequency used for different application.</li> <li>circuit diagram, operation and input and output voltages of practical diode detector.</li> <li>Alignment of AM radio receivers: Necessity of alignment. RF alignment, IF alignment, Selectivity, sensitivity, fidelity, dynamic range of radio receiver, simple AGC circuit</li> </ul> | 10 | 24  |
|   | FM Radio Receiver                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |    |     |
| 5 | <ul> <li>Specific objective:         <ul> <li>To draw block diagram of FM radio receiver.</li> <li>To explain types of FM demodulators circuit.</li> <li>To state necessity of alignment of radio receiver and procedure of RF &amp; IF alignment carried out in AM radio receivers.</li> </ul> </li> <li>Contents:         <ul> <li>[18]</li> <li>Block diagram &amp; operation of FM radio receiver, Circuit diagram &amp; operation of amplitude limiter, Circuit diagram and operation FM Demodulators: Slope detector, Balance slope detector, Foster see lay detector, Ratio detector, PLL based FM demodulator, concept of AFC.</li> </ul> </li> </ul>                                                                                                                       | 08 | 18  |
|   | Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 48 | 100 |

## Practical: Skills to be developed

# **Intellectual skills**

- 1. To incept, analyze & record transmission line properties.
- 2. To study directional pattern of any or given antenna using field strength meter.
- 3. To apply AM input from AM generator to the radio receiver.
- 4. To identify the different stages of AM radio receiver.

- 5. To identify components & follow the instruction as given.
- 6. To analyze & record voltages at different test points of AM radio receiver.
- 7. To analyze frequency adjustment of RF & IF stage.
- 8. To locate the fault by logical analysis of symptoms.
- 9. To verify the output of each stage with standard values.

#### **Motor Skills**

- 1. Installing and testing of experimental set up and tabulate the reading.
- 2. Skill to connect the instrument plots the directional pattern of antenna on polar paper.
- 3. Skill to draw the layout of AM radio receiver.
- 4. Skill to measure the voltages at the different test point using DMM as per procedure.

#### **List of Practical:**

- 1. To measure parameters and attenuation of transmission line
- 2. To measure frequency characteristics and stationary waves of transmission line.
- 3. To plot directional pattern of given antenna.
- 4. To observe different section & draw layout of AM radio receiver and to measure the voltages of different section of transistorized AM radio receiver.
- 5. To observe different section & draw layout of FM radio receiver and to measure the voltages of different section of transistorized FM radio receiver.
- 6. To calculate bandwidth & plot graph between output voltages & input freq. of ratio detector.
- 7. To plot the sensitivity characteristics curve of AM radio receiver.
- 8. Observe input and output waveforms of ratio detector.
- 9. IF alignment in AM radio receiver.
- 10. To observe symptoms, do logical analysis and rectify the fault in AM radio receiver.
- 11. To observe symptoms, do logical analysis and rectify the fault in FM radio receivers.

#### List of Assignments:

- 1. List antenna specifications :Antenna gain, effective radiated power, Directivity for Yagi-Uda antenna, Dish antenna and Loop antenna
- 2. State Frequency Band allotted to AM radio Broad casting station. List AM program and allotted frequency band.
- 3. State Frequency Band allotted to FM radio Broad casting station. List FM program and allotted frequency band.

# List of Equipments:

- 1. CRO, Signal generator, DMM.
- 2. Transmission line trainer kit, Antenna parameter trainer kit, AM radio receiver, FM radio receiver.

# **Learning Recourses:**

# 1. Books:

| Sr.<br>No. | Title                                | Author           | Publisher                                  |
|------------|--------------------------------------|------------------|--------------------------------------------|
| 01         | Electronics Communication<br>Systems | George Kennedy   | Mc Graw – Hill Book Co.<br>Ltd. Singapore. |
| 02         | Analog Communication                 | V. Chandra Sekar | Oxford University Press                    |
| 03         | Communication Electronics            | Frenzil          | Mc Graw – Hill Book Co.<br>Ltd. Singapore  |
| 04         | Electronics Communication<br>Systems | Wayne Tomasi     | Pearson                                    |

# 2. Web sites:

www.csus.edu/indiv/n/ngw/EEE-272/Antenna.ppt www.emergencyradio.ca/course/lesson-6%20Antenna.ppt www.emergencyradio.ca/course/lesson-7%20propagation%201010.ppt

| Course Name        | : Diploma in Electronics & Video Engineering |
|--------------------|----------------------------------------------|
| <b>Course Code</b> | : EV                                         |
| Semester           | : Fourth                                     |
| Subject Title      | : TV Signal Transmission System              |
| Subject Code       | : 17441                                      |

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |     |    | Examination | on Scheme |       |
|-----------------|----|----|--------------|-----|----|-------------|-----------|-------|
| TH              | TU | PR | PAPER<br>HRS | TH  | PR | OR          | TW        | TOTAL |
| 03              | 02 |    | 03           | 100 |    |             | 25@       | 125   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Transmission plays an important role for processing of signals. The signals are transmitted in different ways i.e. wire communication, wireless communication and wavelength communication.

This subject deals with the concept of the TV signal transmission for analog and digital TV system depending on the techniques for processing the signal is being transmitted from the transmitter, CVS & CCVS.

The topic CVS signals useful to understand the basic concept of TV signal generation & transmission.

Thus student will learn different requirement of signal for TV transmission. For learning this subject student should know the concept of analog & digital signals as well as electromagnetic spectrum.

Thus students will be aware the subject of TV Receiver in further Semester.

#### **General Objectives.**

Students will able to:

- Understand the basic concepts of TV Transmitter.
- Analyze the details of CVS & CCVS signals.
- Study the details of color burst signals.
- Visualize the concept of color theory.
- Understand function of B/W & color TV transmitter for PAL system.
- Understand the transmission of digital TV signal.

# **Learning Structure:**

| Applications | Application in Television<br>at studios before Transmis                                                                                                                         | Broadcastin<br>ssion.                                 | ng stations                                               | , Prograr                              | n Record                               | ing and Mixing                                                     |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|-----------------------------------------------------------|----------------------------------------|----------------------------------------|--------------------------------------------------------------------|
| Procedure    | Analyze Composite<br>video Signal with details<br>of Horizontal and<br>blanking<br>Period                                                                                       | Analyze Co<br>Composite<br>Signal with<br>Burst signa | olour<br>Video<br>1 PAL<br>1                              | PAL co<br>Transm<br>Block d            | lour<br>itter<br>iagram                | Digital TV and<br>HDTV<br>transmission<br>technique.               |
| Principle    | Interlace scanning in T.V.<br>for picture continuity,<br>Horizontal and Vertical<br>scanning                                                                                    | Colour d<br>colour si<br>and its ac<br>total ban      | ifference s<br>gnal band<br>ccommoda<br>d width of        | signal,<br>width<br>ation in<br>T.V.   | Block d<br>monoch<br>Transm<br>TV sign | iagram of<br>frome T.V.<br>ission and digital<br>nal transmission. |
| Concept      | <ul> <li>Helmholtz law and light,</li> <li>Electromagnetic sp visible light.</li> <li>Structure of picture</li> <li>Image continuity,</li> <li>Persistence of vision</li> </ul> | I theory of<br>bectrum of<br>e frame<br>on            | Mixing o<br>colours: A<br>and Subt<br>Mixing o<br>lights. | of<br>Additive<br>ractive<br>of colour | Digit<br>Tech                          | al Modulation niques,                                              |
|              | Ť                                                                                                                                                                               |                                                       | Î                                                         |                                        |                                        | Ť                                                                  |
| Fact         | Visible light spectrum,<br>Human eye structure.<br>Aspect Ratio, Scanning<br>in T.V. system<br>Resolution in TV                                                                 | Primary a<br>Colours o                                | nd second<br>f Spectrur                                   | ary                                    | Basics of<br>FM Trans<br>Modulati      | AM, VSB and smission and on Techniques.                            |

# Theory:

| Topic | Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Hours | Marks |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
| 110   | T.V. Fundamentals                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |       |
| 1     | <ul> <li>Specific Objectives:</li> <li>&gt; Understand the fundamentals of TV transmission</li> <li>&gt; Understand the different requirements for TV signal</li> <li>&gt; Understand the purpose of VSB transmission.</li> <li>Contents:</li> <li>1.1 Perception of vision &amp; Gross Structure, Concept of persistence of vision, Application of persistence of vision for motion pictures and television, aspect ratio, image continuity, Interlace scanning, scanning periods, horizontal resolution, vertical resolution, Kell factor, Concept of gross structure of TV system and perceiving image continuity in TV system, aspect ratio, scanning, H and V Resolution, kell factor, progressive and interlace scanning, bandwidth for TV signal, interlace error. [14]</li> <li>1.2 Vestigial side band transmission for T.V. Signal, VSB transmission, Diagrammatic representation of VSB, Bandwidth for color signal, brightness, contrast, viewing distance, luminance. [04]</li> </ul>   | 08    | 18    |
| 2     | <ul> <li>Composite Video Signal</li> <li>Specific Objectives:</li> <li>Draw the CVS for TV signal.</li> <li>List the standards used for TV Signal transmission.</li> <li>Designate band allocation for TV Transmission.</li> <li>Contents:</li> <li>2.1 [10]</li> <li>Pedestal height, Blanking pulses (H&amp; V) Color Bust, Horizontal sync. Pulse details, vertical sync. Pulse details, Equalization Pulses, D.C. Level</li> <li>Diagrammatic representation of CVS: Purpose of blanking pulses, pedestal height. Details of H blanking period and purpose of each time allocation. Purpose of Colour Burst Signal and its placement. Details of V blanking period. Requirement of serrated V-Sync pulses Purpose of equalizing pulses.</li> <li>CCIR- B standards for colour signal transmission, List CCIR-B standards for PAL Colour TV, T.V. channel allocation for band-I and band-III- Different channel allocation &amp; their comparison, Purpose of channel allocation. [08]</li> </ul> | 10    | 18    |
| 3     | <ul> <li>Monochrome T.V. Transmitter</li> <li>Specific Objectives:</li> <li>Explain the modulation techniques used for TV signal<br/>Transmission.</li> <li>Describe the function of different camera tubes.</li> <li>Explain the function of monochrome TV transmission.</li> <li>Contents:</li> <li>3.1 Audio and video signal transmission, FM for sound signal and AM<br/>for Picture signal, Positive and negative modulation with proper<br/>waveform and comparison</li> <li>2.2 Camera tubes, Block schematic of Silicon Diode Array, Videocon<br/>camera and its working, Schematic diagram of CCD Camera and its</li> </ul>                                                                                                                                                                                                                                                                                                                                                                | 10    | 16    |

| working, Block diagram of Colour camera and its function. [08]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| B/W TV Transmitter and function of each block. [04]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Colour Theory                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <ul> <li>Specific Objectives:</li> <li>Explain fundamentals of Colour Theory</li> <li>Analyze human eye response to different colours.</li> <li>Visualize the concept of mixing of colours.</li> <li>Contents:</li> <li>4.1 [10]</li> <li>Visible light spectrum, Nature of light, Draw visible light spectrum.</li> <li>Human eye response to different colours. Construction of Human eye.</li> <li>Color theory:- Primary and Secondary colors, Additive and Subtractive Mixing, Grassman's Law of colour mixing., Hue, Saturation, Luminance and Chrominance Signal.</li> <li>Colour Difference signal: Compatibility of colour signal transmission and factors to be considered for compatibility, Purpose of colour difference signals. Generation of colour difference signals with the help of block diagram, Elimination of (G -Y) Signal. Bandwidth of colour sub-carrier frequency, Calculation of colour sub-carrier frequency, Factors influencing the choice of colour sub-carrier, Weighted colour vectors U and V, Concept of over-modulation of colour signals, Requirement of weighted factors, Calculations of weighted factors, Phasor diagram for weighted and unweighted primary and secondary colours.</li> <li>Block Diagram and concept of Quadrature Amplitude Modulation. Block diagram and working of QAM for PAL system.</li> </ul> | 08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 18                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <ul> <li>Specific Objectives:</li> <li>&gt; Explain the basic principles of PAL Transmitter</li> <li>Contents:</li> <li>5.1 PAL – V switching [06]</li> <li>Elimination of differential phase error in PAL system,<br/>Advantages of PAL system, Describe concept of PAL-V<br/>switching and its purpose with the help of phasor diagram,<br/>requirement of PAL burst or swinging burst signal,<br/>specifications of PAL burst signal. Selection of exact PAL<br/>colour sub-carrier frequency Factors influencing to select exact<br/>PAL colour sub-carrier frequency.</li> <li>5.2 Bandwidth for transmitted PAL colour resultant [04]</li> <li>Placement of PAL colour signal in VSB of TV Transmission,<br/>selection of bandwidth for colour signal over luminance signal,<br/>Suppressed colour sub-carrier transmission.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 06                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 18                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <ul> <li>Working, Block diagram of Colour camera and its function. [08]</li> <li>3.3 Block diagram of monochrome T.V. Transmitter, Block diagram of B/W TV Transmitter and function of each block. [04]</li> <li>Colour Theory</li> <li>Specific Objectives:         <ul> <li>Explain fundamentals of Colour Theory</li> <li>Analyze human eye response to different colours.</li> <li>Visualize the concept of mixing of colours.</li> </ul> </li> <li>Contents:         <ul> <li>4.1 [10]</li> <li>Visible light spectrum, Nature of light, Draw visible light spectrum.</li> <li>Human eye response to different colours. Construction of Human eye.</li> <li>Color theory:- Primary and Secondary colors, Additive and Subtractive Mixing, Grassman's Law of colour mixing., Hue, Saturation, Luminance and Chrominance Signal.</li> <li>Colour Difference signal: Compatibility of colour signal transmission and factors to be considered for compatibility, Purpose of colour difference signals. Generation of colour difference signals.</li> <li>Frequency interleaving, Utilization of interleaved space for colour signal transmission, Choice of colour sub-carrier frequency, Calculation of colour sub-carrier frequency, Colours.</li> <li>Block Diagram and concept of Quadrature Amplitude Modulation. Block diagram and working of QAM for PAL system, Advantages of PAL system, Describe concept of PAL-V switching and its purpose with the help of phasor diagram, requirement of PAL burst or swinging burst signal, specifications of PAL burst signal in VSB of TV Transmission, selection of bandwidth for colour resultant [04]<td>00510g. Block diagram of noncohrom CV. Transmitter, Block diagram of B/W TV Transmitter and function of each block.       [04]         Colour Theory       Specific Objectives:       &gt; Explain fundamentals of Colour Theory       &gt; Analyze human eye response to different colours.         &gt; Visualize the concept of mixing of colours.       [10]         • Visualize the concept of mixing of colours.       [10]         • Visualize the concept of mixing of colours.       [10]         • Visualize the concept of mixing of colours.       [10]         • Visualize the concept of mixing of colours.       [10]         • Visualize the concept of mixing of colours.       [10]         • Visualize the concept of mixing of colours.       [10]         • Visualize the concept of light, Draw visible light spectrum.       [10]         • Human eye response to different colours. Construction of Human eye.       [10]         • Color theory:- Primary and Secondary colors, Additive and Subtractive Mixing, Grassman's Law of colour mixing., Hue, Saturation, Luminance and Chrominance Signal.       [08]         • Colour Difference signal: Compatibility of colour signal transmission and factors to be considered for compatibility, Purpose of colour difference signals. Generation of colour difference signal.       [08]         • Frequency interleaving, Utilization of interleaved space for colour signal transmission, Choice of colour sub-carrier frequency, Calculations of colour sub-carrier frequency, Calculations of weighted factors, Phasor diagram fo</td></li></ul></li></ul> | 00510g. Block diagram of noncohrom CV. Transmitter, Block diagram of B/W TV Transmitter and function of each block.       [04]         Colour Theory       Specific Objectives:       > Explain fundamentals of Colour Theory       > Analyze human eye response to different colours.         > Visualize the concept of mixing of colours.       [10]         • Visualize the concept of mixing of colours.       [10]         • Visualize the concept of mixing of colours.       [10]         • Visualize the concept of mixing of colours.       [10]         • Visualize the concept of mixing of colours.       [10]         • Visualize the concept of mixing of colours.       [10]         • Visualize the concept of mixing of colours.       [10]         • Visualize the concept of light, Draw visible light spectrum.       [10]         • Human eye response to different colours. Construction of Human eye.       [10]         • Color theory:- Primary and Secondary colors, Additive and Subtractive Mixing, Grassman's Law of colour mixing., Hue, Saturation, Luminance and Chrominance Signal.       [08]         • Colour Difference signal: Compatibility of colour signal transmission and factors to be considered for compatibility, Purpose of colour difference signals. Generation of colour difference signal.       [08]         • Frequency interleaving, Utilization of interleaved space for colour signal transmission, Choice of colour sub-carrier frequency, Calculations of colour sub-carrier frequency, Calculations of weighted factors, Phasor diagram fo |

|   | Total                                                                                                                     | 48 | 100 |
|---|---------------------------------------------------------------------------------------------------------------------------|----|-----|
|   | Definition Signal. Block diagram of HDTV signal transmitter<br>and it's working. Characteristics of HD Signals and System |    |     |
|   | • Features of HDTV Transmission& channel, Features of High                                                                |    |     |
|   | 6.2 [06]                                                                                                                  |    |     |
|   | Transmission                                                                                                              |    |     |
|   | Digital TV Signal. Advantage & Disadvantage of digital TV                                                                 |    |     |
| 6 | digital TV signal transmission and its working. Characteristics of                                                        | 06 | 12  |
|   | • Concept of digital TV Transmission Basic block diagram of                                                               |    |     |
|   | 6.1 [06]                                                                                                                  |    |     |
|   | Contents:                                                                                                                 |    |     |
|   | $\triangleright$ Explain the concept of HDTV transmission.                                                                |    |     |
|   | $\succ$ Explain the basic fundamentals of Digital TV Transmission                                                         |    |     |
|   | Specific Objectives:                                                                                                      |    |     |
|   | Digital TV Transmission                                                                                                   |    |     |
|   | PAL Transmitter and function of each section.                                                                             |    |     |
|   | function of each block with output waveforms, Block diagram of                                                            |    |     |
|   | • Draw CCVS and label it, Block diagram of PAL Encoder and                                                                |    |     |

#### **Practical:**

#### **Intellectual Skills:**

- Select measuring instruments on the basis of range, least count, precision and accuracy required for measurement.
- Record and analyze the observations.
- Interpret the results from observations and calculations.

#### Motor Skills:

- Proper handling of instruments.
- Measuring voltages and current at different stages accurately.
- Observe the phenomenon and to list the observations in proper tabular form.
- Follow proper procedure while performing the experiment.
- Observe, Draw and Analyze the waveforms at different stages.

# List of Experiments:

(For class size 60, batch size 20 experiments shall be conducted in cyclic order with group of 4 to 5 students.)

- 1. To observe, draw and analyze the output CVS waveform of pattern generator for monochrome bar pattern.
- 2. To observe, draw and analyze the output CVS waveform of pattern generator for monochrome Chessboard pattern.
- 3. To observe, draw and analyze the output CVS waveform of pattern generator for Colour bar pattern.
- 4. To observe, draw and analyze the output CVS waveform of pattern generator for Colour cross edge and colour dot patterns. (Horizontal and Vertical Sync pulses to be analyzed.)
- 5. To observe and analyze the video camera output signal on CRO.

- 6. To perform video recording and transmit the signal through transmission link and observe the same on TV receiver.
- 7. Visit to Doordarshan Kendra to understand the concept of C.T.V. transmission. Write a report of it.
  - Students should observe how synchronizing pulses are inserted.
  - Students should observe the switching of different cameras at studio.
  - Students should understand the concept of relay or retransmission of same programme.
  - Students should observe and understand the mixing of audio and video signals before transmission.(Function of Combining Network)

# List of Assignments:

- 1) A) Persistence of vision and its use for image continuity.
  - B) Explanation of gross structure of TV
  - C) Horizontal and vertical resolution and their use in calculation of No. of lines and video bandwidth.
  - D) Total bandwidth of channel and its distribution in VSB.
- 2) A) Representation of composite video signal for one or two horizontal line for a given pattern of frame.
  - Concept of composite video signal for horizontal lines and explanation & functioning of each part of that.
  - Vertical blanking details their requirements and need for serration and equalizing pulses.
- 3) A) Camera functioning and working.
  - B) Different types of camera tubes and their working.
- 4) A) Terms related to Monochrome and colour T.V. and their explanation. E.g. Brightness, luminance, Hue, contrast etc.
  - B) Mixing of colours, Grass man's law
  - C) Compatibility and its factors for Monochrome and colour TV.
- 5) A) Colour difference signals and their requirement.
  - B) Positive and negative modulation.
  - C) Elimination of (G-Y) signal.
  - D) Frequency interleaving and placing of colour sub-carrier signal in bandwidth.
- 6) A) Over-modulation of colour signals and how to over come from that.
  - B) Factors influencing choice of colour sub-carrier signal.
  - C) QAM for PAL system.
  - D) Phasor diagrams of weighted and unweighted colour signals.
- 7) A) Block diagram level study of monochrome T.V. Transmissions.
  - B) PAL V switching and its purpose.
- 8) A) Picture and sound transmission as AM & FM respectively Justify.
  - B) PAL Encoder block diagram and its working.
- 9) A) Study the concept of digital TV transmission.B) Study the concept of HDTV transmission.

# Learning Resources:

#### 1. Books:

| Sr.<br>No. | Title                                | Author       | Publisher                            |
|------------|--------------------------------------|--------------|--------------------------------------|
| 01         | Television & Video Engg.             | Dhake        | Tata Mc grow Hill New Delhi          |
| 02         | Modern T.V. Practice                 | R.R.Gulati   | Wiley Eastern Ltd. London.           |
| 03         | Colour T.V. Principle &<br>Practices | R.R.Gulati   | New Age International Ltd.<br>Delhi. |
| 04         | Basic T.V. & Video System            | Barnad Grobe | Mac- GRaw Hill Ltd., New York        |
| 05         | Colour T.V. & Video<br>Technology    | Maini        | PHI Publication, New Delhi           |

# 2. Websites

- 1. http://assets.cambridge.org/97805218/96023/excerpt/9780521896023\_excerpt.pdf2.
- 2. http://en.wikipedia.org/wiki/Television
- 3. http://www.ustudy.in/node/923

| Course Name   | : Electronics Engineering Group          |
|---------------|------------------------------------------|
| Course Code   | : ET/EN/EX/EJ/IE/IS/IC/DE/EV/MU/IU/ED/EI |
| Semester      | : Fourth                                 |
| Subject Title | : Linear Integrated Circuits             |
| Subject Code  | : 17445                                  |

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |     | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|-----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH  | PR        | OR        | TW  | TOTAL |
| 04              |    | 02 | 03           | 100 | 50#       |           | 25@ | 175   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Modern age technology has developed on high density and high speed electronics circuits. Integrated circuits are basis of these high density circuits enabled to reduce size, weight and cost of equipments. They have intrinsic features such as low power consumption, low noise and ease of design.

Today the growth of any industry depends upon electronics to great extent. Contents of this subject are the basic building blocks of different analog circuits.

Basic operating and designing principle of such a large collection of circuits establishes a foundation for understanding new development in the electronics field, instrumentation and power control. This subject acquaints student with general analog principles and design methodologies using integrated circuit for system design.

Prerequisites various devices and circuits studied in elements of electronics and electronic devices and circuits. Prospects- LSI, MSI, VLSI.

# **General Objectives:**

Students will be able to:

- Understand working principle of Op-Amp and IC555
- Develop electronics circuits using timer IC555 and Op-Amp

• Analyze the response of frequency selective circuits such as PLL with respect to the incoming signal.

# **Learning Structure:**

# **Application:**



# **Contents: Theory**

| Topic | Content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Hours | Marks |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
|       | <b>Operational Amplifier (Op-Amp):</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |       |
|       | Specific Objectives :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |       |
|       | Draw labeled block diagram of Op-Amp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |
|       | Specify and define Different parameters of Op-Amp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |       |
|       | Interpret ideal transfer characteristics of Op-Amp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |       |
|       | Contents:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |       |
|       | • Importance of Op-Amp:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |       |
|       | Block diagram of Op-Amp and function of each block with the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |       |
|       | circuit such as balanced, Unbalanced, differential amplifiers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |       |
|       | with simple current source, level shifter and complementary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |       |
| 1     | push-pull amplifier. Equivalent Circuit, Circuit Symbols And                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 12    | 10    |
|       | Terminals. Op-Amp IC-741 pin diagram and function.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |       |
|       | • Parameters of Op-Amp:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |       |
|       | Input offset voltage, Input offset current, Input bias current,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |       |
|       | differential input resistance, Input capacitance, Input voltage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |       |
|       | range, offset voltage adjustment range, Common Mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |       |
|       | Rejection Ratio (CMRR), Supply Voltage Rejection Ratio                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |       |
|       | (SVRR), large signal voltage gain and transfer characteristics,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |       |
|       | supply voltages, supply current, output voltage swing, output                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |       |
|       | resistance, slew rate, gain bandwidth product, output short                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |       |
|       | circuit current.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |       |
|       | <b>Op-Amp Configuration:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |       |
|       | Specific Objectives: Students will be able to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |       |
|       | Differentiate open and close loop configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |       |
|       | Identify inverting and non-inverting configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |       |
|       | Construct integrator and differentiator.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |       |
|       | <b>1</b> One of the state of the sta |       |       |
|       | 2.1 Open loop and closed loop configuration of Op-Amp, [08]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |       |
|       | Open loop configuration Inverting Non-inverting                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |       |
|       | Close loop configuration Inverting non inverting                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |       |
| 2     | differential amplifier, unity gain amplifier (voltage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 12    | 18    |
| 2     | follower) inverter(sign changer)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 12    | 10    |
|       | Tonower), inverter(sign changer)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |       |
|       | <b>2.2</b> Inverting and non-inverting configuration of [10]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |       |
|       | Adders (summing amplifier scaling Amplifier averaging                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |       |
|       | amplifier) Subtractor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |       |
|       | Basic Integrator                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |       |
|       | Basic Differentiator                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |
|       | Basic concept of frequency compensation of On-Amp and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |       |
|       | Offset nulling                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       |       |
|       | Numerical based on designing of above circuit.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       |       |
|       | Applications of Op-Amp:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |       |
|       | Specific Objectives:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |
|       | <ul> <li>Compute component values for instrumentation amplifier.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |       |
| 3     | Explain IC LM-324                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 12    | 22    |
|       | Explain different applications of Op-Amp.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |       |
|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |       |
|       | <b>3.1</b> Need for signal conditioning and signal processing. [08]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |       |

|   | Circuit diagram, operation, derivation of output voltage<br>Equation. advantages and applications of Instrumentation<br>amplifier.<br>Pin diagram pin functions and specifications of IC LM 324<br>Voltage to current converter (with floating load, with grounded                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |    |    |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|
|   | load) Current to voltage converter.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |    |    |
|   | <b>3.2</b> Sample and hold circuit. [16]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |    |    |
|   | Logarithmic and antilogarithmic amplifiers (using Diodes)<br>Analog divider and analog multiplier<br>Comparator: Circuit diagrams and operation of<br>• Zero crossing detector,<br>• Schmitt trigger,<br>• Window detector,<br>• Phase detector,<br>• Active peak detector,<br>• Peak to peak detector                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |    |    |
| 4 | <ul> <li>Filters:</li> <li>Specific Objectives:</li> <li>Distinguish the types of filter</li> <li>Explain active and passive filter</li> <li>Explain different parameters of filter.</li> <li>Contents: <ul> <li>Introduction to filters ,Classification of filters,</li> <li>Concept of passive and active filters</li> <li>Merits and demerits of active filters over passive filters</li> <li>Ideal and actual characteristics, terms:- cut off frequency, Pass band, Stop band, center frequency, roll off rate, BW, Q-factor, first order and second order Butterworth filters, order of filter, Low pass filter, high pass filter, band pass filter (wide band pass, narrow band pass filter) Band reject filter. Numerical based on design of different filters.</li> </ul> </li> </ul> | 10 | 16 |
| 5 | <ul> <li>Timers</li> <li>Specific Objectives:</li> <li>Draw block diagram of IC 555</li> <li>Understand industrial applications of IC 555,565</li> <li>5.1 Introduction to timer IC 555 [10]</li> <li>Block diagram of IC 555 and its pin diagram and function of each pin.</li> <li>Concepts of different timer circuits used in industries: water level controller, Touch plate switch, frequency divider.</li> <li>Numericals based on timers.</li> <li>5.2 Phase Lock Loop</li> <li>Principle of operation, block diagram of PLL. [08]</li> <li>Applications of PLL as multiplier, FM demodulator.</li> <li>Pin diagram and pin functions of IC 565(PLL)</li> </ul>                                                                                                                        | 10 | 18 |

|   | Oscillators:                                                                                                                                        |    |     |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
|   | Specific Objectives:                                                                                                                                |    |     |
|   | Explain concept of oscillators                                                                                                                      |    |     |
|   | Explain different types of oscillators                                                                                                              |    |     |
|   | > Develop multivibrators and oscillators for given values.                                                                                          |    |     |
| 6 | Contents:                                                                                                                                           | 08 | 10  |
| 0 | • Concept of oscillators,                                                                                                                           |    | 10  |
|   | • Types of oscillators: Phase shift oscillators, Wien bridge oscillators using IC-741                                                               |    |     |
|   | • Types of Multivibrators: Monostable, Astable, Bistable using IC-555 and IC-741. Schmitt trigger, voltage controlled oscillator (VCO) using IC 555 |    |     |
|   | Total                                                                                                                                               | 64 | 100 |

# Practical:

## **Intellectual Skills:**

- 1. Interpret the waveforms.
- 2. Find faults in circuits.

#### Motor Skill:

1. Testing and Measurement.

# **List of Practicals:**

| Sr. No. | Title of the Experiment                                                                 |
|---------|-----------------------------------------------------------------------------------------|
| 01      | Determine the op-amp parameters:                                                        |
|         | • Input Offset Voltage (V <sub>io</sub> )                                               |
| 01      | • Output Offset Voltage (V <sub>00</sub> )                                              |
|         | Common mode rejection ratio (CMRR)                                                      |
| 02      | Determine the gain of Inverting and Non-inverting amplifier using op-amp and            |
| 02      | compare it with theoretical gain.                                                       |
| 03      | Verify the operation of Adder and Subtractor circuit using op-amp IC 741.               |
|         | Verify the working of active integrator and differentiator circuits using op-amp IC 741 |
|         | for following inputs:                                                                   |
| 04      | • Sine waveform                                                                         |
|         | • Square waveform                                                                       |
|         | Rectangular waveform                                                                    |
| 05      | Assemble V to I converter and I to V converter using IC 741 and measure the             |
| 03      | respective output.                                                                      |
|         | Verify the working of following comparator circuits using op-amp IC 741 and draw the    |
| 06      | input-output waveforms                                                                  |
| 00      | • Zero crossing detector                                                                |
|         | Active peak detector                                                                    |
| 07      | Assemble first order low pass Butterworth filter using op-amp and plot the frequency    |
| 07      | response and determine its cutoff frequency.                                            |
| 08      | Assemble Astable multivibrator circuit using IC 741. Plot the output waveform and       |
| 00      | determine the frequency of oscillations and duty cycle.                                 |
| 09      | Assemble Monostable multivibrator circuit using IC 555. Plot the output waveform        |
| 07      | and determine the on-time.                                                              |
| 10      | Assemble Schmitt trigger circuit using IC 555. Plot the output waveform and             |

|    | determine UTP and LTP                                                             |
|----|-----------------------------------------------------------------------------------|
| 11 | Assemble Instrumentation amplifier circuit using IC 324 and determine the overall |
|    | gain.                                                                             |
| 12 | Verify the operation of frequency Multiplier using PLL IC 565 and determine the   |
|    | output frequency.                                                                 |

# Learning Resources:

Books:

| Sr.<br>No. | Author            | Title                                                              | Publisher        |  |
|------------|-------------------|--------------------------------------------------------------------|------------------|--|
| 01         | K.R. Botkar       | Integrated Circuit                                                 | Khanna           |  |
| 02         | Ramakant Gayakwad | Op-Amps and Linear Integrated Circuit                              | PHI              |  |
| 03         | Serigo Franco     | Design with Operational Amplifier and<br>Analog Integrated Circuit | Tata-McGraw Hill |  |
| 04         | Willam D. Stanley | Operation Amplifier with Linear<br>Integrated Circuit              | Person           |  |

Course Name : Electronics Engineering GroupCourse Code : ET/EJ/IE/IS/EN/EX/IC/MU/EV/DE/IU/ED/EISemester : FourthSubject Title : Visual Basic

Subject Code : 17043

#### **Teaching and Examination Scheme**:

| Teaching Scheme |    | Examination Scheme |              |    |    |    |     |       |
|-----------------|----|--------------------|--------------|----|----|----|-----|-------|
| TH              | TU | PR                 | PAPER<br>HRS | TH | PR | OR | TW  | TOTAL |
| 01              |    | 02                 |              |    |    |    | 25@ | 25    |

## **Rationale:**

Today's most of the electronically operated devices, integrated circuits, controllers, equipments, gadgets are run by specific drivers/software. To understand design, develop and write drivers programming knowledge is required. To run the devices software has to be user friendly. New approach is to use graphical user interface. Graphical user interface can be implemented using visual software's.

Traditionally visual basic is the most popular, versatile, suitable, simple and commonly used visual programming language to write efficient, compact and portable interfaces, drivers/ software's.

The subject will enable the students to inculcate visual programming concepts and methodology used to write, debug, compile and execute simple visual basic programs using different powerful data types, built in visual controls and integrated visual basic environment (IDE) provided by Microsoft visual studio. Students will be exposed to event driven programming and bottom up approached used in objects oriented programming.

Students will understand how a complex interface can be easily implemented in visual basic with almost no programming expertise.

This course will lay the basic foundation of visual programming which will enable students to develop simple to complex programmable systems interfaces in the real world of work

#### **General Objectives**

Students will able to.

- 1. Learn visual programming development environment, concepts and methodology.
- 2. Use essential components (visual tools ) of Visual software's
- 3. Develop the skill of visual basic programming to build custom standalone applications
- 4. Develop applications with Multiple documents interface (MDI) using common dialog, menus and graphics
- 5. Use ADO for database connectivity with different databases.
- 6. Create simple reports using data report, Seagate crystal reports and integrating it with visual basic
- 7. Develop applications using class modules

# **Learning Structure:**



# Theory

|                                                                                              | uis |
|----------------------------------------------------------------------------------------------|-----|
| Topic 1] Introduction to Visual Environment                                                  |     |
| Specific Objectives:                                                                         |     |
| Familiar with IDE of Visual basic                                                            |     |
| Use concepts of object based language                                                        |     |
| Use basic elements of visual interface                                                       |     |
| Use properties, events and methods at design time and runtime                                | 2   |
| Create objects, place them on forms                                                          | 12  |
| Contents:                                                                                    |     |
| 1.1 Concepts of visual programming, object, features, properties, methods, events.           |     |
| 1.2 Environment of VB – Menu bar, toolbar, project explorer, toolbox, properties             |     |
| window, form designer, form layout, immediate window.                                        |     |
| 1.3 Concept of project, elements of projects, form, their properties, methods and events.    |     |
| Topic 2] Introduction to Visual Basic                                                        |     |
| Specific Objectives:                                                                         |     |
| Use different data types                                                                     |     |
| > Use powerful features of arrays and collections                                            |     |
| > Write procedures and functions                                                             |     |
| > Call procedures and functions                                                              |     |
| Differentiate between procedure and functions                                                |     |
| <ul> <li>Use library functions for math and string operations</li> <li>0</li> </ul>          | 2   |
| <ul> <li>Use Inputbox and Msgbox functions</li> </ul>                                        | _   |
| Contents:                                                                                    |     |
| 2.1 Data types, variables, constants, arrays, collections                                    |     |
| 2.2 procedures. Arguments, function, return values, control flow statements, loop            |     |
| statements Nested control structures exit statement                                          |     |
| 2.3 Math operators & formulas, logical operators, string functions, special functions        |     |
| available in VB like Input Box (). Message Box (). Format ().                                |     |
| Tonic 3] Controls and Events                                                                 |     |
| Snecific Objectives:                                                                         |     |
| <ul> <li>Vise basic controls</li> </ul>                                                      |     |
| <ul> <li>Select appropriate controls for given data</li> </ul>                               |     |
| <ul> <li>Set properties of different basic controls</li> </ul>                               |     |
| <ul> <li>Call methods and events of basic controls</li> </ul>                                |     |
| <ul> <li>Demonstrate the use of each control with simple examples</li> </ul>                 | 12  |
| Contents:                                                                                    | -   |
| 3.1 Basic controls: Text box list Box Combo Box Scroll Bar frame Option button               |     |
| checkbox command button OLE controls                                                         |     |
| 3.2 File Drive directory Picture box Image and timer controls Designing a form using         |     |
| controls concepts of event & properties changing properties (runtime & design                |     |
| time) Important events of each control & creating applications using controls                |     |
| Tonic 4] Advance Controls & Events                                                           |     |
| Snecific Objectives:                                                                         |     |
| <ul> <li>Add extrinsic controls in an application</li> </ul>                                 |     |
| <ul> <li>Itse common dialog how control and its properties such open save as font</li> </ul> |     |
| color nrint and heln                                                                         | 3   |
| <ul> <li>Ise rich text has to design simple ms-word like application</li> </ul>              |     |
| <ul> <li>Use and create evolorer like utilities using tree view and list controls</li> </ul> |     |
| <ul> <li>Familiar with windows common controls</li> </ul>                                    |     |
| Contents:                                                                                    |     |
| 4.1 Common Dialog Box controls, The Tree view and List, View controls, the rich         |    |
|-----------------------------------------------------------------------------------------|----|
| textbox controls                                                                        |    |
| 4.2 Windows common controls – status Bar, Tab control, image list control, Important    |    |
| properties, changing properties at design or run time, event handling.                  |    |
| Topic 5] Module, Class Module, Mdi, Menu Graphics                                       |    |
| Specific Objectives:                                                                    |    |
| Write class modules                                                                     |    |
| Define functions and procedures in class module                                         |    |
| Access functions and procedures from class module                                       |    |
| Use multiple document interface                                                         |    |
| Design menu based applications such as notepad editor                                   |    |
| Work with graphic functions and methods                                                 | 03 |
| Contents:                                                                               |    |
| 5.1 Concept of module, class module, using class module to define functions,            |    |
| procedures, variables and accessing them using objects                                  |    |
| 5.2 MDI- MDI form and child form, Creation and use in                                   |    |
| 5.3 Menu: Creating own menu using menu editor, popup menu.                              |    |
| 5.3 Graphics: Basic controls – Line & shape control, line method, circle method, Pset   |    |
| method, RGB () Functions, Paint picture () method, Load picture () function.            |    |
| Topic 6] Database and Report                                                            |    |
| Specific Objectives:                                                                    |    |
| Create database                                                                         |    |
| Use ADO and its properties, methods and events                                          |    |
| Select appropriate concepts such as back-end and front-end                              |    |
| Make database connectivity with different databases                                     |    |
| Generate report using Data Report and Crystal Report                                    |    |
| Contents:                                                                               | 04 |
| 6.1 Concept of database, Record, Record set, Data control & its important properties    | 04 |
| 6.2 validating data, entering data, visual data manager.                                |    |
| 6.3 Programming with ADO ( Active data objects ), using ADO Objects at design time-     |    |
| connection, command, record set, parameter, Creating & closing a connection;            |    |
| executing a command,                                                                    |    |
| 6.4 Using ADO Objects at run time, attaching visual controls to record set at run time, |    |
| Using delete, save, search, update exit, new, add, methods.                             |    |
| 6.5 Report generation using data report and crystal report                              |    |
| Total                                                                                   | 16 |

# **TERM WORK:-**

| Sr<br>No. | Name of the Experiments                                                                    |
|-----------|--------------------------------------------------------------------------------------------|
|           | a) Study and Understand Visual                                                             |
|           | Basic Environment                                                                          |
| 1         | b) Develop VB Project which                                                                |
|           | accepts User Name & Password                                                               |
|           | using three forms Login Form1                                                              |
|           | and Form2 to accept data, and                                                              |
|           | Form3 to display data.                                                                     |
| 2         | Design simple calculator to perform mathematical function using Control array like         |
| 2         | Windows Calculator.                                                                        |
| 3         | Design GUI to Find Resistor Value from it's color code.                                    |
| 4         | Display student data using structure in loop. Implement it using Class module & Procedures |

| 5  | Demonstrate list boxes features with sorted list and selected item transfer facility.                                                                                                                                                                          |  |  |  |  |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|
| 6  | <ul><li>a) Design Color box using RGB function to observe color change using H- scroll bar.</li><li>b) Design project to demonstrate file, folder &amp; drive controls to explore drive &amp; folders.</li></ul>                                               |  |  |  |  |
| 7  | Design GUI for Testing AC series Circuit                                                                                                                                                                                                                       |  |  |  |  |
|    | Practice Experiment / Exercise                                                                                                                                                                                                                                 |  |  |  |  |
| 8  | <ul><li>a) Design project to implement Common Dialog box controls such as open, save, Color, Font,<br/>Printer &amp; Help</li><li>b) Design a menu structure like notepad using menu editor</li></ul>                                                          |  |  |  |  |
| 9  | Design MDI application with 4 child forms & arrange forms with cascade, Tile Horizontal,<br>Tile Vertical arrangements                                                                                                                                         |  |  |  |  |
| 10 | Design student database project using ADO connectivity in design time and runtime and MS access as backend database engine, with basic features such as add, edit, update, save, cancel, delete feature and generate Report using Data Report / Crystal Report |  |  |  |  |
| 11 | Develop mini VB Project                                                                                                                                                                                                                                        |  |  |  |  |

# **Reference:**

Books:

| Sr.<br>No. | Author                            | Title                             | Publisher                   |
|------------|-----------------------------------|-----------------------------------|-----------------------------|
| 01         | MSDN library on Line<br>Reference |                                   | From Microsoft MSDN Library |
| 02         | Evangelos Petroustus              | Mastering VB6                     | WILEY India                 |
| 03         | Steven Holzner                    | Visual basic 6                    | Dream Tech. Press           |
| 04         | Content Development<br>Group      | Visual Basic 6.0<br>Programming   | Tata McGraw Hill            |
| 05         | Mohammed Azam                     | Programming with visual basic 6.0 | Vikas Publishers            |
| 06         | Nel Jerka                         | The complete referenceVB6         | Tata McGraw Hill Publishing |

Course Name : Electronics Engineering Group Course Code : ET/EJ/EN/EX/IE/IS/IC/DE/EV/MU/IU/ED/EI Semester : Fourth Subject Title : Professional Practices-II

Subject Code : 17044

### **Teaching and Examination Scheme:**

| Teac | hing Scl | heme | Examination Scheme |    |    |    |     |       |
|------|----------|------|--------------------|----|----|----|-----|-------|
| TH   | TU       | PR   | PAPER<br>HRS       | TH | PR | OR | TW  | TOTAL |
|      |          | 03   |                    |    |    |    | 50@ | 50    |

### **Rationale:**

Most of the diploma holders join industries. Due to globalization and competition in the industrial and service sectors the selection for the job is based on campus interviews or competitive tests.

While selecting candidates a normal practice adopted is to see general confidence, ability to communicate and attitude, in addition to basic technological concepts.

The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

# **Objectives:**

To develop the following skills:

# Intellectual skills:

- 1) Analyze information from different sources.
- 2) Prepare reports.

# Motor skills:

- 1) Present given topic in a seminar.
- 2) Interact with peers to share thoughts.
- 3) Prepare a report on industrial visit, expert lecture.

38

### **Learning Structure:**



### **Contents:**

| Activity | Content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |    |  |  |  |  |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|--|--|--|--|
| 1        | Industrial VisitsStructured industrial visits be arranged and report of the same should besubmitted by the individual student to form a part of the term work.Minimum two industrial visits may be arranged in the following areas/industries :i) Electronic equipment manufacturing unitii) Resistance Welding unitiii) Industrial automation unitiv) Sugar mill, Paper mill, Cement Industry.v) Railway station control room.vi) Telephone Exchange.vii) Any other suitable Industry. |    |  |  |  |  |
| 2        | vii) Any other suitable Industry.Lectures by Professional / Industrial Expert to be organized from any of<br>the following areas (Any three)i) Cyber laws.ii) Fiber optics communication systemiii) Disaster managementiv) Atomic energyv) Industrial Safetyvi) Computer security systems/Ethical hacking.vii) Any other suitable topicviii) Introduction to Apprenticeship Training Scheme                                                                                             |    |  |  |  |  |
| 3        | Information Search :         Information search can be done through manufacturers, catalogue, internet, magazines; books etc. and submit a report on one of the following topics:         3       i) GPS         ii) Market survey for motors used in electronic application         iii) Electronic billing system.         iv) Elevators installation and maintenance         v) Any other suitable areas                                                                             |    |  |  |  |  |
| 4        | Seminar :<br>Seminar topic should be related to the subjects of fourth semester. Each<br>student shall submit a report of at least 10 pages and deliver a seminar<br>(Presentation time – 10 Minutes)                                                                                                                                                                                                                                                                                   |    |  |  |  |  |
| 5        | <b>Group Discussion</b> :<br>The students should discuss in group of six to eight students and write a brief<br>report on the same as a part of term work. The topic of group discussion may<br>be selected by the faculty members.                                                                                                                                                                                                                                                     | 08 |  |  |  |  |
|          | Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 48 |  |  |  |  |

# Learning Resources:

# 1. Books:

| Sr.<br>No. | Author               | Title                  | Publisher                     |
|------------|----------------------|------------------------|-------------------------------|
| 01         | NRDC, Publication Bi | Invention Intelligence | National Research Development |

|    | Monthly Journal                                                                                               | Journal                                            | Corporation, GOI. |  |
|----|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------|-------------------|--|
| 02 | DK Publishing                                                                                                 | How things works<br>encyclopedia                   | DK Publishing     |  |
| 03 | Trott                                                                                                         | Innovation mgmt.& new product development          | Pearson Education |  |
| 04 | E.H. McGrath, S.J.                                                                                            | Basic Managerial Skills<br>for All – Ninth Edition | РНІ               |  |
| 05 | Apprenticeship Training Scheme:- Compiled By – BOAT (Western Region), Mumbai,<br>Available on MSBTE Web Site. |                                                    |                   |  |

# 2. Web sites

www.engineeringforchange.org www.wikipedia.com www.slideshare.com www.teachertube.com

# Course Name : All Branches of Diploma in Engineering & Technology Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG Industrial Training (Optional) after 4<sup>th</sup> semester examination.

Note:- Examination in Professional Practices of 5<sup>th</sup> Semester.

# INDUSTRIAL TRAINING (OPTIONAL)

# Rational:-

There was a common suggestion from the industry as well as other stakeholders that curriculum of Engineering and Technology courses should have Industrial training as part of the curriculum. When this issue of industrial training was discussed it was found that it will be difficult to make industrial training compulsory for all students of all courses as it will be difficult to find placement for all the students. It is therefore now proposed that this training can be included in the curriculum as optional training for student who is willing to undertake such training on their own. The institutes will help them in getting placement or also providing them requisite documents which the student may need to get the placement.

Details:- Student can undergo training in related industries as guided by subject teachers / HOD.

- The training will be for four weeks duration in the summer vacation after the fourth semester examination is over.
- The student undergoing such training will have to submit a report of the training duly certified by the competent authority from the industry clearly indicating the achievements of the student during training. This submission is to be made after joining the institute for Fifth semester.
- The student completing this training will have to deliver a seminar on the training activities based on the report in the subject Professional Practices at Fifth Semester.
- The student undergoing this training will be exempted from attending activities under Professional Practices at Fifth semester except the seminar.
- The students who will not undergo such training will have to attend Professional Practices Classes/activities of fifth semester and will have to complete the tasks given during the semester under this head.
- There work will be evaluated on their submissions as per requirement and will be given marks out of 50. Or student may have to give seminar on training in Industry he attended.
- Institute shall encourage and guide students for Industry training.
- Evaluation:- Report of Training attended and delivery of seminar and actual experience in Industry will be evaluated in fifth semester under Profession Practices-III and marks will be given accordingly out of 50.

'G' Scheme

#### MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI Ū TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES COURSE NAME : DIPLOMA IN FABRICATION TECHNOLOGY & ERECTION ENGINEERING (SANDWICH PATTERN) **COURSE CODE : FE DURATION OF COURSE : 8 SEMESTERS** WITH EFFECT FROM 2012-13 **SEMESTER : FOURTH DURATION: 16 WEEKS PATTERN : FULL TIME - SEMESTER SCHEME : G EXAMINATION SCHEME** TEACHING SUB SR. Abbrev SW **SCHEME TH** (1) **PR** (4) TW (9) SUBJECT TITLE **OR** (8) PAPER CODE NO iation (17400)HRS. TH TU PR Max Min Max Min Max Min Max Min EST 50#\* Environmental Studies \$ 17401 01 02 01 20 25@ 1 ---------10 2 Manufacturing Processes β MPR 17402 03 04 03 100 40 25# 10 50@ 20 ------Fluid Mechanics & Machinery β 02 03 25# 10 25@ 3 FMM 17411 04 --100 40 --10 --25# Welding Technology --02 4 WTE 17455 03 03 100 40 10 --25@ 10 50 \_\_\_ 5 **Fabrication Processes** FPR 17456 03 02 03 100 40 50# 20 25@ 10 ------**Processes Equipments** 04 02 03 6 PEO 17457 --100 40 25@ 10 --------7 **Professional Practices-II** PPS 17048 --03 50@ 20 -----------------18 17 550 125 TOTAL ----225 50 ------------Examination in 5<sup>th</sup> Semester Professional Practices-III \*\* **Industrial Training (Optional)** Student Contact Hours Per Week: 35 Hrs. THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH. Total Marks : 950 @ - Internal Assessment, # - External Assessment, No Theory Examination, - Common to all branches, $\beta$ - Common to ME / PG / PT/ MH / MI/FG Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work.

\*\* Industrial Training (Optional) - Student can undergo Industrial Training of four weeks after fourth semester examination during summer vacation.

Assessment will be done in Fifth semester under Professional Practices-III. They will be exempted from activities of Professional Practices-III of 5<sup>th</sup> Semester.

- Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subjects is to be converted out of 50 marks as sessional work (SW).
- > Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.
- Code number for TH, PR, OR, TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.
- > For CAD software subject MSBTE decide the contents of the practical every year.

MSBTE - Final Copy Dt. 30/08/2013

**Course Name : All Branches of Diploma in Engineering & Technology** 

# Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG/AU

Semester : Fourth

Subject Title : Environmental Studies

Subject Code : 17401

**Teaching and Examination Scheme:** 

| Teac | ching Scl | heme | Examination Scheme |      |    |    |     |       |
|------|-----------|------|--------------------|------|----|----|-----|-------|
| TH   | TU        | PR   | PAPER<br>HRS       | TH   | PR | OR | TW  | TOTAL |
| 01   |           | 02   | 01                 | 50#* |    |    | 25@ | 75    |

### **#\* - Online Theory Examination**

NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Environment essentially comprises of our living ambience, which gives us the zest and verve in all our activities. The turn of the twentieth century saw the gradual onset of its degradation by our callous deeds without any concern for the well being of our surrounding we are today facing a grave environmental crisis. The unceasing industrial growth and economic development of the last 300 years or so have resulted in huge ecological problems such as overexploitation of natural resources, degraded land, disappearing forests, endangered species, dangerous toxins, global warming etc.

It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

The curriculum covers the aspects about environment such as Environment and Ecology, Environmental impacts on human activities, Water resources and water quality, Mineral resources and mining, Forests, etc.

General Objectives: The student will be able to,

- 1. Understand importance of environment
- 2. Know key issues about environment
- 3. Understands the reasons for environment degradation
- 4. Know aspects about improvement methods
- 5. Know initiatives taken by the world bodies to restrict and reduce degradation

# **Learning Structure:**



# Theory:

| Topic and Contents                                                   | Hours | Marks |
|----------------------------------------------------------------------|-------|-------|
| Topic 1: Nature of Environmental Studies                             |       |       |
| Specific Objectives:                                                 |       |       |
| Define the terms related to Environmental Studies                    |       |       |
| State importance of awareness about environment in general           |       |       |
| public                                                               | 01    | 04    |
| Contents:                                                            |       |       |
| • Definition, Scope and Importance of the environmental studies      |       |       |
| <ul> <li>Importance of the studies irrespective of course</li> </ul> |       |       |
| Need for creating public awareness about environmental issues        |       |       |
| <b>Topic 2: Natural Resources and Associated Problems</b>            |       |       |
| Specific Objectives:                                                 |       |       |
| Define natural resources and identify problems associated with       |       |       |
| them                                                                 |       |       |
| Identify uses and their overexploitation                             |       |       |
| > Identify alternate resources and their importance for environment  |       |       |
| Contents:                                                            |       |       |
| 2.1 Renewable and Non renewable resources                            |       |       |
| • Definition                                                         |       |       |
| Associated problems                                                  |       |       |
| 2.2 Forest Resources                                                 |       |       |
| General description of forest resources                              |       |       |
| <ul> <li>Functions and benefits of forest resources</li> </ul>       |       |       |
| • Effects on environment due to deforestation, Timber                |       |       |
| extraction, Building of dams, waterways etc.                         | 04    | 10    |
| 2.3 Water Resources                                                  | 04    | 10    |
| • Hydrosphere: Different sources of water                            |       |       |
| • Use and overexploitation of surface and ground water               |       |       |
| • Effect of floods, draught, dams etc. on water resources and        |       |       |
| community                                                            |       |       |
| 2.4 Mineral Resources:                                               |       |       |
| • Categories of mineral resources                                    |       |       |
| Basics of mining activities                                          |       |       |
| • Mine safety                                                        |       |       |
| • Effect of mining on environment                                    |       |       |
| 2.5 Food Resources:                                                  |       |       |
|                                                                      |       |       |
| • Food for all                                                       |       |       |
| • Effects of modern agriculture                                      |       |       |
| World food problem                                                   |       |       |
| Topic 3. Ecosystems                                                  |       |       |
| Concept of Ecosystem                                                 | 01    | 0.4   |
| • Structure and functions of ecosystem                               | 01    | 04    |
| • Energy flow in ecosystem                                           |       |       |
| <ul> <li>Major ecosystems in the world</li> </ul>                    |       |       |

| Tonic 4 Biodiversity and Its Conservation                                         |    |    |
|-----------------------------------------------------------------------------------|----|----|
| Definition of Biodiversity                                                        |    |    |
| <ul> <li>Levels of biodiversity</li> </ul>                                        |    |    |
| Value of high versity                                                             | 02 | 06 |
| Throats to biodiversity                                                           |    |    |
| <ul> <li>Threats to biodiversity</li> <li>Conservation of biodiversity</li> </ul> |    |    |
| Conservation of blochversity     Topic 5 Environmental Pallution                  |    |    |
| Definition                                                                        |    |    |
| Air pollution Definition Classification sources offects                           |    |    |
| • All pollution. Definition, Classification, sources, effects, prevention         | 02 | 08 |
| • Water Pollution: Definition, Classification, sources, effects,                  | 03 |    |
| prevention                                                                        |    |    |
| • Soil Pollution: Definition, sources, effects, prevention                        |    |    |
| • Noise Pollution: Definition, sources, effects, prevention                       |    |    |
| Topic 6. Social Issues and Environment                                            |    |    |
| Concept of development, sustainable development                                   |    |    |
| • Water conservation, Watershed management, Rain water                            | 03 | 10 |
| harvesting: Definition, Methods and Benefits                                      |    |    |
| Climate Change, Global warming, Acid rain, Ozone Layer                            |    |    |
| Depletion, Nuclear Accidents and Holocaust: Basic concepts                        |    |    |
| and their effect on climate                                                       |    |    |
| Concept of Carbon Credits and its advantages                                      |    |    |
| <b>Topic 7. Environmental Protection</b>                                          |    |    |
| Brief description of the following acts and their provisions:                     |    |    |
| Environmental Protection Act                                                      |    |    |
| • Air (Prevention and Control of Pollution) Act                                   |    |    |
| • Water (Prevention and Control of Pollution) Act                                 | 02 | 08 |
| Wildlife Protection Act                                                           | 02 | 00 |
| Forest Conservation Act                                                           |    |    |
| Population Growth: Aspects, importance and effect on environment                  |    |    |
| Human Health and Human Rights                                                     |    |    |
| Total                                                                             | 16 | 50 |

# Practical:

Skills to be developed:

### **Intellectual Skills**:

- 1. Collection of information, data
- 2. Analysis of data
- 3. Report writing

### **Motor Skills:**

- 1. Presentation Skills
- 2. Use of multi media

### **List of Projects:**

**Note:** Any one project of the following:

1. Visit to a local area to document environmental assets such as river / forest / grassland / hill / mountain

- 2. Visit to a local polluted site: Urban/Rural/Industrial/Agricultural
- 3. Study of common plants, insects, birds
- 4. Study of simple ecosystems of ponds, river, hill slopes etc

Prepare a project report on the findings of the visit illustrating environment related facts, analysis and conclusion. Also suggest remedies to improve environment.

#### Learning Resources: Books:

| Sr.<br>No. | Author Title                                          |                                              | Publisher               |  |
|------------|-------------------------------------------------------|----------------------------------------------|-------------------------|--|
| 01         | Anindita Basak                                        | Environmental Studies                        | Pearson Education       |  |
| 02         | R. Rajgopalan                                         | Environmental Studies<br>from Crises to Cure | Oxford University Press |  |
| 03         | Dr. R. J. Ranjit Daniels, Dr.<br>Jagdish Krishnaswamy | Environmental Studies                        | Wiley India             |  |

Course Name : Mechanical Engineering Group Course Code : ME/PG/PT/MH/MI/FE/FG Semester : Fourth Subject Title : Manufacturing Process Subject Code : 17402

### **Teaching and Examination Scheme**

| Teac | hing Sch | ieme | Examination Scheme |     |     |    |     |       |
|------|----------|------|--------------------|-----|-----|----|-----|-------|
| TH   | TU       | PR   | PAPER<br>HRS       | TH  | PR  | OR | TW  | TOTAL |
| 03   |          | 04   | 03                 | 100 | 25# |    | 50@ | 175   |

### **Rationale:**

Diploma technician often comes across various types of basic manufacturing processes. He / she is required to select, operate and control the appropriate processes for specific applications. He / she is also required to know about various cutting tools, latest improvements in manufacturing processes. This is a core technology subject. The diploma technician should know how the raw material gets processed through various processes and ultimately results into finished goods.

Hence it is essential that, he has understanding of basic manufacturing processes, machines, tools and equipments. With sound knowledge of this subject, the diploma technician will be able to handle and control practical situations more effectively and confidently.

### **Objectives:**

The student will be able to:

- 1) Use the basic machine tools like lathe and drilling.
- 2) Produce and inspect the job as per specified dimensions.
- 3) Select the specific manufacturing processes for the desired output.
- 4) Adopt safety practices while working on various machines.
- 5) Explain the different types of plastic moulding processes.
- 6) Select the basic manufacturing process for different components to be machined.

# **Learning Structure:**



# Theory:

| 1:Forming Processes       Specific Objectives:       0         > To list basic manufacturing processes and write working principal of different manufacturing processes like Drop forging, Rolling and Extrusion       0         > To identify and select proper manufacturing process for a specific component       0       18         Content       0       0       Marks         Upset forging, press forging(die forging), open die & closed die forging, forging operations       0       18         1.1 Drop forging:       0       Marks       0         Principle of rolling, hot & cold rolling, Types of rolling mill, application of rolling       0       Marks         Principle of rolling, hot & cold rolling, Types of rolling mill, applications.       0       0         2. Press working:       0       Marks       0         Specific Objectives:       >       0       Marks         > To state various classification of press machine and their plpractical applications       08       16         Content       1.1 Pros classification, press operations like punching/piercing, blanking, notching, lancing       0       0         2.1 Press classification, press opartern and model       >       10       22         2.3 Forming Operations:       22 Marks       10       22         2.1 For state different between pattern and model       >                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Topic and Content                                                                     |     | Hours | Marks |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-----|-------|-------|
| Specific Objectives:       >       Yes       18         > To idst basic manufacturing processes and write working principal of different manufacturing processes like Drop forging, Rolling and Extrusion       08       18         > To identify and select proper manufacturing process for a specific component       08       18         Content       1.1 Drop forging:       06 Marks       08       18         Upset forging, press forging(die forging),open die & closed die forging, forging operations       06 Marks       08       18         L3 Rolling:       06 Marks       06 Marks       08       18         Direct & indirect extrusion, Advantages, disadvantages and Applications       08       16         Content       0       08       16         Content       0       06 Marks       08       16         2.1 Press classification, press operations like punching/piercing, blanking, notching, lancing       04 Marks       08       16         2.1 Press classification, press operations like punching/piercing, blanking, notching, lancing       04 Marks       08       16         2.2 Die set components and types of dies       06 Marks       08       16         3. Casting Processes:       22 Marks       22       22 Marks       23       24       24       24         2.1 Press classification, s                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1:Forming Processes                                                                   |     |       |       |
| > To list basic manufacturing processes and write working principal of different manufacturing processes like Drop forging, Rolling and Extrusion       0         > To identify and select proper manufacturing process for a specific component       08       18         Upset forging, press forging(die forging),open die & closed die forging, forging operations       06 Marks       08       18         Upset forging, press forging(die forging),open die & closed die forging, forging operations       06 Marks       08       18         1.1 Drop forging:       06 Marks       06 Marks       08       18         Principle of rolling, hot & cold rolling, Types of rolling mill, application of rolling       06 Marks       08       18         2. Press working:       06 Marks       06 Marks       08       16         2. Press working machine principal       > To otate various classification of press machine.       08       16         2. To state various classifications of press machine.       > To state various classification of press machine and their plpractical applications:       08       16         Content       3. Casting Processes:       22 Marks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Specific Objectives:                                                                  |     |       |       |
| of different manufacturing processes like Drop forging, Rolling<br>and Extrusion081818Content11 Drop forging;<br>(die forging), open die & closed die forging,<br>forging operations0812. Rolling:06 Marks<br>Upset forgin, press forging(die forging), open die & closed die forging,<br>forging operations0812. Rolling:06 Marks<br>Principle of rolling, hot & cold rolling, Types of rolling mill, application of<br>rolling06 MarksDirect & indirect extrusion, Advantages, disadvantages and Applications.08162. Press working:<br>Specific Objectives:0816> To state various classification of press machine.<br>>> To state different operations performed on press machine and<br>their plpractical applications08162.1 Press vorking:<br>Specific Objectives:06 Marks08162.1 Press classification, press operations like punching/piercing, blanking,<br>notching, lancing06 Marks08162.1 Press classification, press operations like punching/piercing, blanking,<br>notching, lancing04 Marks163. Casting Processes:<br>> Zo forstate various types of pattern and model<br>>> To state various types of pattern and model<br>> To state various types of casting processes.<br>Content10223.1 Pattern making:<br>and cold coding of patterns06 Marks<br>Basic steps in making easting, Pattern : types, materials and allowances,<br>tools, color coding of patterns10223.2 Moulding:<br>moulding, investment casting, Casting defects - Causes & remedies.<br>At to chamber and cold chamber die casting, Die casting defects - Causes &<br>remedies.0714<                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | > To list basic manufacturing processes and write working princi                      | pal |       |       |
| and Extrusion00000> To identify and select proper manufacturing process for a specific<br>component018Content1.1 Drop forging:<br>(Joging operations)0Marks08181.2 Rolling:<br>Principle of rolling, hot & cold rolling, Types of rolling mill, application of<br>rolling06 Marks08182. Press vorking:<br>Specific Objectives:<br>> To define Press working machine principla<br>> To state various classification of press machine.<br>> To state various classification of press machine.<br>> To state various classification of press machine and<br>their p[practical applications0816Content<br>2.1 Press classification, press operations like punching/piercing, blanking,<br>notching, lancing<br>2.3 Costing Processes:<br>> To state different operations, lending, drawing<br>2.3 Forming Operations: Bending, drawing<br>3. Casting Processes:<br>> To state various types of pattern and model<br>> To istate different types of pattern and model<br>> To istate various types of casting processes.<br>Content06 Marks<br>2.1 Dist different types of pattern and model<br>> To state various types of casting processes.<br>Content10222.2 Moulding:<br>3.3 Casting Processes:<br>0.0 roding of patterns06 Marks<br>0.0 Marks<br>0.0 Marks10223.3 Costing Processes:<br>3.3 Costing Processes:<br>0.0 roding of patterns06 Marks<br>0.0 Marks<br>0.0 Marks10223.3 Casting:<br>0.0 roding of patterns06 Marks<br>0.0 Marks                                                                                                                                                                                                                                                                                                                                                                                                                                                     | of different manufacturing processes like Drop forging, Rolling                       | _   |       |       |
| > To identify and select proper manufacturing process for a specific component       08       18         Content       06 Marks       08       18         Upset forging, press forging(die forging),open die & closed die forging, forging operations       06 Marks       08       18         Upset forging, press forging(die forging),open die & closed die forging, forging operations       06 Marks       08       18         2. Ress working:       06 Marks       06 Marks       08       18         Direct & indirect extrusion, Advantages, disadvantages and Applications.       2       2       8       18         2. Press working:       Specific Objectives:       0       9       16       08       16         Content       2.1 Press working:       06 Marks       08       16         Content       0.1 State various classification of press machine.       06 Marks       08       16         Content       2.1 Press classification, press operations like punching/piercing, blanking, notching, lancing       06 Marks       08       16         Content       3. Casting Processes:       22 Marks       22 Marks       5       5         3. Casting Processes:       22 Marks       5       5       10       22         Specific Objectives:       > To state various types of pattern and mo                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | and Extrusion                                                                         |     |       |       |
| component0018Content1.1 Drop forging:<br>(in goperations)06 Marks0818Upset forging, press forging(die forging), open die & closed die forging,<br>forging operations06 Marks08181.2 Rolling:<br>(in goperations)06 Marks0606061.3 Extrusion:<br>Direct & indirect extrusion, Advantages, disadvantages and Applications.0608162. Press working:<br>Specific Objectives:<br>><br>> To define Press working machine principal<br>> To state various classification of press machine.<br>> To state various classification of press machine.<br>> To state various classifications0816Content<br>2.1 Press classification, press operations like punching/piercing, blanking,<br>notching, lancing<br>2.2 Die set components and types of dies<br>3. Casting Processee:<br>> 2.2 Marks06Marks3.2 Casting Processes:<br>> To state various types of pattern and model<br>> To istat different between pattern and model<br>> To istat different types of pattern and their applications<br>> To state various types of pattern allowances.<br>> To state various types of pattern allowances.<br>> To state various types of pattern allowances.<br>> To state various types of pattern s<br>3.2 Moulding:<br>Types of moulding sands, properties of sand, moulding, floor<br>moulding, inwestment casting, Casting defects - Causes & mendies.10223.3 Casting:<br>Turace: - Methods & applications of - Centrifugal casting, shell<br>moulding, investment casting, Casting defects - Causes & mendies.10223.4 Hot chamber and cold chamber die casting, Die casting defects - Causes & remedies.04143.4 Hot chamber and cold chamber die casti                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | > To identify and select proper manufacturing process for a speci                     | fic |       |       |
| Content06 Marks1.1 Drop forging:06 MarksUpset forging, press forging(die forging),open die & closed die forging,<br>forging operations081.2 Rolling:06 MarksPrinciple of rolling, hot & cold rolling, Types of rolling mill, application of<br>rolling06 MarksDirect & indirect extrusion, Advantages, disadvantages and Applications.22. Press working:<br>Specific Objectives:08> To define Press working machine principal<br>> To state various classification of press machine.08> To state various classification of press machine.08> To state various classification of press machine,<br>herip fipractical applications082.1 Press classification, press operations like punching/piercing, blanking,<br>notching, lancing06 Marks2.2 Die set components and types of dies06 Marks3. Casting Processes:22 MarksSpecific Objectives:22 Marks> To state various types of pattern and model> To state various types of pattern and model> To state various types of pattern and model> To state various types of gattern allowances,<br>tools, color coding of patterns3.2 Moulding:06 Marks3.2 Moulding sands, properties of sand, moulding methods, cores<br>and core prints, elements of gating system, bench moulding, floor<br>moulding, investment casting, Casting dects - Causes & remedies.3.4 Hot chamber and cold chamber of casting dects - Causes & remedies.3.4 Hot chamber and cold chamber die casting, Die casting defects - Causes &<br>remedies.3.4 Hot chamber and cold chamber die casting, Die casting defects - Caus                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | component                                                                             |     |       |       |
| 1.1 Drop forging:06 Marks0818Upset forging, press forging(die forging),open die & closed die forging,<br>forging operations06 Marks18Unset forging, press forging(die forging),open die & closed die forging,<br>forging operations06 Marks18Principle of rolling, hot & cold rolling, Types of rolling mill, application of<br>rolling06 Marks18Direct & indirect extrusion, Advantages, disadvantages and Applications.2192. Press working:<br>Specific Objectives:<br>> To define Press working machine principal<br>> To state various classification of press machine.<br>> To state different operations performed on press machine and<br>their plpractical applications0816Content0.10.6 Marks162.1 Press classification, press operations like punching/piercing, blanking,<br>notching, lancing06 Marks162.2 Die set components and types of dies06 Marks2.3163. Casting Processes:<br>Specific Objectives:<br>> To state different bypes of pattern and model<br>> To istate different types of pattern and model<br>> To istate various types of pattern and model<br>> To istate various types of pattern and model<br>> To istate various types of pattern is of and processes.<br>Content10223.2 Moulding:06 Marks<br>Basic steps in making casting, Pattern : types, materials and allowances,<br>tools, color coding of patterns06 Marks<br>Basic steps in making casting, Pattern : types, materials and allowances,<br>tools, color coding of patterns10223.2 Moulding:06 Marks<br>Furnaces: Construction and working of cupola furnace, electric arc<br>furmace, - Methods & applications of - Cen                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Content                                                                               |     | 0.0   | 10    |
| Upset forging, press forging(die forging), open die & closed die forging,<br>forging operations06 Marks1.2 Rolling:06 MarksPrinciple of rolling, hot & cold rolling, Types of rolling mill, application of<br>rolling06 Marks1.3 Extrusion:06 MarksDirect & indirect extrusion, Advantages, disadvantages and Applications.22. Press working:<br>Specific Objectives:08> To state various classification of press machine.08> To state various classification of press machine and<br>their p[practical applications082.1 Press classification, press operations like punching/piercing, blanking,<br>notching, lancing06 Marks2.2 Die set components and types of dies06 Marks2.3 Forming Operations: Bending, drawing04 Marks3. Casting Processes:22 MarksSpeeific Objectives:> To state different types of pattern and model> To state various types of casting processes.102.1 Pattern making:<br>Basic steps in making casting, Pattern : types, materials and allowances,<br>tools, color coding of patterns103.2 Austing:<br>Types of moulding, anachine moulding.06 Marks3.3 Casting:<br>Types of moulding, machine moulding.06 Marks3.3 Casting:<br>Types of moulding, machine moulding.06 Marks3.4 Hot chamber and cold chamber die casting, Die casting defects - Causes &<br>remedies.102222Mulding, investment casting, Casting defects - Causes & remedies.343.4 Hot chamber and cold chamber die casting, Die casting defects - Causes &<br>remedies.073.4 Hot ch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1.1 Drop forging: 06 Marks                                                            | 08  | 18    |       |
| Torate approximate the parameter of parameter of the term of term of term of the term of t | Upset forging, press forging(die forging), open die & closed die forging.             |     |       |       |
| Description06 MarksPrinciple of rolling, hot & cold rolling, Types of rolling mill, application of<br>rolling06 MarksDirect & indirect extrusion, Advantages, disadvantages and Applications.22. Press working:<br>Specific Objectives:<br>> To oftate various classification of press machine.<br>> To state various classification of press machine.<br>> To state different operations performed on press machine and<br>their p[practical applications082. Press working:<br>2. Die set components and types of dies<br>3. Casting Processes:<br>> To state different between pattern and model<br>> To state different types of pattern and model<br>> To state different types of pattern and model<br>> To state various types of pattern allowances.<br>> To state various types of casting processes.06 Marks<br>2. Die set components and types of fast of Marks<br>3. Casting Processes:<br>To state different between pattern and model<br>> To state various types of pattern allowances.<br>> To state various types of casting processes.102.2 Moulding:<br>Types of moulding sands, properties of sand, moulding methods, cores<br>and core prints, elements of gaing system, bench moulding. floor<br>moulding, int workment casting, Casting defects - Causes & remedies.103.3 Casting:<br>Types of moulding, machine moulding.223.4 Hot chamber and cold chamber die casting, Die casting defects - Causes & remedies.073.4 Hot chamber and cold chamber die casting, Die casting defects - Causes & remedies.3.4 Hot chamber and cold chamber die casting, Die casting defects - Causes & remedies.07                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | forging operations                                                                    |     |       |       |
| In Normaly, application of rolling, hot & cold rolling, Types of rolling mill, application of rolling       06 Marks         1.3 Extrusion:       06 Marks         Direct & indirect extrusion, Advantages, disadvantages and Applications.       2.         2. Press working:       Specific Objectives:         > To define Press working machine principal       08         > To state various classification of press machine.       08         > To state different operations performed on press machine and their pfpractical applications       08         Content       06 Marks         2.1 Press classification, press operations like punching/piercing, blanking, notching, lancing       06 Marks         2.2 Die set components and types of dies       06 Marks         2.3 Forming Operations: Bending, drawing       04 Marks         3. Casting Processes:       22 Marks         Specific Objectives:       22 Marks         > To state various types of pattern and model       >         > To state various types of casting processes.       06 Marks         Soulding:       06 Marks         3.1 Pattern making:       06 Marks         Basic steps in making casting, Pattern : types, materials and allowances, tools, color coding of patterns       10         3.2 Moulding:       06 Marks         Types of moulding sands, properties of sand, moulding methods, cores                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1 2 Rolling 06 Marks                                                                  |     |       |       |
| Trinspie of rollingInterfere Control1.3 Extrusion:06 MarksDirect & indirect extrusion, Advantages, disadvantages and Applications.22. Press working:Specific Objectives:> To define Press working machine principal8> To state various classification of press machine.08> To state different operations performed on press machine and<br>their p[practical applications0816Content082.1 Press classification, press operations like punching/piercing, blanking,<br>notching, lancing06 Marks2.2 Die set components and types of dies06 Marks2.3 Forming Operations: Bending, drawing04 Marks3. Casting Processes:22 MarksSpecific Objectives:>> To state different between pattern and model> To state various types of pattern and model> To state various types of pattern and model> To state various types of pattern and their applications> To state various types of pattern and model> To state various types of casting processes.Content3.1 Pattern making:06 MarksBasic steps in making casting, Pattern : types, materials and allowances,<br>tools, color coding of patterns3.2 Moulding:06 MarksTypes of moulding sands, properties of sand, moulding methods, cores<br>and core prints, elements of gating system, bench moulding, floor<br>moulding, investment casting, Casting defects - Causes & remedies.3.4 Hot chamber and cold chamber die casting, Die casting defects - Causes &<br>remedies.3.4 Hot chamber and cold chamber die casting, Die casting def                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Principle of rolling hot & cold rolling Types of rolling mill application of          | f   |       |       |
| IORING<br>Direct & indirect extrusion, Advantages, disadvantages and Applications.06 MarksDirect & indirect extrusion, Advantages, disadvantages and Applications.2. Press working:Specific Objectives:<br>> To define Press working machine principal<br>> To state various classification of press machine.<br>> To state different operations performed on press machine and<br>their p[practical applications08Content<br>2.1 Press classification, press operations like punching/piercing, blanking,<br>notching, lancing06 Marks2.2 Die set components and types of dies<br>0.6 Marks06 Marks3. Casting Processes:<br>Specific Objectives:<br>> To state different between pattern and model<br>> To list different types of pattern and their applications<br>> To state various types of pattern allowances.<br>> To state various types of casting processes.102.2 Die set various types of pattern and their applications<br>> To state various types of casting processes.102.3 Houtlding:<br>Types of moulding sands, properties of sand, moulding methods, cores<br>and core prints, elements of gating system, bench moulding, floor<br>moulding, investment casting, Casting defects - Causes & remedies.103.4 Hot chamber and cold chamber die casting, Die casting defects - Causes &<br>remedies.04 Marks4. Welding<br>Specific Objectives:0714                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | rolling                                                                               |     |       |       |
| 1.5 Extrusion.       00 Marks         Direct & indirect extrusion, Advantages, disadvantages and Applications.       2.         2. Press working:       Specific Objectives:       8         > To define Press working machine principal       8       16         > To state various classification of press machine.       8       16         Content       06 Marks       9         2.1 Press classification, press operations like punching/piercing, blanking, notching, lancing       06 Marks       9         2.2 Die set components and types of dies       06 Marks       9       9         3. Casting Processes:       22 Marks       5       5       5       10 state various types of pattern and model       8       10       22         > To state various types of pattern and model       9       10       22       22       10       22         > To state various types of pattern and model       9       10       22       22       23       23       24       25       25       25       26       27       24       24       24       24       24       24       24       24       24       24       24       24       24       24       24       25       25       25       25       25       26       26                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1 3 Extrusion: 06 Marks                                                               |     |       |       |
| Difference inductor extrubision, Advantages, disadvantages and Applications.2. Press working:<br>Specific Objectives:<br>> To define Press working machine principal<br>> To state various classification of press machine.<br>> To state various classification of press machine.<br>> To state different operations performed on press machine and<br>their plpractical applications0816Content<br>2.1 Press classification, press operations like punching/piercing, blanking,<br>notching, lancing<br>2.2 Die set components and types of dies<br>3. Casting Processes:<br>> To state different between pattern and model<br>> To state different between pattern and model<br>> To state different between pattern and model<br>> To state various types of pattern allowances.<br>> To state various types of pattern allowances.<br>> To state various types of pattern is of 6 Marks<br>Basic steps in making casting, Pattern : types, materials and allowances,<br>tools, color coding of patterns<br>3.2 Moulding:<br>Types of moulding, machine moulding.<br>3.3 Casting:<br>To state of gating system, bench moulding, floor<br>moulding, pit moulding, machine moulding.<br>3.3 Casting:<br>To state and core prints, elements of gating system, bench moulding, floor<br>moulding, pit moulding, machine moulding.<br>3.3 Casting:<br>Construction and working of cupola furnace, electric arc<br>furnaces: Construction and working of cupola furnace, electric arc<br>furnaces.<br>State steps in and cole chamber die casting, Die casting defects - Causes &<br>remedies.10223.4 Hot chamber and cold chamber die casting, Die casting defects - Causes &<br>remedies.0714                                                                                                                                                                                                                                                                                                                                                                                                                  | Direct & indirect extrusion Advantages disadvantages and Applications                 | '   |       |       |
| 2. Press Working:         Specific Objectives:         > To define Press working machine principal         > To state various classification of press machine.         > To state different operations performed on press machine and their p[practical applications         08         16         Content         2.1 Press classification, press operations like punching/piercing, blanking, notching, lancing         06 Marks         2.3 Forming Operations: Bending, drawing         04 Marks         3. Casting Processes:         2.3 Forming Operations: bending, drawing         04 Marks         3. Casting Processes:         2.1 Dist different between pattern and model         > To state various types of pattern allowances.         > To state various types of pattern allowances.         > To state various types of pattern allowances.         > To state various types of pattern : types, materials and allowances, tools, color coding of patterns         06 Marks         Basic steps in making casting, Pattern : types, materials and allowances, and core prints, elements of gating system, bench moulding, floor moulding, machine moulding.         3.3 Casting:       06 Marks         Furnaces: Construction and working of cupola furnace, electric arc furnace, - Methods & applications of - Centrifugal casting, shell moulding, investment casting, Casting defects - Causes &                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Direct & indirect extrusion, Advantages, disadvantages and Applications.              |     |       |       |
| Specific Objectives:08> To define Press working machine principal> To state various classification of press machine.> To state different operations performed on press machine and<br>their p[practical applications0816Content2.1 Press classification, press operations like punching/piercing, blanking,<br>notching, lancing06 Marks2.2 Die set components and types of dies06 Marks2.3 Casting Processes:22 MarksSpecific Objectives:> To state different between pattern and model> To state various types of pattern allowances.> To state various types of casting processes.Content3.1 Pattern making:06 MarksBasic steps in making casting, Pattern : types, materials and allowances,<br>tools, color coding of patterns3.2 Moulding:Types of moulding sands, properties of sand, moulding methods, cores<br>and core prints, elements of gating system, bench moulding, floor<br>moulding, pit moulding, machine moulding.3.3 Casting:06 MarksFurnace: - Methods & applications of - Centrifugal casting, shell<br>moulding, investment casting, Casting defects - Causes & remedies.3.4 Hot chamber and cold chamber die casting, Die casting defects - Causes &<br>remedies.04 Marks4. Welding<br>Specific Objectives:0714                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 2. Fress working.                                                                     |     |       |       |
| <ul> <li>To define Press working machine principal</li> <li>To state various classification of press machine.</li> <li>To state different operations performed on press machine and their p[practical applications</li> <li>08</li> <li>16</li> <li>Content</li> <li>2.1 Press classification, press operations like punching/piercing, blanking, notching, lancing</li> <li>06 Marks</li> <li>2.2 Die set components and types of dies</li> <li>06 Marks</li> <li>3. Casting Processes:</li> <li>22 Marks</li> <li>Specific Objectives:</li> <li>To state different between pattern and model</li> <li>To state various types of pattern and model</li> <li>To state various types of casting processes.</li> <li>Content</li> <li>3.1 Pattern making:</li> <li>06 Marks</li> <li>3.2 Moulding:</li> <li>06 Marks</li> <li>3.2 Moulding:</li> <li>06 Marks</li> <li>3.3 Casting:</li> <li>06 Marks</li> <li>06 Marks</li> <li>10</li> <li>22</li> <li>40 Marks</li> <li>3.4 Pattern making:</li> <li>06 Marks</li> <li>3.5 Contruction of patterns</li> <li>06 Marks</li> <li>3.6 Marks</li> <li>3.7 Content</li> <li>3.7 Content of patterns</li> <li>06 Marks</li> <li>10</li> <li>22</li> <li>40 Marks</li> <li>40 Marks</li> <li>40 Marks</li> <li>07</li> <li>14</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Specific Objectives:                                                                  |     |       |       |
| <ul> <li>To state various classification of press machine.</li> <li>To state different operations performed on press machine and their p[practical applications</li> <li>08</li> <li>16</li> <li>Content</li> <li>2.1 Press classification, press operations like punching/piercing, blanking, notching, lancing</li> <li>06 Marks</li> <li>2.2 Die set components and types of dies</li> <li>06 Marks</li> <li>3. Casting Processes:</li> <li>22 Marks</li> <li>Specific Objectives:</li> <li>&gt; To state different between pattern and model</li> <li>&gt; To state different types of pattern allowances.</li> <li>&gt; To state various types of casting processes.</li> <li>Content</li> <li>3.1 Pattern making:</li> <li>06 Marks</li> <li>3.2 Moulding:</li> <li>06 Marks</li> <li>3.3 Costing:</li> <li>06 Marks</li> <li>3.4 Hot chamber and cold chamber die casting, Die casting defects - Causes &amp; remedies.</li> <li>3.4 Hot chamber and cold chamber die casting, Die casting defects - Causes &amp; remedies.</li> <li>3.4 Hot chamber and cold chamber die casting, Die casting defects - Causes &amp; remedies.</li> <li>3.4 Hot chamber and cold chamber die casting, Die casting defects - Causes &amp; remedies.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | F To define Press working machine principal To define Press working machine principal |     |       |       |
| > 10 state different operations performed on press machine and<br>their p[practical applications0816Content08162.1 Press classification, press operations like punching/piercing, blanking,<br>notching, lancing06 Marks2.2 Die set components and types of dies06 Marks3. Casting Processes:22 MarksSpecific Objectives:22 Marks> To state different between pattern and model70 state different types of pattern allowances.> To state various types of pattern allowances.10> To state various types of casting processes.10Content3.1 Pattern making:<br>tools, color coding of patterns3.2 Moulding:06 Marks<br>pattern making casting, Pattern : types, materials and allowances,<br>tools, color coding of patterns3.3 Casting:06 Marks<br>pattern : types of moulding methods, cores<br>and core prints, elements of gating system, bench moulding, floor<br>moulding, pit moulding, machine moulding.3.3 Casting:06 Marks<br>pattern : types applications of - Centrifugal casting, shell<br>moulding, investment casting, Casting defects - Causes & remedies.3.4 Hot chamber and cold chamber die casting, Die casting defects - Causes &<br>remedies.07                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | F To state various classification of press machine.                                   |     |       |       |
| their pipractical applications0816Content2.1 Press classification, press operations like punching/piercing, blanking,<br>notching, lancing06 Marks2.2 Die set components and types of dies06 Marks2.3 Forming Operations: Bending, drawing04 Marks3. Casting Processes:22 MarksSpecific Objectives:22 Marks> To state different between pattern and model>> To state different types of pattern and their applications> To state various types of pattern allowances.> To state various types of casting processes.Content3.1 Pattern making:06 MarksBasic steps in making casting, Pattern : types, materials and allowances,<br>tools, color coding of patterns3.2 Moulding:06 MarksTypes of moulding sands, properties of sand, moulding methods, cores<br>and core prints, elements of gating system, bench moulding, floor<br>moulding, pit moulding, machine moulding.3.3 Casting:06 MarksFurnaces: Construction and working of cupola furnace, electric arc<br>furnace Methods & applications of - Centrifugal casting, shell<br>moulding, investment casting, Casting defects - Causes & remedies.3.4 Hot chamber and cold chamber die casting, Die casting defects - Causes &<br>remedies.074. Welding<br>Specific Objectives:07                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | > To state different operations performed on press machine and                        |     | 0.0   | 16    |
| Content06 Marks2.1 Press classification, press operations like punching/piercing, blanking,<br>notching, lancing06 Marks2.2 Die set components and types of dies06 Marks2.3 Forming Operations: Bending, drawing04 Marks3. Casting Processes:22 MarksSpecific Objectives:>> To state different between pattern and model>> To state different types of pattern and their applications>> To state various types of pattern allowances.>> To state various types of casting processes.Content3.1 Pattern making:06 MarksBasic steps in making casting, Pattern : types, materials and allowances,<br>tools, color coding of patterns103.2 Moulding:06 MarksTypes of moulding sands, properties of sand, moulding methods, cores<br>and core prints, elements of gating system, bench moulding, floor<br>moulding, pit moulding, machine moulding.3.3 Casting:06 MarksFurnaces: Construction and working of cupola furnace, electric arc<br>furnace Methods & applications of - Centrifugal casting, shell<br>moulding, investment casting, Casting defects - Causes & remedies.3.4 Hot chamber and cold chamber die casting, Die casting defects - Causes &<br>remedies.074. Welding<br>Specific Objectives:07                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | their p[practical applications                                                        |     | 08    | 16    |
| 2.1 Press classification, press operations like punching/piercing, blanking, notching, lancing       06 Marks         2.2 Die set components and types of dies       06 Marks         2.3 Forming Operations: Bending, drawing       04 Marks         3. Casting Processes:       22 Marks         Specific Objectives:       22 Marks         > To state different between pattern and model       22 Marks         > To state different types of pattern and their applications       70 state various types of pattern allowances.         > To state various types of casting processes.       06 Marks         Content       06 Marks         3.1 Pattern making:       06 Marks         Basic steps in making casting, Pattern : types, materials and allowances, tools, color coding of patterns       10         3.2 Moulding:       06 Marks         Types of moulding sands, properties of sand, moulding methods, cores and core prints, elements of gating system, bench moulding, floor moulding, pit moulding, machine moulding.       10       22         3.3 Casting:       06 Marks       10       22         State science:       06 Marks       10       22         Mulding, investment casting, Casting defects - Causes & remedies.       3.4       10       22         4. Welding       04 Marks       07       14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Content                                                                               |     |       |       |
| notching, lancing06 Marks2.2 Die set components and types of dies06 Marks2.3 Forming Operations: Bending, drawing04 Marks3. Casting Processes:22 MarksSpecific Objectives:22 Marks> To state different between pattern and model>> To state different types of pattern and their applications> To state various types of pattern allowances.> To state various types of casting processes.Content3.1 Pattern making:06 MarksBasic steps in making casting, Pattern : types, materials and allowances, tools, color coding of patterns3.2 Moulding:06 MarksTypes of moulding sands, properties of sand, moulding methods, cores and core prints, elements of gating system, bench moulding, floor moulding, pit moulding, machine moulding.3.3 Casting:06 MarksFurnaces: Construction and working of cupola furnace, electric arc furnace Methods & applications of - Centrifugal casting, shell moulding, investment casting, Casting defects - Causes & remedies.4. Welding07Specific Objectives:07                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 2.1 Press classification, press operations like punching/piercing, blanking,          |     |       |       |
| 2.2 Die set components and types of dies       06 Marks         2.3 Forming Operations: Bending, drawing       04 Marks         3. Casting Processes:       22 Marks         Specific Objectives:       >         > To state different between pattern and model       >         > To state different types of pattern and their applications       >         > To state various types of pattern allowances.       >         > To state various types of casting processes.       Content         3.1 Pattern making:       06 Marks         Basic steps in making casting, Pattern : types, materials and allowances, tools, color coding of patterns       10       22         3.2 Moulding:       06 Marks       10       22         Types of moulding sands, properties of sand, moulding methods, cores and core prints, elements of gating system, bench moulding, floor moulding, pit moulding, machine moulding.       06 Marks       10       22         3.3 Casting:       06 Marks       60 Marks       10       22         4. Wethods & applications of - Centrifugal casting, shell moulding, investment casting, Casting defects - Causes & remedies.       04 Marks       10         4. Welding       04 Marks       07       14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | notching, lancing 06 Marks                                                            |     |       |       |
| 2.3 Forming Operations: Bending, drawing       04 Marks         3. Casting Processes:       22 Marks         Specific Objectives:       > To state different between pattern and model         > To state different types of pattern and their applications       > To state various types of pattern and their applications         > To state various types of pattern allowances.       > To state various types of casting processes.         Content       3.1 Pattern making:       06 Marks         Basic steps in making casting, Pattern : types, materials and allowances, tools, color coding of patterns       10       22         3.2 Moulding:       06 Marks       10       22         Types of moulding sands, properties of sand, moulding methods, cores and core prints, elements of gating system, bench moulding, floor moulding, pit moulding, machine moulding.       06 Marks       10       22         3.3 Casting:       06 Marks       60 Marks       10       22         4. Wething       02 Casting defects - Causes & remedies.       04 Marks       10       14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 2.2 Die set components and types of dies 06 Marks                                     |     |       |       |
| 3. Casting Processes:       22 Marks         Specific Objectives:       > To state different between pattern and model         > To state different types of pattern and their applications       > To list different types of pattern allowances.         > To state various types of casting processes.       Content         3.1 Pattern making:       06 Marks         Basic steps in making casting, Pattern : types, materials and allowances, tools, color coding of patterns       10       22         3.2 Moulding:       06 Marks       10       22         Types of moulding sands, properties of sand, moulding methods, cores and core prints, elements of gating system, bench moulding, floor moulding, pit moulding, machine moulding.       06 Marks       10       22         3.3 Casting:       06 Marks       66 Marks       10       22         4. Welding       01       04 Marks       07       14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2.3 Forming Operations: Bending, drawing 04 Marks                                     |     |       |       |
| Specific Objectives:To state different between pattern and modelTo state different types of pattern and their applications> To list different types of pattern and their applicationsTo state various types of pattern allowances.To state various types of casting processes.> To state various types of casting processes.Content3.1 Pattern making:06 MarksBasic steps in making casting, Pattern : types, materials and allowances, tools, color coding of patterns103.2 Moulding:06 MarksTypes of moulding sands, properties of sand, moulding methods, cores and core prints, elements of gating system, bench moulding, floor moulding, pit moulding, machine moulding.103.3 Casting:06 MarksFurnaces: Construction and working of cupola furnace, electric arc furnace Methods & applications of - Centrifugal casting, shell moulding, investment casting, Casting defects - Causes & remedies.3.4 Hot chamber and cold chamber die casting, Die casting defects - Causes & remedies.074. Welding<br>Specific Objectives:07                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 3. Casting Processes:22 Marks                                                         |     |       |       |
| <ul> <li>To state different between pattern and model</li> <li>To list different types of pattern and their applications</li> <li>To state various types of pattern allowances.</li> <li>To state various types of casting processes.</li> <li>Content</li> <li>3.1 Pattern making: 06 Marks         <ul> <li>Basic steps in making casting, Pattern : types, materials and allowances, tools, color coding of patterns</li> <li>06 Marks</li> <li>Types of moulding sands, properties of sand, moulding methods, cores and core prints, elements of gating system, bench moulding, floor moulding, pit moulding, machine moulding.</li> </ul> </li> <li>3.3 Casting: 06 Marks         <ul> <li>Furnaces: Construction and working of cupola furnace, electric arc furnace Methods &amp; applications of - Centrifugal casting, shell moulding, investment casting, Casting defects - Causes &amp; remedies.</li> <li>3.4 Hot chamber and cold chamber die casting, Die casting defects - Causes &amp; remedies.</li> <li>4. Welding</li> <li>Specific Objectives:</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Specific Objectives:                                                                  |     |       |       |
| <ul> <li>To list different types of pattern and their applications</li> <li>To state various types of pattern allowances.</li> <li>To state various types of casting processes.</li> <li>Content</li> <li>3.1 Pattern making:         <ul> <li>06 Marks</li> <li>Basic steps in making casting, Pattern : types, materials and allowances, tools, color coding of patterns</li> <li>2.2 Moulding:</li></ul></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | To state different between pattern and model                                          |     |       |       |
| <ul> <li>To state various types of pattern allowances.</li> <li>To state various types of casting processes.</li> <li>Content</li> <li>3.1 Pattern making: 06 Marks         Basic steps in making casting, Pattern : types, materials and allowances,         tools, color coding of patterns         3.2 Moulding: 06 Marks         Types of moulding sands, properties of sand, moulding methods, cores         and core prints, elements of gating system, bench moulding, floor         moulding, pit moulding, machine moulding.         3.3 Casting: 06 Marks         Furnaces: Construction and working of cupola furnace, electric arc         furnace Methods &amp; applications of - Centrifugal casting, shell         moulding, investment casting, Casting defects - Causes &amp; remedies.         3.4 Hot chamber and cold chamber die casting, Die casting defects - Causes &amp;         remedies. 04 Marks         4. Welding         Specific Objectives: 07 14     </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | To list different types of pattern and their applications                             |     |       |       |
| <ul> <li>To state various types of casting processes.</li> <li>Content</li> <li>3.1 Pattern making: 06 Marks         Basic steps in making casting, Pattern : types, materials and allowances,         tools, color coding of patterns         3.2 Moulding: 06 Marks         Types of moulding sands, properties of sand, moulding methods, cores         and core prints, elements of gating system, bench moulding, floor         moulding, pit moulding, machine moulding.         3.3 Casting: 06 Marks         Furnaces: Construction and working of cupola furnace, electric arc         furnace Methods &amp; applications of - Centrifugal casting, shell         moulding, investment casting, Casting defects - Causes &amp; remedies.         3.4 Hot chamber and cold chamber die casting, Die casting defects - Causes &amp;         remedies. 04 Marks         4. Welding         Specific Objectives: 07 14</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | To state various types of pattern allowances.                                         |     |       |       |
| Content06 Marks3.1 Pattern making:06 MarksBasic steps in making casting, Pattern : types, materials and allowances,<br>tools, color coding of patterns103.2 Moulding:06 MarksTypes of moulding sands, properties of sand, moulding methods, cores<br>and core prints, elements of gating system, bench moulding, floor<br>moulding, pit moulding, machine moulding.103.3 Casting:06 MarksFurnaces: Construction and working of cupola furnace, electric arc<br>furnace Methods & applications of - Centrifugal casting, shell<br>moulding, investment casting, Casting defects - Causes & remedies.3.4 Hot chamber and cold chamber die casting, Die casting defects - Causes &<br>04 Marks4. Welding<br>Specific Objectives:0714                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | To state various types of casting processes.                                          |     |       |       |
| 3.1 Pattern making:06 MarksBasic steps in making casting, Pattern : types, materials and allowances,<br>tools, color coding of patterns10223.2 Moulding:06 Marks1022Types of moulding sands, properties of sand, moulding methods, cores<br>and core prints, elements of gating system, bench moulding, floor<br>moulding, pit moulding, machine moulding.10223.3 Casting:06 Marks06 Marks1022Furnaces: Construction and working of cupola furnace, electric arc<br>furnace Methods & applications of - Centrifugal casting, shell<br>moulding, investment casting, Casting defects - Causes & remedies.3.4 Hot chamber and cold chamber die casting, Die casting defects - Causes &<br>remedies.0714                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Content                                                                               |     |       |       |
| Basic steps in making casting, Pattern : types, materials and allowances,<br>tools, color coding of patterns1022 <b>3.2 Moulding:06 Marks</b> 1022Types of moulding sands, properties of sand, moulding methods, cores<br>and core prints, elements of gating system, bench moulding, floor<br>moulding, pit moulding, machine moulding.1022 <b>3.3 Casting:06 Marks10</b> 22Furnaces: Construction and working of cupola furnace, electric arc<br>furnace Methods & applications of - Centrifugal casting, shell<br>moulding, investment casting, Casting defects - Causes & remedies.44 <b>4. Welding</b><br>Specific Objectives:0714                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>3.1 Pattern making:</b> 06 Marks                                                   | 1   |       |       |
| tools, color coding of patterns1022 <b>3.2 Moulding:</b> 06 Marks1022Types of moulding sands, properties of sand, moulding methods, cores<br>and core prints, elements of gating system, bench moulding, floor<br>moulding, pit moulding, machine moulding.1022 <b>3.3 Casting:</b> 06 MarksFurnaces: Construction and working of cupola furnace, electric arc<br>furnace Methods & applications of - Centrifugal casting, shell<br>moulding, investment casting, Casting defects - Causes & remedies.1022 <b>3.4</b> Hot chamber and cold chamber die casting, Die casting defects - Causes &<br>remedies.0714                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Basic steps in making casting, Pattern : types, materials and allowances              | ,   |       |       |
| 3.2 Moulding:06 Marks1022Types of moulding sands, properties of sand, moulding methods, cores<br>and core prints, elements of gating system, bench moulding, floor<br>moulding, pit moulding, machine moulding.10223.3 Casting:06 MarksFurnaces: Construction and working of cupola furnace, electric arc<br>furnace Methods & applications of - Centrifugal casting, shell<br>moulding, investment casting, Casting defects - Causes & remedies.4. Welding4. Welding<br>Specific Objectives:0714                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | tools, color coding of patterns                                                       |     | 10    | 22    |
| Types of moulding sands, properties of sand, moulding methods, cores<br>and core prints, elements of gating system, bench moulding, floor<br>moulding, pit moulding, machine moulding. <b>3.3 Casting:06 Marks</b> Furnaces: Construction and working of cupola furnace, electric arc<br>furnace Methods & applications of - Centrifugal casting, shell<br>moulding, investment casting, Casting defects - Causes & remedies. <b>3.4</b> Hot chamber and cold chamber die casting, Die casting defects - Causes &<br><b>04 Marks4. Welding0714</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 3.2 Moulding: 06 Marks                                                                | )   | 10    |       |
| and core prints, elements of gating system, bench moulding, floor<br>moulding, pit moulding, machine moulding.06 Marks <b>3.3 Casting:</b> 06 MarksFurnaces: Construction and working of cupola furnace, electric arc<br>furnace Methods & applications of - Centrifugal casting, shell<br>moulding, investment casting, Casting defects - Causes & remedies.4. Welding<br>Specific Objectives: <b>4. Welding</b> 0714                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Types of moulding sands, properties of sand, moulding methods, cores                  |     |       |       |
| moulding, pit moulding, machine moulding.06 Marks3.3 Casting:06 MarksFurnaces: Construction and working of cupola furnace, electric arc<br>furnace Methods & applications of - Centrifugal casting, shell<br>moulding, investment casting, Casting defects - Causes & remedies.4. Welding<br>Specific Objectives:4. Welding07                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | and core prints, elements of gating system, bench moulding, floor                     |     |       |       |
| 3.3 Casting:       06 Marks         Furnaces: Construction and working of cupola furnace, electric arc       furnace Methods & applications of - Centrifugal casting, shell         moulding, investment casting, Casting defects - Causes & remedies.       3.4 Hot chamber and cold chamber die casting, Die casting defects - Causes & remedies.         3.4 Hot chamber and cold chamber die casting, Die casting defects - Causes & remedies.       04 Marks         4. Welding       07       14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | moulding, pit moulding, machine moulding.                                             |     |       |       |
| Furnaces: Construction and working of cupola furnace, electric arc<br>furnace Methods & applications of - Centrifugal casting, shell<br>moulding, investment casting, Casting defects - Causes & remedies.Image: Cause of the second se               | 3.3 Casting: 06 Marks                                                                 | 5   |       |       |
| furnace Methods & applications of - Centrifugal casting, shell<br>moulding, investment casting, Casting defects - Causes & remedies.3.4 Hot chamber and cold chamber die casting, Die casting defects - Causes &<br>remedies.4. Welding<br>Specific Objectives:07                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Furnaces: Construction and working of cupola furnace, electric arc                    |     |       |       |
| moulding, investment casting, Casting defects - Causes & remedies.3.4 Hot chamber and cold chamber die casting, Die casting defects - Causes & remedies.4. WeldingSpecific Objectives:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | furnace Methods & applications of - Centrifugal casting, shell                        |     |       |       |
| 3.4 Hot chamber and cold chamber die casting, Die casting defects - Causes & remedies.       04 Marks         4. Welding       07       14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | moulding, investment casting, Casting defects - Causes & remedies.                    |     |       |       |
| remedies. 04 Marks<br>4. Welding<br>Specific Objectives: 07 14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>3.4</b> Hot chamber and cold chamber die casting. Die casting defects - Cause      | s & |       |       |
| 4. Welding<br>Specific Objectives: 07 14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | remedies. 04 Marks                                                                    |     |       |       |
| Specific Objectives: 07 14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 4. Welding                                                                            |     | ~ -   |       |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Specific Objectives:                                                                  |     | 07    | 14    |

| <ul> <li>To define Arc welding and Gas welding Principal.</li> <li>To state difference between soldering and burging processes</li> </ul> |    |     |
|-------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
| Content                                                                                                                                   |    |     |
| 4.1 Introduction & classification of welding processes -                                                                                  |    |     |
| Gas welding, carbon arc welding, shielded metal arc welding, TIG                                                                          |    |     |
| welding, MIG welding, plasma arc welding, resistance welding types-                                                                       |    |     |
| spot, seam projection. Electron beam welding, laser beam welding.                                                                         |    |     |
| welding defects. <b>10 Marks</b>                                                                                                          |    |     |
| 4.2 Introduction to soldering and brazing –                                                                                               |    |     |
| Process, fillers, heating methods & applications. 04 Marks                                                                                |    |     |
| 5. Machining Operations                                                                                                                   |    |     |
| Specific Objectives:                                                                                                                      |    |     |
| > To state the working principal of lathe and drilling machines.                                                                          |    |     |
| > To list out various operations performed on lathe and drilling                                                                          |    |     |
| machines                                                                                                                                  |    |     |
| Content                                                                                                                                   |    |     |
| 5.1 Lathe Machine: 12 Marks                                                                                                               |    |     |
| Introduction, classification and basic parts of center lathe & their                                                                      | 10 | 20  |
| functions, Lathe operations like facing, plain turning, taper turning, thread                                                             |    |     |
| cutting, chamfering, grooving, knurling. Cutting tool nomenclature & tool                                                                 |    |     |
| signature, cutting parameters.                                                                                                            |    |     |
| 5.2 Drilling Machine: 08 Marks                                                                                                            |    |     |
| Introduction, classification, basic parts of radial drilling machine and their                                                            |    |     |
| functions, twist drill nomenclature, drilling machine operations like                                                                     |    |     |
| drilling, reaming, boring, counter sinking, counter boring, spot facing.                                                                  |    |     |
| Cutting parameters.                                                                                                                       |    |     |
| 6. Plastic Moulding:                                                                                                                      |    |     |
| Specific Objectives:                                                                                                                      |    |     |
| To state different properties of plastics                                                                                                 |    |     |
| To explain various plastic mauling methods like Injection, blow,                                                                          |    |     |
| compression molding                                                                                                                       | 05 | 10  |
| Content                                                                                                                                   |    |     |
| Introduction, Properties of plastics, types of plastics, plastic moulding                                                                 |    |     |
| methods - compression moulding, injection moulding, blow moulding,                                                                        |    |     |
| extrusion, vacuum forming and calendaring.                                                                                                | 10 | 100 |
| Total                                                                                                                                     | 48 | 100 |

# **Practical:**

Skills to be developed:

# Intellectual skills:

- 1) Identify basic manufacturing processes like forging, rolling and extrusion, for required component.
- 2) Specify need of pattern allowances.
- 3) Decide process parameters for different operations.
- 4) Decide tools required for a manufacturing process.
- 5) Identify a joining method for fabrication.

### **Motor Skills:**

1) Operate lathe, drilling machine.

- 2) Set the tool and select the cutting parameters for machining operations.
- 3) Set the tools, job and decide cutting parameters.
- 4) Inspect various dimensions of jobs by using measuring instruments.
- 5) Make simple wooden / thermocole pattern.

### List of Practical:

- 1) One turning job on lathe containing the operations like plain turning, step turning, taper turning, grooving, knurling and chamfering.
- 2) One job using Spot welding machine. (Min. 4 spots on 0.5-1mm thick metal strip.)
- 3) One simple job on TIG / MIG welding setup or visit to TIG / MIG welding shop.
- 4) Moulding practice for any one pattern.
- 5) Industrial visit to observe plastic processing shop and report on the visit.
- 6) One composite job containing the operations like lathe with axial & across drilling (like Nut- Bolt assembly or any other equivalent job).
- 7) Demonstration of eccentric turning using four jaw chuck.

### Notes:

- 1] The workshop instructors should prepare specimen job in each shop as demonstration practice before the student (as per the drawing given by subject teacher/ workshop superintendent).
- 2] Theory behind practical is to be covered by the concerned subject teacher/ workshop superintendent.
- 3] Workshop diary should be maintained by each student duly signed by respective shop instructors.
- 4] Assignments are to be assessed by the concerned subject teacher/ workshop superintendent.

# **Guidelines for conducting Practical Examination for MANUFACTURING PROCESSES**

- 1. The job drawing must be jointly decided by the External and Internal examiner prior to one day in advance from the commencement of practical examination. Every student should be supplied the copy of job drawing before examination.
- 2. Time for practical examination should be **THREE HOURS.**
- 3. Practical examination of the students shall consists of Turning job containing different operations like Facing, straight Turning, Taper turning, Chamfering, Knurling, Threading, Grooving. (Minimum 5 operations) Students will perform the job as per the drawing provided to them.
- 4. Raw material size Bar dia. 40 to 50 mm, length 80 to 100 mm.

# Learning Resources:

**Books:** 

| Sr.<br>No. | Author                              | Title                                            | Publisher                                 |
|------------|-------------------------------------|--------------------------------------------------|-------------------------------------------|
| 01         | S. K. Hajra Chaudhary,<br>Bose, Roy | Elements of workshop<br>Technology-Volume I & II | Media Promoters and<br>Publishers Limited |
| 02         | O. P. Khanna & Lal                  | Production Technology<br>Volume- I & II          | Production Technology<br>Volume- I & II   |

#### w.e.f Academic Year 2012-13

### 'G' Scheme

|    |                                   |                                         | Dhanpat Rai Publications |
|----|-----------------------------------|-----------------------------------------|--------------------------|
| 03 | W. A. J. Chapman, S. J.<br>Martin | W. A. J. Chapman, S. J.<br>Volume –I,II | Viva Books (p) Ltd.      |
| 04 | O.P. Khanna                       | A text book of Foundry Tech.            | Dhanpat Rai Publications |
| 05 | H.S. Bawa                         | Workshop Technology<br>Volume- I & II   | Tata McGraw-Hill         |
| 06 | P.C. Sharma                       | Production Engineering                  | S. Chand Publications    |

Course Name : Mechanical Engineering GroupCourse Code : ME/MH/MI/PG/PT/FE/FGSemester : FourthSubject Title : Fluid Mechanics and MachinerySubject Code : 17411

### **Teaching and Examination Scheme:**

| Teac | ching Scl | neme | Examination Scheme |     |     |    |     |       |
|------|-----------|------|--------------------|-----|-----|----|-----|-------|
| TH   | TU        | PR   | PAPER<br>HRS       | TH  | PR  | OR | TW  | TOTAL |
| 04   |           | 02   | 03                 | 100 | 25# |    | 25@ | 150   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Knowledge of fluid properties, fluid flow & fluid machinery is essential in all fields of engineering. Hydraulic machines have important role in water supply, irrigation, power generation and also in most of the engineering segments. This subject requires knowledge of basic engineering sciences, applied mechanics, mathematics etc. The fundamentals of this subject are essential for the subject "Industrial Fluid Power" in sixth semester.

General Objectives: The student will be able to

- 1) Define various properties of fluids
- 2) Measure pressure, velocity and flow rate using various instruments.
- 3) State continuity equation, Bernoulli's equation and its applications.
- 4) Estimate various losses in flow through pipes.
- 5) Explain concept of impact of jet on various types of vanes.
- 6) Draw the construction, working of hydraulic pumps and turbines.
- 7) Evaluate performance of turbines and pumps.



# Theory:

| Topics and Contents                                                                             | Hours | Marks |
|-------------------------------------------------------------------------------------------------|-------|-------|
| 1. Properties of fluid and Fluid Pressure                                                       |       |       |
| Specific Objectives:                                                                            |       |       |
| Define fluid properties.                                                                        |       |       |
| Differentiate between fluid pressure intensity and pressure head.                               |       |       |
| Solve numerical related to properties of fluid, fluid pressure and                              |       |       |
| manometers.                                                                                     |       |       |
| Contents:                                                                                       |       |       |
| 1.1 Properties of Fluid 06 Marks                                                                |       |       |
| Density, Specific gravity, Specific volume, Specific Weight, Dynamic                            |       |       |
| viscosity, Kinematic viscosity, Surface tension, Capillarity, Vapour                            | 12    | 20    |
| Pressure, Compressibility                                                                       |       | -     |
| 1.2: Fluid Pressure & Pressure Measurement 14 Marks                                             |       |       |
| • Fluid pressure, Pressure head, Pressure intensity                                             |       |       |
| • Conceptof absolute vacuum, gauge pressure, atmospheric pressure,                              |       |       |
| absolute pressure.                                                                              |       |       |
| • Simple and differential manometers. Bourden pressure gauge.                                   |       |       |
| Total pressure center of pressure- regular surface forces on                                    |       |       |
| immersed bodies in liquid in horizontal vertical and inclined                                   |       |       |
| position                                                                                        |       |       |
| 2. Fluid Flow                                                                                   |       |       |
| Specific Objectives:                                                                            |       |       |
| State Bernoulli's theorem and apply it to venturimeter, orifice and pitot                       |       |       |
| tube.                                                                                           |       |       |
| Contents:                                                                                       |       |       |
| • Types of fluid flows-Laminar, turbulent, steady, unsteady, uniform,                           |       |       |
| non uniform, rotational, irrotational.                                                          |       |       |
| Continuity equation Bernoulli's theorem                                                         | 10    | 14    |
| <ul> <li>Venturimeter - Construction principle of working</li> </ul>                            |       |       |
| coefficient of discharge Derivation for discharge through                                       |       |       |
| venturimeter                                                                                    |       |       |
| • Orifice meter - Construction Principle of working hydraulic                                   |       |       |
| coefficients Derivation for discharge through Orifice meter                                     |       |       |
| <ul> <li>Pitot tube – Construction Principle of Working</li> </ul>                              |       |       |
| 3 Flow Through Pines                                                                            |       |       |
| Specific Objectives:                                                                            |       |       |
| <ul> <li>State laws of friction and list various losses in flow through pipes.</li> </ul>       |       |       |
| <ul> <li>Solve numerical on laws of friction and list various losses in flow through</li> </ul> |       |       |
| pipes.                                                                                          |       |       |
| Contents:                                                                                       | 10    |       |
| • Laws of fluid friction (Laminar and turbulent)                                                | 10    | 14    |
| • Darcy's equation and Chezy's equation for frictional losses                                   |       |       |
| <ul> <li>Minor losses in fittings and valves</li> </ul>                                         |       |       |
| <ul> <li>Hydraulic gradient line and total energy line</li> </ul>                               |       |       |
| Hydraulie power transmission through pipe                                                       |       |       |
| nyuraune power transmission through pipe                                                        |       |       |
| 4. Impact of Jets                                                                               | 0.5   | 10    |
| Specific Objectives:                                                                            | 06    | 10    |
| Analyze <b>explain the</b> impact of jet on vanes in various conditions.                        |       |       |

| Solve numerical on impact of jet on vanes in various conditions.                                                                |    |     |  |  |  |  |  |
|---------------------------------------------------------------------------------------------------------------------------------|----|-----|--|--|--|--|--|
| Contents:                                                                                                                       |    |     |  |  |  |  |  |
| • Impact of jet on fixed vertical, moving vertical flat plates.                                                                 |    |     |  |  |  |  |  |
| • Impact of jet on curved vanes with special reference to turbines and                                                          |    |     |  |  |  |  |  |
| pumps                                                                                                                           |    |     |  |  |  |  |  |
| 5. Hydraulic Turbines                                                                                                           |    |     |  |  |  |  |  |
| Specific Objectives:                                                                                                            |    |     |  |  |  |  |  |
| Explain working principle of various hydraulic turbines.                                                                        |    |     |  |  |  |  |  |
| Calculate work done, power generated and various efficiencies of hydraulic                                                      |    |     |  |  |  |  |  |
| turbines.                                                                                                                       |    |     |  |  |  |  |  |
| Contents:                                                                                                                       |    |     |  |  |  |  |  |
| <ul> <li>Layout and features of hydroelectric power plant, surge tanks and its need.</li> </ul>                                 | 12 | 18  |  |  |  |  |  |
| • Classification of hydraulic turbines and their applications.                                                                  |    |     |  |  |  |  |  |
| <ul> <li>Construction and working principle of Pelton wheel Francis and</li> </ul>                                              |    |     |  |  |  |  |  |
| Kanlan turbine                                                                                                                  |    |     |  |  |  |  |  |
| • Draft tubes types and construction Concept of equitation in                                                                   |    |     |  |  |  |  |  |
| • Draft tubes – types and construction, concept of cavitation in turbinos                                                       |    |     |  |  |  |  |  |
| Coloulation of Work done. Derver officiency of turking                                                                          |    |     |  |  |  |  |  |
| Calculation of work done, Power, enciency of turbine                                                                            |    |     |  |  |  |  |  |
| 6. Pumps                                                                                                                        |    |     |  |  |  |  |  |
| Specific Objectives:                                                                                                            |    |     |  |  |  |  |  |
| Explain working of centrifugal, reciprocating and multistage pumps.                                                             |    |     |  |  |  |  |  |
| Explain the concept of cavitation in pumps.                                                                                     |    |     |  |  |  |  |  |
| Calculate manometric head, work done and various efficiencies related to                                                        |    |     |  |  |  |  |  |
| the pumps.                                                                                                                      |    |     |  |  |  |  |  |
| Select the pump for a given application.                                                                                        |    |     |  |  |  |  |  |
| 6.1 Centrifugal Pumps 14 Marks                                                                                                  |    |     |  |  |  |  |  |
| Contents:                                                                                                                       |    |     |  |  |  |  |  |
| <ul> <li>Construction, principle of working, priming methods and Cavitation</li> <li>Types of casings and impellers.</li> </ul> |    |     |  |  |  |  |  |
| • Manometric head, Work done, Manometric efficiency, Overall                                                                    |    |     |  |  |  |  |  |
| efficiency, NPSH.                                                                                                               | 14 | 24  |  |  |  |  |  |
| • Performance Characteristics of Centrifugal numps                                                                              |    |     |  |  |  |  |  |
| Trouble Shooting                                                                                                                |    |     |  |  |  |  |  |
| <ul> <li>Construction working and applications multistage numps</li> </ul>                                                      |    |     |  |  |  |  |  |
| Construction, working and appreations mutustage pumps     Submarship aware and ist aware                                        |    |     |  |  |  |  |  |
| • Submersible pumps and jet pump                                                                                                |    |     |  |  |  |  |  |
| 6.2 Reciprocating Pump 10 Marks                                                                                                 |    |     |  |  |  |  |  |
| • Construction, working principle and applications of single and double acting reciprocating pumps.                             |    |     |  |  |  |  |  |
| • Slip, Negative slip, Cavitation and separation.                                                                               |    |     |  |  |  |  |  |
| • Use of Air Vessels.                                                                                                           |    |     |  |  |  |  |  |
| • Indicator diagram with effect of acceleration head & frictional head                                                          |    |     |  |  |  |  |  |
| (No numerical on reciprocating numns)                                                                                           |    |     |  |  |  |  |  |
| Total                                                                                                                           | 64 | 100 |  |  |  |  |  |
|                                                                                                                                 | 1  |     |  |  |  |  |  |

### Practical: Skills to be developed: Intellectual Skills:

- 1. Select appropriate flow and pressure measuring devices for a given situation.
- 2. Analyze the performance of pumps and turbines.

#### **Motor Skills:**

- 1. Use flow and pressure measuring devices.
- 2. Operate pumps and turbines.

### **List of Practicals:**

- 1. Measure water pressure by using Bourdon's pressure gauge and U-tube Manometer. Also measure discharge of water by using measuring tank and stop watch.
- 2. Calibrate Bourdon's pressure gauge with the help of Dead weight pressure gauge.
- 3. Verify Bernoulli's theorem.
- 4. Determine Coefficient of Discharge of Venturimeter.
- 5. Determine coefficient of Discharge, Coefficient of Contraction and Coefficient of Velocity of Sharp edged circular orifice.
- 6. Determine Darcy's friction factor 'f' in pipes of three different diameters for four different discharges.
- 7. Determine minor frictional losses in pipe fittings.
- 8. Determine overall efficiency of Pelton wheel by using Pelton wheel test rig.
- 9. Determine overall efficiency of Centrifugal Pump & plot its operating characteristics by using Centrifugal pump test rig.
- 10. Determine overall efficiency of Reciprocating pump by using Reciprocating Pump test rig.

### Assignments

1. Information collection of Centrifugal, reciprocating, multistage pumps and submersible pumps from local market and from internet. Comparison of various models manufactured by different manufacturers. [The market survey is to be completed in a group of (max.) three to four students and the report of the same is to be included as part of term work.]

#### Learning Resources: 1. Books:

| Sr.<br>No | Author                                              | Title                                                                         | Publication                      |  |  |  |
|-----------|-----------------------------------------------------|-------------------------------------------------------------------------------|----------------------------------|--|--|--|
| 01        | Ojha, Berndtsson,<br>Chnadramouli                   | Fluid Mechanics and Machinery                                                 | Oxford University Press          |  |  |  |
| 02        | Som S K , Biswas G.                                 | Introduction to Fluid Mechanics<br>and Fluid Machines 3 <sup>rd</sup> Edition | Tata McGraw-Hill Co.<br>Ltd.     |  |  |  |
| 03        | Modi P.N. Seth<br>S M                               | Hydraulics and Fluid Mechanics<br>including Hydraulic Machines                | Standard Book House<br>New Delhi |  |  |  |
| 04        | Subramanya K.                                       | Fluid Mechanics and Hydraulic<br>Machines: problems and solution              | Tata McGraw-Hill Co.<br>Ltd.     |  |  |  |
| 05        | 05 Product catalogues of various pump manufacturers |                                                                               |                                  |  |  |  |

**Course Name : Diploma in Fabrication Technology & Erection Engineering** 

Course Code: FE/FGSemester: FourthSubject Title: Welding Technology

Subject Code : 17455

### **Teaching and Examination Scheme:**

| Teac | ching Scł | neme |              |     | Examinati | on Scheme |     |       |
|------|-----------|------|--------------|-----|-----------|-----------|-----|-------|
| TH   | TU        | PR   | PAPER<br>HRS | TH  | PR        | OR        | TW  | TOTAL |
| 03   |           | 02   | 03           | 100 | 25#       |           | 25@ | 150   |

### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

### **Rationale:**

To teach students to understand facts concepts principles and procedures of gas and arc welding, brazing, soldering.

# **Objectives:**

### The student will be able to:

- 1. Make student familiar with gas welding process.
- 2. Understand phenomenon of manual metal arc welding.
- 3. Describe and use the welding arc & metal transfer mechanism.
- 4. Identify weld defects.
- 5. Use the knowledge of joint design and weld metallurgy
- 6. Compare various metal joining processes welding, brazing & soldering.

### **Learning Structure:**



# **Details:** Contents

| Chapter | Description                                                                                                                            | Marks      | Hours |
|---------|----------------------------------------------------------------------------------------------------------------------------------------|------------|-------|
|         | Gas Welding                                                                                                                            |            |       |
|         | Theory                                                                                                                                 |            |       |
| 1       | • Types of joints and terminology & symbols of welding                                                                                 |            |       |
|         | <ul> <li>Definition of gas welding.</li> </ul>                                                                                         |            |       |
|         | • Oxy acetylene welding.                                                                                                               |            |       |
|         | • Types of welding flames.                                                                                                             | 16         | 08    |
|         | • Gas welding equipment.                                                                                                               |            |       |
|         | • Gas welding techniques                                                                                                               |            |       |
|         | <ul> <li>Advantages &amp; limitations of gas welding</li> </ul>                                                                        |            |       |
|         | <ul> <li>Filler metals and fluxes</li> </ul>                                                                                           |            |       |
|         | Manual Matal Are Walding                                                                                                               |            |       |
|         | Theory                                                                                                                                 |            |       |
|         | Electric and definition                                                                                                                |            |       |
|         | • Electric arc definition                                                                                                              |            |       |
|         | • Arc structure & mechanism, arc characteristics, arc stability,                                                                       |            |       |
|         | arc blow                                                                                                                               |            |       |
|         | • Metal transfer mechanism-Free flight type, short circuit type                                                                        |            |       |
|         | • Are walding nower sources both $D C + A C$                                                                                           |            |       |
|         | <ul> <li>Arc weighing power sources bour D.C. &amp; A.C.</li> <li>Easter affacting 7 selection of power sources</li> </ul>             |            |       |
|         | <ul> <li>Factor affecting / selection of power sources</li> <li>Delarity, surrent voltage, electrical travel, are length</li> </ul>    |            |       |
| 2       | Polarity, current vonage, electrical travel, arc religin                                                                               | 24         | 10    |
| 2       | • Positions flat, norizontal vertical overnead                                                                                         | 24         | 18    |
|         | • Electrodes sizes, composition, coating, classification & coding,                                                                     |            |       |
|         | manufacturing of electrodes, care & storage of electrodes                                                                              |            |       |
|         | Practice:                                                                                                                              |            |       |
|         | <ul> <li>Straight line deposition - down hand</li> </ul>                                                                               |            |       |
|         | But welding _ down hand                                                                                                                |            |       |
|         | <ul> <li>Dut weiding - down hand</li> <li>T-joint - down hand</li> </ul>                                                               |            |       |
|         | Straight line deposition Vartical                                                                                                      |            |       |
|         | But wolding Vertical                                                                                                                   |            |       |
|         | • Dut welding - Ventical                                                                                                               |            |       |
|         | • 1-joint - Ventcar<br>Wolding of Different Motols                                                                                     |            |       |
|         | Theory                                                                                                                                 |            |       |
|         | • Waldahility and factors affacting it                                                                                                 |            |       |
|         | <ul> <li>Weldanity and factors affecting it.</li> <li>Welding of mild steel &amp; iron, processes used &amp; explanation of</li> </ul> |            |       |
|         | • Weiding of find steel & non- processes used & explanation of metal arc welding                                                       |            |       |
| 3       | • Walding of cast iron, processes used & explanation of metal                                                                          | 20         | 08    |
| 5       | • Weiding of cast non- processes used & explanation of metal                                                                           | 20         | 08    |
|         | • Welding of allow steels stainless steels, processes used &                                                                           |            |       |
|         | • welding of anoy steels, stanless steels- processes used a                                                                            |            |       |
|         | <ul> <li>Welding of aluminum &amp; other non farrous metals processes</li> </ul>                                                       |            |       |
|         | • weiding of automnum & other non-remous metals - processes<br>used & explanation of Tig welding                                       |            |       |
|         | Welding Metallurgy & Weld Defects                                                                                                      |            |       |
|         | Theory:                                                                                                                                |            |       |
| 4       | <ul> <li>Solidification of metals in welding</li> </ul>                                                                                | 24         | 08    |
| т       | • Heat affected zone and structure of weld metal for MS                                                                                | <b>~</b> T | 00    |
|         | Copper, and Aluminum etc.                                                                                                              |            |       |

|   | Soldering joint & design.  Total                                | 100 | 48 |
|---|-----------------------------------------------------------------|-----|----|
|   | Principle of soldering                                          |     |    |
|   | carbon arc etc. of brazing.                                     |     |    |
|   | • Processes, torch, furnace, vacuum, induction Dip. Resistance, |     |    |
|   | application & limitations                                       |     |    |
| 5 | • Filler metals, joint preparation & design                     | 16  | 06 |
|   | Principle of brazing                                            |     |    |
|   | • Difference between brazing, soldering, welding                |     |    |
|   | • Definition of brazing & soldering                             |     |    |
|   | Theory:                                                         |     |    |
|   | Brazing & Soldering                                             |     |    |
|   | ✓ Remedial Procedures                                           |     |    |
|   | $\checkmark$ Types of defects & their causes                    |     |    |
|   | • Weld defects.                                                 |     |    |
|   | • Heat treatment used in welding.                               |     |    |
|   | • Effect of welding on properties of metals.                    |     |    |

# **Practicals:**

# Skill to be developed Intellectual Skill:

- 1. Identify the joining methods of welding
- 2. Understand welding of different materials
- 3. Specify different arc welding parameters.

# Moral Skill:

- 1. Edge preparation for making the welding joint
- 2. Cleaning of edges.
- 3. Use welding machine & equipment.
- 4. Set the tool, job & decide parameter of machines.
- 5. Inspect the dimensions of the job using measuring instruments
- 6. Evaluation of weld quality

# Learning Resources:

**Books:** 

| Author               | Title                           | Edition | Year of<br>Publication | Publisher &<br>Address |
|----------------------|---------------------------------|---------|------------------------|------------------------|
| O.P. Khanna          | Welding Technology              |         | 1994                   | Dhanpatrai & Sons      |
| L. Little            | Welding & Welding<br>Technology | 10th    | 1986                   | TMC, New Delhi         |
| Agarwal &<br>Maghani | Welding Engineering             |         |                        |                        |

**Course Name : Diploma in Fabrication Technology & Erection Engineering** 

Course Code: FE/FGSemester: FourthSubject Title: Fabrication Process

Subject Code : 17456

### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |     | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|-----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH  | PR        | OR        | TW  | TOTAL |
| 03              |    | 02 | 03           | 100 | 50#       |           | 25@ | 175   |

### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

### **Rationale:**

This subject will help the students to know the basic requirements of fabrication & the orderly sequence in which a component is prepared for fabrication.

# **Objectives:**

The student will be able to:

- Know basic marking / measuring processes. Identify & select various marking / measuring tools in sheet metal shops.
- To know the methods used for straightening & stiffening in sheet metal works.
- To know recent trends of materials in fabrication.
- To know the layout employed for fabrication processes.
- To know importance of surface cleaning prior to coating.

### **Learning Structure:**



# **THEORY:**

| Topic and Contents                                                     | Marks | Hours |
|------------------------------------------------------------------------|-------|-------|
| 1. Measurement                                                         |       |       |
| Introduction 04 Marks                                                  |       |       |
| 1. Definition and meaning of :                                         |       |       |
| Quantity, measurement, metrology, measure                              |       |       |
| Precision & accuracy,                                                  |       |       |
| Repeatability,                                                         |       |       |
| Calibration,                                                           |       |       |
| Sensitivity & readability                                              |       |       |
| 2. Sources of error                                                    |       |       |
| 3. Classification of measurements                                      |       |       |
| Standards of measurements 04 Marks                                     |       |       |
| 1. Introduction to standards                                           |       |       |
| 2. Line standard                                                       |       |       |
| 3. End standard                                                        |       |       |
| 4. Angular standard                                                    |       |       |
| Marking process 16Marks                                                |       |       |
| 1. Tools used in marking                                               |       |       |
| 2. Marking methods for large size plates                               |       |       |
| 3. Use of chalk line for marking long straight line                    |       |       |
| 4. Shop method of drawing an ellipse                                   |       |       |
| 5. Plotting ellipse using trammels                                     |       |       |
| 6. Shop method of drawing a circle                                     |       |       |
| 7. Method of marking out bolt holes for flanges                        |       |       |
| 8. Marking out a bracket from a datum surface                          |       |       |
| 9. Procedure for marking out instrument panel                          |       |       |
| 10. Marking of holes in angle sections, channel sections, T- sections, |       |       |
| columns and beams                                                      | 48    | 28    |
| Instruments for datum measurements 04 Marks                            |       |       |
| 1. Vertical datum- plumb line                                          |       |       |
| 2. Horizontal datum- spirit level                                      |       |       |
| 3. Alignment testing- use of tensioned wire, surveyor's level          |       |       |
| Geometric shape 08 Marks                                               |       |       |
| 1. Straightness testing- straight edge method, spirit level method     |       |       |
| 2. Flatness testing- comparison with flat circles, use of spirit level |       |       |
| 3. Squareness testing- engineer's square, block square                 |       |       |
| 4. Roundness measurement – Diametral, circumferential confining        |       |       |
| gauge, rotating on centres, assessment using a V-block, roundness      |       |       |
| measuring machine                                                      |       |       |
| Templates 12 Marks                                                     |       |       |
| 1. The need of templates                                               |       |       |
| 2. Materials used for templates                                        |       |       |
| 3. Information given on templates                                      |       |       |
| 4. Use of templates                                                    |       |       |
| <ul> <li>Templates for setting out sheet metal fabrications</li> </ul> |       |       |
| Templates for hopper plates                                            |       |       |
| Box templates                                                          |       |       |
| Steel templates (ordinary and bushed)                                  |       |       |
| 5. Templates as means of checking                                      |       |       |
| 6. Templates as a means of marking hole positions                      |       |       |

| 7. Templates as means of to provide an economical arrangement of |     |     |
|------------------------------------------------------------------|-----|-----|
| layout for press-work                                            |     |     |
| 8. Templates as a guide for cutting processes                    |     |     |
| 9. Protection and storage of templates and tools                 |     |     |
| 10. Comparison of methods of direct marking and use of templates |     |     |
| 2. Straightening Methods                                         |     |     |
| Mechanical straightening                                         |     |     |
| 1 Manual                                                         |     |     |
| 2. Machine straightening                                         |     |     |
|                                                                  | 08  | 04  |
| Thermal methods                                                  |     |     |
| 1. Hot shrinking                                                 |     |     |
| 2. Use of heat strips                                            |     |     |
| 3. Use of heat triangles                                         |     |     |
| 4. Principle of hot straightening for structural sections        |     |     |
| 3. Stiffening of Fabricated Material                             |     |     |
| Methods of stiffening sheet metal                                |     |     |
| Reasons for stiffening                                           |     |     |
| Stiffening of large panels                                       | 12  | 04  |
| 1. Use of applied stiffeners                                     |     |     |
| 2. Use of angle stiffeners                                       |     |     |
| Need for web stiffeners                                          |     |     |
| 4. Composite Materials in Fabrication                            |     |     |
| Introduction to composite material                               |     |     |
| Classification of composites                                     |     |     |
| Composition of composites                                        | 08  | 04  |
| Processing of composites                                         |     |     |
| Joining of composites                                            |     |     |
| Applications                                                     |     |     |
| 5. Surface Cleaning                                              |     |     |
| Introduction                                                     |     |     |
| Need for coating & cleaning                                      |     |     |
| Methods of surface cleaning                                      | 12  | 04  |
| 1. Chemical method                                               | 12  | 0.  |
| 2. Mechanical method                                             |     |     |
| 3. Thermal method                                                |     |     |
| 4. Dry method                                                    |     |     |
| 6. Factory / Workshop Layout                                     |     |     |
| Introduction                                                     |     |     |
| Definition of Factory layout                                     |     |     |
| Importance of layout                                             | 10  | 0.4 |
| Essentials of layout                                             | 12  | 04  |
| Types of layout                                                  |     |     |
| Factors influencing layout                                       |     |     |
| Dynamics plant layout                                            |     |     |
|                                                                  | 100 | 10  |
| I Otal                                                           | 100 | 40  |

### Practical:

# Skill to be developed;

### Intellectual skills

- 1. Ability to read job drawings.
- 2. Ability to identify & select proper material & tools for marking / measuring.

# Motor skills

- 1. Ability to set work piece for measurement on measuring instruments / devices.
- 2. Ability to inspect the job for confirming desired dimensions and shape.
- 3. Ability to recognize errors from mistakes and take remedial actions.

### **Practicals**:

### 1. Demonstration and use of :

- Vernier calliper,
- Micrometer screw gauge,
- Vernier height gauge,
- Vernier depth gauge,
- Feeler gauge, radius gauge & screw pitch gauge
- Slip gauges,
- Universal Bevel Protractor,
- Sine bar
- Angle gauges,

# 2. Study of Engineer's rule,

3. Study of Steel rule and tape (Layout preparation)

### Learning Resources: Books:

| Sr.<br>No. | Author                    | Title                                 | Publisher & Address      |
|------------|---------------------------|---------------------------------------|--------------------------|
| 1          | Kadam Manish J            | Metrology & Quality Control           | Everest Pub. House       |
| 2          | Hume K.J.<br>Sharp G.H.   | Practical Metrology                   | ELBS Macdonald & company |
| 3          | R. K. Jain                | Metrology                             | Khanna Publications      |
| 4          | Kenyon W. Pitman          | Basic welding and fabrication         | Pitman Pub. Ltd.         |
| 5          | F.J. M. Smith/<br>Longman | Basic fabrication and welding<br>Engg | Longman Craft Studies.   |

**Course Name : Diploma in Fabrication Technology & Erection Engineering** 

Course Code: FE/FGSemester: FourthSubject Title: Process Equipment

Subject Code : 17457

### **Teaching and Examination Scheme**

| Teaching Scheme |    |    |              | Examinati | on Scheme |    |     |       |
|-----------------|----|----|--------------|-----------|-----------|----|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH        | PR        | OR | TW  | TOTAL |
| 04              |    | 02 | 03           | 100       |           |    | 25@ | 125   |

# **Rationale:**

It is intended that the students understand facts, concepts regarding construction and working of process equipment used in the fabrication industry.

Objectives: The students will be able to-

- 1. Learn pressure vessel terminology.
- 2. Study design loads on process equipments.
- 3. Find stresses / thickness of vessels & dished ends.
- 4. Study of supports.
- 5. Design the process equipment.
- 6. Study & decide the materials & welding processes used in pressure vessel construction.

# Learning Structure:



#### **Theory:**

| Topic and Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Marks | Hrs. |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|
| Pressure Vessels                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 12    | 08   |
| Introduction, types, accessories & mountings, terminology.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 12    | 08   |
| Design of Pressure Vessels                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |      |
| Introduction, design approach, design pressure design temperature, dead load,<br>wind load, piping load, earthquake loads, and combination of design loads,<br>allowable stress range, general design criterion, stresses in ring, cylinder,<br>sphere, poisson ratio, dilation of pressure vessels, membrane stress, thick<br>cylinder, thick sphere, intersecting sphere, thermal stresses, ultra high<br>pressure vessel , multishell construction, discontinuity stresses in vessels,<br>stresses in bi-metallic joints, deformation and stresses in flanges and flanged<br>joints, gaskets, reinforced circular plates, stacked plates and built up plates. | 24    | 16   |
| Membrane Stress Analysis in Various Parts of Vessels                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |      |
| Cylindrical shell, spherical shell, hemispherical heads, semi ellipsoidal heads,<br>torispherical heads, conical heads (simple problems)<br>Supports skirts, support legs, support lugs, anchor bolts, saddles, stiffeners.<br>Design for thickness; shell, dish ends, nozzles, flanges, bolt size & numbers,<br>dilation & ligament efficiency.                                                                                                                                                                                                                                                                                                                 | 24    | 16   |
| Design Construction Features                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |      |
| Stress concentrations, Nozzle reinforcement, placement and shape, fatique concentration, stresses concentration in circular and elliptical opening.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 16    | 08   |
| Weld Design (Theory only)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |      |
| Introduction, groove welds, fillet welds, plug weld, defects in welds, NDT of welds, stress concentration factors, welding processes, welding symbols, welded joints, bolted joints, vessel supports and attachments, gaskets.                                                                                                                                                                                                                                                                                                                                                                                                                                   | 12    | 06   |
| Construction Materials                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |      |
| General considerations, Non corrosive service, ferrous and non ferrous materials for corrosive service, bolting material, selection of material for hydrogen service, aluminum alloys, stainless steels, method of attaching protective layers.                                                                                                                                                                                                                                                                                                                                                                                                                  | 12    | 10   |
| Note: Derivation / Proof of any formula is not expected                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |      |
| TOTAL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 100   | 64   |

### Assignments:

Eight assignments based on above theory content. Details of the assignments be written

### **Implementation Strategies:**

The subject matter will be taught as per the teaching scheme for Theory and practical. The subject teacher will prepare and provide learning material/handout for supplementing/ complementing classroom instructions.
# References: Books:

| Author             | Title                                 | Edition | Year of<br>Publication | Publisher & Address   |  |
|--------------------|---------------------------------------|---------|------------------------|-----------------------|--|
| Henry H.           | Pressure Vessel design                |         |                        |                       |  |
| Bednar             | handbook                              |         |                        |                       |  |
| John F. Harvey     | Theory and design of pressure vessel  | 1st     | 1987                   | C.B.S. Pub. Delhi     |  |
| Eugene F.          | Pressure Vessel                       |         | 1992                   | Press Vessel Handbook |  |
| Megyesy            | Handbook                              |         | 1772                   | Pub. Cl.              |  |
|                    | ASME Boiler & Pressure<br>Vessel Code |         | 1992                   | ASME, New York        |  |
|                    | Boiler & Pressure Vessel<br>Code      |         | 1980                   | ASME, USA             |  |
|                    | Unfired Pressure Vessels              |         | 1946                   | ASME, New York        |  |
| Joshi &<br>Mahajan | Process Equipment<br>Design           |         | 1996                   | Macmillan, New Delhi. |  |

# Course Name : Diploma in Fabrication Technology & Erection Engineering

Course Code : FE/FG Semester : Fourth Subject Title : Professional Practices-II Subject Code : **17048** 

# **Teaching and Examination Scheme:**

| Teac | ching Scł | neme |              |    | Examinati | on Scheme |     |       |
|------|-----------|------|--------------|----|-----------|-----------|-----|-------|
| TH   | TU        | PR   | PAPER<br>HRS | TH | PR        | OR        | TW  | TOTAL |
|      |           | 03   |              |    |           |           | 50@ | 50    |

### **Rationale:**

The purpose of introducing Professional practices is to fulfill the need of students to stand in today's global market with knowledge and confidence. This can be achieved by arranging industrial visits, expert lectures attitude to present them-selves, get alternative solutions and validation of the selected alternatives, socially relevant activities, and modular courses. Professional Practices is helpful in broadening technology base of students beyond curriculum. Model making exercises allow students to think more creatively and innovatively and inculcating habit of working with their own hands. Modular courses are introduced with a view of learning and acquiring higher technology skills through industry experts and consultants from the respective fields.

# **Objectives:**

The student will be able to:

- 1) Acquire information from different sources.
- 2) Prepare notes for given topics
- 3) Present seminar using power projection system.
- 4) Interact with peers to share thoughts.
- 5) Work in a team and develop team spirit.

# **Intellectual Skill:**

Student will be able to-

- 1) Search information from various resources.
- 2) Prepare notes on selected topics.
- 3) Participate in group discussions.

#### **Motor Skills:**

- 1) Observe industrial practices during visits.
- 2) Prepare slides / charts for presentation in seminar.
- 3) Develop a model

### **Learning Structure:**



#### **Content:**

| Topic & Content                                                                               | Hours |
|-----------------------------------------------------------------------------------------------|-------|
| 1. Information Search:-                                                                       |       |
| Information search be made through manufacturers catalogue, Hand books, magazines             |       |
| journal and websites, and submit a report on any Two Topics in a group of 3 to 4              |       |
| students, report size shall not be more than 10 pages.                                        |       |
| Following topics are suggested, any other equivalent topics may be selected.                  |       |
| 1. Present scenario of electric power generation in Maharashtra state /India.                 |       |
| 2. Composite materials – Types, properties & application                                      |       |
| 3. Material handling equipments commonly used in industries.                                  |       |
| 4. Advances in Automobile engines.                                                            |       |
| 5. Hydraulic steering systems of Automobile.                                                  |       |
| 6. Mechanisms used to produce straight-line motion.                                           |       |
| 7. Mechanisms used for generating intermittent motion.                                        |       |
| 8. Advanced surface coating techniques like chemical vapor deposition, ion                    | 10    |
| implantation, physical vapor deposition.                                                      |       |
| 9. Types of cutting tools- specification, materials and applications.                         |       |
| 10. Booking of E-Tickets for Railways/Buses/Air travel.                                       |       |
| 11. Profiles of 2 multinational companies.                                                    |       |
| 12. Engine lubricants, coolants and additives                                                 |       |
| 13. Power steering, power windows                                                             |       |
| 14. ABS(anti lock braking systems)                                                            |       |
| 15. MPFI(multi point fuel injection) system                                                   |       |
| 16. Role of MIDC, MSSIDC, DIC, Financial institutions in development of                       |       |
| industrial sector.                                                                            |       |
| 17. Solar energy systems - Components and their functions, applications                       |       |
| 18. Design data book - Study and use of types of data.                                        |       |
| 2. Lectures by professionals/Industry Experts-                                                |       |
| Two lectures of two hour duration be arranged on any two topics suggested below or            |       |
| any other suitable topics to acquire practical information beyond scope of                    |       |
| curriculum.                                                                                   |       |
| Students shall prepare a brief report of each lecture as a part of their term work.           |       |
| 1. Components of project Report.                                                              |       |
| 2. Various loan schemes of banks, LIC and other agencies for education and other              |       |
| purposes.                                                                                     |       |
| 3. Use of plastics & rubbers in Automobiles industries.                                       |       |
| 4. Type of processes used to protect material surfaces from environmental effect.             | 06    |
| 5. Product file cycle.                                                                        | 06    |
| 6. Industrial application of mechatronics.                                                    |       |
| 7. Special features of CNC machines                                                           |       |
| 8. Gear manufacturing & gear teeth filmsning processes.                                       |       |
| 9. Geal boxes-industrial & Automobile applications.                                           |       |
| 10. super-miniming operation when industrial applications.                                    |       |
| 12 Features of modern boilers                                                                 |       |
| 13. Strainers and filters – Types functions and applications                                  |       |
| 14 Industrial drives-Types, components, comparison and applications                           |       |
| 15. Introduction to Apprenticeshin Training Scheme                                            |       |
| 3. Seminars:                                                                                  |       |
| One seminar be arranged on the subjects related to 4 <sup>th</sup> semester. Or topics beyond | 06    |
| curriculum.                                                                                   |       |

| Each student shall submit a report up to 10 pages and deliver the seminar.                 |    |
|--------------------------------------------------------------------------------------------|----|
| batch size - 2-3 students.                                                                 |    |
| Source of information - books, magazine, Journals, Website ,surveys,                       |    |
|                                                                                            |    |
| Topics suggested for guidance-                                                             |    |
| 1. Clutches - Types, Principles, working, & applications,                                  |    |
| 2. High pressure boilers.                                                                  |    |
| 3. Heat exchangers - Types, working applications.                                          |    |
| 4. Hydraulic turbines -Types, working & applications.                                      |    |
| 5. Hydraulic pumps - Types, working & applications.                                        |    |
| 6. Sensors -Types, principle & applications.                                               |    |
| 7. Super conductor technology - Types, principle & applications.                           |    |
| 8. Semi conductors- Types, materials & applications.                                       |    |
| 9. Industrial brakes- Types, construction, working & applications.                         |    |
| 4. Industrial visits                                                                       |    |
| Structured industrial visits be arranged and report of the same shall be submitted by each |    |
| student to form a part of the term work.                                                   |    |
| No of visits- At least one                                                                 |    |
| Scale of industry- medium scale unit, large scale unit.                                    |    |
| Group size- practical batch                                                                |    |
| Report-not exceeding 7 to 10 pages.                                                        |    |
| Purpose :                                                                                  |    |
| To study the profile of industry                                                           |    |
| > To see the advanced manufacturing processes & machinery.                                 |    |
| > To observe working of CNC machines, work centres, flexible manufacturing                 |    |
| systems                                                                                    |    |
| > To observe working in foundry, forging shop, press shop, heat treatment shop etc.        |    |
| ➢ To observe chip less manufacturing machines & processes.                                 |    |
| > To study process sheets, quality control charts & production drawings, metallurgical     |    |
| testing laboratory                                                                         | 08 |
| To observe Tool room, standards room etc.                                                  |    |
| Following types of industries may be visited in $\ell_{\rm constraints}$ detainstitute     |    |
| Following types of industries may be visited in & around the institute.                    |    |
| 2. Forging units                                                                           |    |
| 2. Forging units<br>3. Sheet metal processing unit                                         |    |
| A Machine/ Automobile component manufacturing unit                                         |    |
| 5 Exprication unit/ powder metallurgy component manufacturing unit                         |    |
| 6 Machine tool manufacturing unit                                                          |    |
| 7 Any processing industry like chemical textile sugar agriculture fertilizer               |    |
| industries.                                                                                |    |
| 8. Auto workshop / four wheeler garage.                                                    |    |
| 9. City water supply pumping station                                                       |    |
| 10. Hydro electric power plant.                                                            |    |
| 11. Wind mills, Solar Park                                                                 |    |

| 5. Socially Relevant Activities                                                                         |    |
|---------------------------------------------------------------------------------------------------------|----|
| Conduct any one activity through active participation of students and write the report.                 |    |
| Group of students- maximum 4                                                                            |    |
| Report- Not more than 6 nages                                                                           |    |
| List of suggested activities (activities may be thought in terms of campus improvement)                 |    |
| 1 Awaraness about carbon credit                                                                         | 06 |
| 2. Anticompution movement                                                                               | 00 |
| 2. Anticolluption movement                                                                              |    |
| 5. Awareness about cyber crimes.                                                                        |    |
| 4. Developing good citizens.                                                                            |    |
| 5. Management of E- WASTE                                                                               |    |
| 6. Recycling of waste materials.                                                                        |    |
| 7. Accident prevention & enforcement of safely rules.                                                   |    |
| 8. Awareness about pollution and pollution control.                                                     |    |
| 9. (Any other relevant activity may be performed)                                                       |    |
| 6. Mini Projects                                                                                        |    |
| Students, in a group of 4, shall perform any one activity listed below.                                 |    |
| 1. Model making out of card board paper, wood, thermocol, plastics, metal, clay                         |    |
| etc                                                                                                     |    |
| a) Any new idea/principle converted into model                                                          |    |
| b) Mechanisms                                                                                           |    |
| c) Ligg/fixtures                                                                                        |    |
| d) Meterial handling device. etc.                                                                       |    |
| u) Waterial halfulling device, etc.                                                                     |    |
| 2. Toy making with simple operating mechanisms                                                          |    |
| 3. Layout of workshop/department/college                                                                |    |
| 4. Experimental set up/testing of a parameter                                                           |    |
| 5. Display board indicating different type of machine components like bearing,                          |    |
| fasteners, couplings, pipe fitting, valves, cams & followers, exploded views of                         |    |
| assemblies, type of welding equipment, welding rods (drawings, photo graphs)                            |    |
| 6. Any relevant project which will make students to collect information & work                          |    |
| with their own hands.                                                                                   |    |
| 7. Students shall arrange exhibition of all mini projects in the class/hall and present                 |    |
| the task to the audience/ experts/examiners. The student shall submit a brief                           | 12 |
| report (Max, 5 pages) of the mini project.                                                              |    |
| OR                                                                                                      |    |
| Modular course:                                                                                         |    |
|                                                                                                         |    |
| Modular courses on any one of the suggested or equivalent topic be undertaken by a                      |    |
| group of 15 to 20 students                                                                              |    |
| 1 Advance features in CAD                                                                               |    |
| <ol> <li>Advance realists in CAD</li> <li>Mashing of solid model using any suitable software</li> </ol> |    |
| 2. Meshing of solid model using any suitable software                                                   |    |
| 5. Developing Unioid Sneet of Hyperblank by using Blanking Software                                     |    |
| 4. CAM Software                                                                                         |    |
| 5. Basics of PLC programming                                                                            |    |
| 6. Applications of mechatronics                                                                         |    |
| 7. Piping Technology                                                                                    |    |
| 8. Modern packaging technology                                                                          |    |
| 9. Enterprise Resource Planning                                                                         |    |
| 10. Bio-pneumatic Robots                                                                                |    |
| 11. Bio-mimicry                                                                                         |    |

# Learning Resources: 1. Books:

| Sr.<br>No. | Author                                                                                                        | Title                                              | Publisher                                             |  |  |  |  |
|------------|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------|-------------------------------------------------------|--|--|--|--|
| 01         | NRDC, Publication Bi<br>Monthly Journal                                                                       | Invention Intelligence<br>Journal                  | National Research<br>Development Corporation,<br>GOI. |  |  |  |  |
| 02         | DK Publishing                                                                                                 | How things works encyclopedia                      | DK Publishing                                         |  |  |  |  |
| 03         | Trott                                                                                                         | Innovation mgmt.& new product development          | Pearson Education                                     |  |  |  |  |
| 04         | E.H. McGrath, S.J.                                                                                            | Basic Managerial Skills for<br>All – Ninth Edition | PHI                                                   |  |  |  |  |
| 05         | Apprenticeship Training Scheme:- Compiled By – BOAT (Western Region), Mumbai,<br>Available on MSBTE Web Site. |                                                    |                                                       |  |  |  |  |

# 2. Web sites

www.engineeringforchange.org

www.wikipedia.com

www.slideshare.com

www.teachertube.com

# Course Name : All Branches of Diploma in Engineering & Technology Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG Industrial Training (Optional) after 4<sup>th</sup> semester examination.

Note:- Examination in Professional Practices of 5<sup>th</sup> Semester.

# INDUSTRIAL TRAINING (OPTIONAL)

# Rational:-

There was a common suggestion from the industry as well as other stakeholders that curriculum of Engineering and Technology courses should have Industrial training as part of the curriculum. When this issue of industrial training was discussed it was found that it will be difficult to make industrial training compulsory for all students of all courses as it will be difficult to find placement for all the students. It is therefore now proposed that this training can be included in the curriculum as optional training for student who is willing to undertake such training on their own. The institutes will help them in getting placement or also providing them requisite documents which the student may need to get the placement.

Details:- Student can undergo training in related industries as guided by subject teachers / HOD.

- The training will be for four weeks duration in the summer vacation after the fourth semester examination is over.
- The student undergoing such training will have to submit a report of the training duly certified by the competent authority from the industry clearly indicating the achievements of the student during training. This submission is to be made after joining the institute for Fifth semester.
- The student completing this training will have to deliver a seminar on the training activities based on the report in the subject Professional Practices at Fifth Semester.
- The student undergoing this training will be exempted from attending activities under Professional Practices at Fifth semester except the seminar.
- The students who will not undergo such training will have to attend Professional Practices Classes/activities of fifth semester and will have to complete the tasks given during the semester under this head.
- There work will be evaluated on their submissions as per requirement and will be given marks out of 50. Or student may have to give seminar on training in Industry he attended.
- Institute shall encourage and guide students for Industry training.
- Evaluation:- Report of Training attended and delivery of seminar and actual experience in Industry will be evaluated in fifth semester under Profession Practices-III and marks will be given accordingly out of 50.

'G' Scheme

#### MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI ~~~`` Ū TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES **COURSE NAME : DIPLOMA IN FABRICATION TECHNOLOGY & ERECTION ENGINEERING COURSE CODE : FG DURATION OF COURSE : 6 SEMESTERS** WITH EFFECT FROM 2012-13 **SEMESTER : FOURTH DURATION : 16 WEEKS PATTERN : FULL TIME - SEMESTER SCHEME : G EXAMINATION SCHEME** TEACHING SUB SR. Abbrev SW **SCHEME TH** (1) **PR** (4) TW (9) SUBJECT TITLE **OR** (8) PAPER CODE NO iation (17400)HRS. TH TU PR Max Min Max Min Max Min Max Min EST 17401 50#\* Environmental Studies \$ 01 02 01 20 25@ 1 ---------10 2 Manufacturing Processes β MPR 17402 03 04 03 100 40 25# 10 50@ 20 ------Fluid Mechanics & Machinery β 02 03 25# 10 25@ 3 FMM 17411 04 --100 40 --10 --25# Welding Technology --02 4 WTE 17455 03 03 100 40 10 --25@ 10 50 \_\_\_ 5 **Fabrication Processes** FPR 17456 03 02 03 100 40 50# 20 25@ 10 ------**Processes Equipments** 04 02 03 6 PEO 17457 --100 40 25@ 10 --------7 **Professional Practices-II** PPS 17048 --03 50@ 20 -----------------18 17 550 125 TOTAL ----225 50 ------------Examination in 5<sup>th</sup> Semester Professional Practices-III \*\* **Industrial Training (Optional)** Student Contact Hours Per Week: 35 Hrs. THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH. Total Marks : 950 @ - Internal Assessment, # - External Assessment, No Theory Examination, - Common to all branches, $\beta$ - Common to ME / PG / PT/ MH / MI/FG

Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work.

\*\* Industrial Training (Optional) - Student can undergo Industrial Training of four weeks after fourth semester examination during summer vacation.

Assessment will be done in Fifth semester under Professional Practices-III. They will be exempted from activities of Professional Practices-III of 5<sup>th</sup> Semester.

- Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subjects is to be converted out of 50 marks as sessional work (SW).
- > Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.
- Code number for TH, PR, OR, TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.
- > For CAD software subject MSBTE decide the contents of the practical every year.

MSBTE - Final Copy Dt. 30/08/2013

**Course Name : All Branches of Diploma in Engineering & Technology** 

# Course Code : AE/CE/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG/AU

Semester : Fourth

Subject Title : Environmental Studies

Subject Code : 17401

**Teaching and Examination Scheme:** 

| Teac | ching Scl | heme | Examination Scheme |      |    |    |     |       |
|------|-----------|------|--------------------|------|----|----|-----|-------|
| TH   | TU        | PR   | PAPER<br>HRS       | TH   | PR | OR | TW  | TOTAL |
| 01   |           | 02   | 01                 | 50#* |    |    | 25@ | 75    |

#### **#\* - Online Theory Examination**

NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Environment essentially comprises of our living ambience, which gives us the zest and verve in all our activities. The turn of the twentieth century saw the gradual onset of its degradation by our callous deeds without any concern for the well being of our surrounding we are today facing a grave environmental crisis. The unceasing industrial growth and economic development of the last 300 years or so have resulted in huge ecological problems such as overexploitation of natural resources, degraded land, disappearing forests, endangered species, dangerous toxins, global warming etc.

It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

The curriculum covers the aspects about environment such as Environment and Ecology, Environmental impacts on human activities, Water resources and water quality, Mineral resources and mining, Forests, etc.

General Objectives: The student will be able to,

- 1. Understand importance of environment
- 2. Know key issues about environment
- 3. Understands the reasons for environment degradation
- 4. Know aspects about improvement methods
- 5. Know initiatives taken by the world bodies to restrict and reduce degradation

# **Learning Structure:**



# Theory:

| Topic and Contents                                                   | Hours | Marks |
|----------------------------------------------------------------------|-------|-------|
| Topic 1: Nature of Environmental Studies                             |       |       |
| Specific Objectives:                                                 |       |       |
| Define the terms related to Environmental Studies                    |       |       |
| State importance of awareness about environment in general           |       |       |
| public                                                               | 01    | 04    |
| Contents:                                                            |       |       |
| • Definition, Scope and Importance of the environmental studies      |       |       |
| <ul> <li>Importance of the studies irrespective of course</li> </ul> |       |       |
| Need for creating public awareness about environmental issues        |       |       |
| <b>Topic 2: Natural Resources and Associated Problems</b>            |       |       |
| Specific Objectives:                                                 |       |       |
| Define natural resources and identify problems associated with       |       |       |
| them                                                                 |       |       |
| Identify uses and their overexploitation                             |       |       |
| Identify alternate resources and their importance for environment    |       |       |
| Contents:                                                            |       |       |
| 2.1 Renewable and Non renewable resources                            |       |       |
| • Definition                                                         |       |       |
| Associated problems                                                  |       |       |
| 2.2 Forest Resources                                                 |       |       |
| General description of forest resources                              |       |       |
| <ul> <li>Functions and benefits of forest resources</li> </ul>       |       |       |
| • Effects on environment due to deforestation, Timber                |       |       |
| extraction, Building of dams, waterways etc.                         | 04    | 10    |
| 2.3 Water Resources                                                  | 04    | 10    |
| • Hydrosphere: Different sources of water                            |       |       |
| • Use and overexploitation of surface and ground water               |       |       |
| • Effect of floods, draught, dams etc. on water resources and        |       |       |
| community                                                            |       |       |
| 2.4 Mineral Resources:                                               |       |       |
| • Categories of mineral resources                                    |       |       |
| Basics of mining activities                                          |       |       |
| • Mine safety                                                        |       |       |
| • Effect of mining on environment                                    |       |       |
| 2.5 Food Resources:                                                  |       |       |
|                                                                      |       |       |
| • Food for all                                                       |       |       |
| • Effects of modern agriculture                                      |       |       |
| World food problem                                                   |       |       |
| Topic 3. Ecosystems                                                  |       |       |
| Concept of Ecosystem                                                 | 01    | 0.4   |
| • Structure and functions of ecosystem                               | 01    | 04    |
| • Energy flow in ecosystem                                           |       |       |
| Major ecosystems in the world                                        |       |       |

| Topic 4. Biodiversity and Its Conservation                                  |    |     |
|-----------------------------------------------------------------------------|----|-----|
| Definition of Biodiversity                                                  |    |     |
| Levels of biodiversity                                                      | 02 | 06  |
| • Value of biodiversity                                                     | 02 | 06  |
| Threats to biodiversity                                                     |    |     |
| Conservation of biodiversity                                                |    |     |
| <b>Topic 5. Environmental Pollution</b>                                     |    |     |
| • Definition                                                                |    |     |
| • Air pollution: Definition, Classification, sources, effects, prevention   | 02 | 0.9 |
| • Water Pollution: Definition, Classification, sources, effects, prevention | 03 | 08  |
| • Soil Pollution: Definition, sources, effects, prevention                  |    |     |
| • Noise Pollution: Definition, sources, effects, prevention                 |    |     |
| Topic 6. Social Issues and Environment                                      |    |     |
| Concept of development, sustainable development                             |    |     |
| • Water conservation, Watershed management, Rain water                      |    |     |
| harvesting: Definition, Methods and Benefits                                | 02 | 10  |
| • Climate Change, Global warming, Acid rain, Ozone Layer                    | 05 | 10  |
| Depletion, Nuclear Accidents and Holocaust: Basic concepts                  |    |     |
| and their effect on climate                                                 |    |     |
| <ul> <li>Concept of Carbon Credits and its advantages</li> </ul>            |    |     |
| <b>Topic 7. Environmental Protection</b>                                    |    |     |
| Brief description of the following acts and their provisions:               |    |     |
| Environmental Protection Act                                                |    |     |
| • Air (Prevention and Control of Pollution) Act                             |    |     |
| • Water (Prevention and Control of Pollution) Act                           | 02 | 08  |
| Wildlife Protection Act                                                     | 02 | 08  |
| Forest Conservation Act                                                     |    |     |
| Population Growth: Aspects, importance and effect on                        |    |     |
| environment                                                                 |    |     |
| Human Health and Human Rights                                               |    |     |
| Total                                                                       | 16 | 50  |

# Practical:

Skills to be developed:

#### **Intellectual Skills**:

- 1. Collection of information, data
- 2. Analysis of data
- 3. Report writing

#### **Motor Skills:**

- 1. Presentation Skills
- 2. Use of multi media

# **List of Projects:**

**Note:** Any one project of the following:

1. Visit to a local area to document environmental assets such as river / forest / grassland / hill / mountain

- 2. Visit to a local polluted site: Urban/Rural/Industrial/Agricultural
- 3. Study of common plants, insects, birds
- 4. Study of simple ecosystems of ponds, river, hill slopes etc

Prepare a project report on the findings of the visit illustrating environment related facts, analysis and conclusion. Also suggest remedies to improve environment.

#### Learning Resources: Books:

| Sr.<br>No. | Author                                                | Title                                        | Publisher               |  |  |
|------------|-------------------------------------------------------|----------------------------------------------|-------------------------|--|--|
| 01         | Anindita Basak                                        | Environmental Studies                        | Pearson Education       |  |  |
| 02         | R. Rajgopalan                                         | Environmental Studies<br>from Crises to Cure | Oxford University Press |  |  |
| 03         | Dr. R. J. Ranjit Daniels, Dr.<br>Jagdish Krishnaswamy | Environmental Studies                        | Wiley India             |  |  |

Course Name : Mechanical Engineering Group Course Code : ME/PG/PT/MH/MI/FE/FG Semester : Fourth Subject Title : Manufacturing Process Subject Code : 17402

### **Teaching and Examination Scheme**

| Teac | hing Sch | ieme | Examination Scheme |                  |     |  |     |     |  |
|------|----------|------|--------------------|------------------|-----|--|-----|-----|--|
| TH   | TU       | PR   | PAPER<br>HRS       | APER TH PR OR TW |     |  |     |     |  |
| 03   |          | 04   | 03                 | 100              | 25# |  | 50@ | 175 |  |

#### **Rationale:**

Diploma technician often comes across various types of basic manufacturing processes. He / she is required to select, operate and control the appropriate processes for specific applications. He / she is also required to know about various cutting tools, latest improvements in manufacturing processes. This is a core technology subject. The diploma technician should know how the raw material gets processed through various processes and ultimately results into finished goods.

Hence it is essential that, he has understanding of basic manufacturing processes, machines, tools and equipments. With sound knowledge of this subject, the diploma technician will be able to handle and control practical situations more effectively and confidently.

#### **Objectives:**

The student will be able to:

- 1) Use the basic machine tools like lathe and drilling.
- 2) Produce and inspect the job as per specified dimensions.
- 3) Select the specific manufacturing processes for the desired output.
- 4) Adopt safety practices while working on various machines.
- 5) Explain the different types of plastic moulding processes.
- 6) Select the basic manufacturing process for different components to be machined.

# **Learning Structure:**



# Theory:

| Topic and Content                                                                |          | Hours | Marks |
|----------------------------------------------------------------------------------|----------|-------|-------|
| 1:Forming Processes                                                              |          |       |       |
| Specific Objectives:                                                             |          |       |       |
| > To list basic manufacturing processes and write working princ                  | ipal     |       |       |
| of different manufacturing processes like Drop forging, Rolling                  | <u> </u> |       |       |
| and Extrusion                                                                    |          |       |       |
| > To identify and select proper manufacturing process for a spec                 | ific     |       |       |
| component                                                                        |          |       |       |
| Content                                                                          |          | 0.0   | 10    |
| 1.1 Drop forging: 06 Mark                                                        | s        | 08    | 18    |
| Upset forging, press forging(die forging), open die & closed die forging.        |          |       |       |
| forging operations                                                               |          |       |       |
| 1 2 Rolling. 06 Mark                                                             | S        |       |       |
| Principle of rolling hot & cold rolling Types of rolling mill application of     | s<br>of  |       |       |
| rolling                                                                          | 1        |       |       |
| 1 3 Extrusion 06 Mark                                                            | e.       |       |       |
| Direct & indirect extrusion Adventeges disadventeges and Applications            | 3        |       |       |
| Direct & indirect extrusion, Advantages, disadvantages and Applications.         |          |       |       |
| 2. Press working:                                                                |          |       |       |
| Specific Objectives:                                                             |          |       |       |
| F To define Press working machine principal                                      |          |       |       |
| > To state various classification of press machine.                              |          |       |       |
| To state different operations performed on press machine and                     |          |       | 1.0   |
| their p[practical applications                                                   |          | 08    | 16    |
| Content                                                                          |          |       |       |
| 2.1 Press classification, press operations like punching/piercing, blanking,     |          |       |       |
| notching, lancing 06 Mark                                                        | S        |       |       |
| 2.2 Die set components and types of dies 06 Marks                                | 5        |       |       |
| 2.3 Forming Operations: Bending, drawing 04 Marks                                | ;        |       |       |
| 3. Casting Processes:22 Mark                                                     | <b>S</b> |       |       |
| Specific Objectives:                                                             |          |       |       |
| To state different between pattern and model                                     |          |       |       |
| To list different types of pattern and their applications                        |          |       |       |
| To state various types of pattern allowances.                                    |          |       |       |
| To state various types of casting processes.                                     |          |       |       |
| Content                                                                          |          |       |       |
| 3.1 Pattern making: 06 Mark                                                      | s        |       |       |
| Basic steps in making casting, Pattern : types, materials and allowance          | s,       |       |       |
| tools, color coding of patterns                                                  |          | 10    | 22    |
| 3.2 Moulding: 06 Mark                                                            | S        | 10    | 22    |
| Types of moulding sands, properties of sand, moulding methods, cores             | 3        |       |       |
| and core prints, elements of gating system, bench moulding, floor                |          |       |       |
| moulding, pit moulding, machine moulding.                                        |          |       |       |
| 3.3 Casting: 06 Mark                                                             | S        |       |       |
| Furnaces: Construction and working of cupola furnace. electric arc               |          |       |       |
| furnace Methods & applications of - Centrifugal casting, shell                   |          |       |       |
| moulding, investment casting, Casting defects - Causes & remedies                |          |       |       |
| <b>3.4</b> Hot chamber and cold chamber die casting. Die casting defects - Cause | es &     |       |       |
| remedies <b>04 Mark</b>                                                          | 5 00     |       |       |
| 4 Welding                                                                        | ,        |       |       |
| Specific Objectives                                                              |          | 07    | 14    |
| breene objectives.                                                               |          |       |       |

| <ul> <li>To define Arc welding and Gas welding Principal.</li> <li>To state difference between soldering and brazing processes</li> </ul> |    |     |
|-------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
| Content                                                                                                                                   |    |     |
| 4.1 Introduction & classification of welding processes -                                                                                  |    |     |
| Gas welding, carbon arc welding, shielded metal arc welding, TIG                                                                          |    |     |
| welding, MIG welding, plasma arc welding, resistance welding types-                                                                       |    |     |
| spot, seam projection. Electron beam welding, laser beam welding.                                                                         |    |     |
| welding defects. <b>10 Marks</b>                                                                                                          |    |     |
| 4.2 Introduction to soldering and brazing –                                                                                               |    |     |
| Process, fillers, heating methods & applications. 04 Marks                                                                                |    |     |
| 5. Machining Operations                                                                                                                   |    |     |
| Specific Objectives:                                                                                                                      |    |     |
| > To state the working principal of lathe and drilling machines.                                                                          |    |     |
| > To list out various operations performed on lathe and drilling                                                                          |    |     |
| machines                                                                                                                                  |    |     |
| Content                                                                                                                                   |    |     |
| 5.1 Lathe Machine: 12 Marks                                                                                                               |    |     |
| Introduction, classification and basic parts of center lathe & their                                                                      | 10 | 20  |
| functions, Lathe operations like facing, plain turning, taper turning, thread                                                             | 10 | 20  |
| cutting, chamfering, grooving, knurling. Cutting tool nomenclature & tool                                                                 |    |     |
| signature, cutting parameters.                                                                                                            |    |     |
| 5.2 Drilling Machine: 08 Marks                                                                                                            |    |     |
| Introduction, classification, basic parts of radial drilling machine and their                                                            |    |     |
| functions, twist drill nomenclature, drilling machine operations like                                                                     |    |     |
| drilling, reaming, boring, counter sinking, counter boring, spot facing.                                                                  |    |     |
| Cutting parameters.                                                                                                                       |    |     |
| 6. Plastic Moulding:                                                                                                                      |    |     |
| Specific Objectives:                                                                                                                      |    |     |
| To state different properties of plastics                                                                                                 |    |     |
| To explain various plastic mauling methods like Injection, blow,                                                                          |    |     |
| compression molding                                                                                                                       | 05 | 10  |
| Content                                                                                                                                   |    |     |
| Introduction, Properties of plastics, types of plastics, plastic moulding                                                                 |    |     |
| methods - compression moulding, injection moulding, blow moulding,                                                                        |    |     |
| extrusion, vacuum forming and calendaring.                                                                                                |    |     |
| Total                                                                                                                                     | 48 | 100 |

# **Practical:**

Skills to be developed:

# Intellectual skills:

- 1) Identify basic manufacturing processes like forging, rolling and extrusion, for required component.
- 2) Specify need of pattern allowances.
- 3) Decide process parameters for different operations.
- 4) Decide tools required for a manufacturing process.
- 5) Identify a joining method for fabrication.

#### **Motor Skills:**

1) Operate lathe, drilling machine.

- 2) Set the tool and select the cutting parameters for machining operations.
- 3) Set the tools, job and decide cutting parameters.
- 4) Inspect various dimensions of jobs by using measuring instruments.
- 5) Make simple wooden / thermocole pattern.

# List of Practical:

- 1) One turning job on lathe containing the operations like plain turning, step turning, taper turning, grooving, knurling and chamfering.
- 2) One job using Spot welding machine. (Min. 4 spots on 0.5-1mm thick metal strip.)
- 3) One simple job on TIG / MIG welding setup or visit to TIG / MIG welding shop.
- 4) Moulding practice for any one pattern.
- 5) Industrial visit to observe plastic processing shop and report on the visit.
- 6) One composite job containing the operations like lathe with axial & across drilling (like Nut- Bolt assembly or any other equivalent job).
- 7) Demonstration of eccentric turning using four jaw chuck.

#### Notes:

- 1] The workshop instructors should prepare specimen job in each shop as demonstration practice before the student (as per the drawing given by subject teacher/ workshop superintendent).
- 2] Theory behind practical is to be covered by the concerned subject teacher/ workshop superintendent.
- 3] Workshop diary should be maintained by each student duly signed by respective shop instructors.
- 4] Assignments are to be assessed by the concerned subject teacher/ workshop superintendent.

# **Guidelines for conducting Practical Examination for MANUFACTURING PROCESSES**

- 1. The job drawing must be jointly decided by the External and Internal examiner prior to one day in advance from the commencement of practical examination. Every student should be supplied the copy of job drawing before examination.
- 2. Time for practical examination should be **THREE HOURS.**
- 3. Practical examination of the students shall consists of Turning job containing different operations like Facing, straight Turning, Taper turning, Chamfering, Knurling, Threading, Grooving. (Minimum 5 operations) Students will perform the job as per the drawing provided to them.
- 4. Raw material size Bar dia. 40 to 50 mm, length 80 to 100 mm.

# Learning Resources:

Books:

| Sr.<br>No. | Author                              | Title                                            | Publisher                                 |
|------------|-------------------------------------|--------------------------------------------------|-------------------------------------------|
| 01         | S. K. Hajra Chaudhary,<br>Bose, Roy | Elements of workshop<br>Technology-Volume I & II | Media Promoters and<br>Publishers Limited |
| 02         | O. P. Khanna & Lal                  | Production Technology<br>Volume- I & II          | Production Technology<br>Volume- I & II   |

#### w.e.f Academic Year 2012-13

### 'G' Scheme

|    |                                   |                                         | Dhanpat Rai Publications |
|----|-----------------------------------|-----------------------------------------|--------------------------|
| 03 | W. A. J. Chapman, S. J.<br>Martin | W. A. J. Chapman, S. J.<br>Volume –I,II | Viva Books (p) Ltd.      |
| 04 | O.P. Khanna                       | A text book of Foundry Tech.            | Dhanpat Rai Publications |
| 05 | H.S. Bawa                         | Workshop Technology<br>Volume- I & II   | Tata McGraw-Hill         |
| 06 | P.C. Sharma                       | Production Engineering                  | S. Chand Publications    |

Course Name : Mechanical Engineering GroupCourse Code : ME/MH/MI/PG/PT/FE/FGSemester : FourthSubject Title : Fluid Mechanics and MachinerySubject Code : 17411

# **Teaching and Examination Scheme:**

| Teac | hing Scl | neme | Examination Scheme |     |     |    |     |       |
|------|----------|------|--------------------|-----|-----|----|-----|-------|
| TH   | TU       | PR   | PAPER<br>HRS       | TH  | PR  | OR | TW  | TOTAL |
| 04   |          | 02   | 03                 | 100 | 25# |    | 25@ | 150   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Knowledge of fluid properties, fluid flow & fluid machinery is essential in all fields of engineering. Hydraulic machines have important role in water supply, irrigation, power generation and also in most of the engineering segments. This subject requires knowledge of basic engineering sciences, applied mechanics, mathematics etc. The fundamentals of this subject are essential for the subject "Industrial Fluid Power" in sixth semester.

General Objectives: The student will be able to

- 1) Define various properties of fluids
- 2) Measure pressure, velocity and flow rate using various instruments.
- 3) State continuity equation, Bernoulli's equation and its applications.
- 4) Estimate various losses in flow through pipes.
- 5) Explain concept of impact of jet on various types of vanes.
- 6) Draw the construction, working of hydraulic pumps and turbines.
- 7) Evaluate performance of turbines and pumps.



# Theory:

| Topics and Contents                                                                                                                               | Hours | Marks |
|---------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
| 1. Properties of fluid and Fluid Pressure                                                                                                         |       |       |
| Specific Objectives:                                                                                                                              |       |       |
| Define fluid properties.                                                                                                                          |       |       |
| Differentiate between fluid pressure intensity and pressure head.                                                                                 |       |       |
| Solve numerical related to properties of fluid, fluid pressure and                                                                                |       |       |
| manometers.                                                                                                                                       |       |       |
| Contents:                                                                                                                                         |       |       |
| 1.1 Properties of Fluid 06 Marks                                                                                                                  |       |       |
| Density, Specific gravity, Specific volume, Specific Weight, Dynamic                                                                              |       |       |
| viscosity, Kinematic viscosity, Surface tension, Capillarity, Vapour                                                                              | 12    | 20    |
| Pressure, Compressibility                                                                                                                         |       |       |
| 1.2: Fluid Pressure & Pressure Measurement14 Marks                                                                                                |       |       |
| Fluid pressure, Pressure head, Pressure intensity                                                                                                 |       |       |
| • Conceptof absolute vacuum, gauge pressure, atmospheric pressure,                                                                                |       |       |
| absolute pressure.                                                                                                                                |       |       |
| • Simple and differential manometers, Bourden pressure gauge.                                                                                     |       |       |
| • Total pressure, center of pressure- regular surface forces on                                                                                   |       |       |
| immersed bodies in liquid in horizontal, vertical and inclined                                                                                    |       |       |
| position                                                                                                                                          |       |       |
| 2. Fluid Flow                                                                                                                                     |       |       |
| Specific Objectives:                                                                                                                              |       |       |
| State Bernoulli's theorem and apply it to venturimeter, orifice and pitot                                                                         |       |       |
| tube.                                                                                                                                             |       |       |
| Contents:                                                                                                                                         |       |       |
| • Types of fluid flows-Laminar, turbulent, steady, unsteady, uniform,                                                                             |       |       |
| non uniform, rotational, irrotational.                                                                                                            | 10    | 14    |
| • Continuity equation, Bernoulli's theorem                                                                                                        | 10    |       |
| • Venturimeter – Construction, principle of working,                                                                                              |       |       |
| coefficient of discharge, Derivation for discharge through                                                                                        |       |       |
| venturimeter.                                                                                                                                     |       |       |
| • Orifice meter – Construction, Principle of working, hydraulic                                                                                   |       |       |
| coefficients. Derivation for discharge through Orifice meter                                                                                      |       |       |
| Pitot tube – Construction, Principle of Working                                                                                                   |       |       |
| 3. Flow Through Pipes                                                                                                                             |       |       |
| Specific Objectives:                                                                                                                              |       |       |
| State laws of friction and list various losses in flow through pipes. Solve numerical on laws of friction and list various losses in flow through |       |       |
| Solve numerical on laws of metion and list various losses in now unough<br>pipes                                                                  |       |       |
| pipes.<br>Contents:                                                                                                                               |       |       |
| • Laws of fluid friction (Laminar and turbulant)                                                                                                  | 10    | 14    |
| <ul> <li>Laws of huld friction (Laminar and turbulent)</li> <li>Denergy's sequetion and Cherry's sequetion for frictional losses</li> </ul>       |       |       |
| Miner lesses in fittings and valves                                                                                                               |       |       |
| • Winfor fosses in fittings and varves                                                                                                            |       |       |
| • Hydraulic gradient line and total energy line                                                                                                   |       |       |
| • Hydraulic power transmission through pipe                                                                                                       |       |       |
| 4. Impact of Jets                                                                                                                                 |       |       |
| Specific Objectives:                                                                                                                              | 06    | 10    |
| > Analyze explain the impact of jet on vanes in various conditions.                                                                               |       |       |

| Solve numerical on impact of jet on vanes in various conditions.                                                                           |     |     |
|--------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|
| Contents:                                                                                                                                  |     |     |
| <ul> <li>Impact of jet on fixed vertical, moving vertical flat plates.</li> </ul>                                                          |     |     |
| • Impact of jet on curved vanes with special reference to turbines and                                                                     |     |     |
| pumps                                                                                                                                      |     |     |
| 5. Hydraulic Turbines                                                                                                                      |     |     |
| Specific Objectives:                                                                                                                       |     |     |
| Explain working principle of various hydraulic turbines.                                                                                   |     |     |
| Calculate work done, power generated and various efficiencies of hydraulic                                                                 |     |     |
| turbines.                                                                                                                                  |     |     |
| Contents:                                                                                                                                  |     |     |
| • Layout and features of hydroelectric power plant, surge tanks and its                                                                    |     |     |
| need.                                                                                                                                      | 12  | 18  |
| • Classification of hydraulic turbines and their applications.                                                                             |     |     |
| • Construction and working principle of Pelton wheel, Francis and                                                                          |     |     |
| Kaplan turbine.                                                                                                                            |     |     |
| • Draft tubes – types and construction. Concept of cavitation in                                                                           |     |     |
| turbines                                                                                                                                   |     |     |
| <ul> <li>Calculation of Work done Power efficiency of turbine</li> </ul>                                                                   |     |     |
| 6 Pumps                                                                                                                                    |     |     |
| Specific Objectives:                                                                                                                       |     |     |
| Explain working of centrifugal reciprocating and multistage numps                                                                          |     |     |
| <ul> <li>Explain working of continugui, reciprocuting and manistage pumps.</li> <li>Explain the concept of cavitation in pumps.</li> </ul> |     |     |
| <ul> <li>Calculate manometric head, work done and various efficiencies related to</li> </ul>                                               |     |     |
| the numps                                                                                                                                  |     |     |
| <ul> <li>Select the number of a given application</li> </ul>                                                                               |     |     |
| 6 1 Centrifugal Pumps 13 a given appreadon. 14 Marks                                                                                       |     |     |
| Contents.                                                                                                                                  |     |     |
| • Construction principle of working priming methods and Cavitation                                                                         |     |     |
| <ul> <li>Types of cosings and impollers</li> </ul>                                                                                         |     |     |
| <ul> <li>Types of casings and imperiors.</li> <li>Manometric head, Work done, Manometric officiency, Overall</li> </ul>                    |     |     |
| • Manometric nead, work done, Manometric efficiency, Overan                                                                                | 14  | 24  |
| Derformance Characteristics of Contrifugal numps                                                                                           |     |     |
| • Ferrormance Characteristics of Centinugal pullips.                                                                                       |     |     |
| • Trouble Shooting.                                                                                                                        |     |     |
| • Construction, working and applications multistage pumps                                                                                  |     |     |
| • Submersible pumps and jet pump                                                                                                           |     |     |
| 6.2 Reciprocating Pump 10 Marks                                                                                                            |     |     |
| • Construction, working principle and applications of single and                                                                           |     |     |
| double acting recipiocating pumps.                                                                                                         |     |     |
| • Sup, Negative sup, Cavitation and separation.                                                                                            |     |     |
| • Use of Air Vessels.                                                                                                                      |     |     |
| • Indicator diagram with effect of acceleration head & frictional head.                                                                    |     |     |
| (No numerical on reciprocating pumps)                                                                                                      | ~ 4 | 400 |
| Total                                                                                                                                      | 64  | 100 |

### Practical: Skills to be developed: Intellectual Skills:

- 1. Select appropriate flow and pressure measuring devices for a given situation.
- 2. Analyze the performance of pumps and turbines.

#### **Motor Skills:**

- 1. Use flow and pressure measuring devices.
- 2. Operate pumps and turbines.

#### **List of Practicals:**

- 1. Measure water pressure by using Bourdon's pressure gauge and U-tube Manometer. Also measure discharge of water by using measuring tank and stop watch.
- 2. Calibrate Bourdon's pressure gauge with the help of Dead weight pressure gauge.
- 3. Verify Bernoulli's theorem.
- 4. Determine Coefficient of Discharge of Venturimeter.
- 5. Determine coefficient of Discharge, Coefficient of Contraction and Coefficient of Velocity of Sharp edged circular orifice.
- 6. Determine Darcy's friction factor 'f' in pipes of three different diameters for four different discharges.
- 7. Determine minor frictional losses in pipe fittings.
- 8. Determine overall efficiency of Pelton wheel by using Pelton wheel test rig.
- 9. Determine overall efficiency of Centrifugal Pump & plot its operating characteristics by using Centrifugal pump test rig.
- 10. Determine overall efficiency of Reciprocating pump by using Reciprocating Pump test rig.

#### Assignments

1. Information collection of Centrifugal, reciprocating, multistage pumps and submersible pumps from local market and from internet. Comparison of various models manufactured by different manufacturers. [The market survey is to be completed in a group of (max.) three to four students and the report of the same is to be included as part of term work.]

#### Learning Resources: 1. Books:

| Sr.<br>No | Author                                           | Title                                                                         | Publication                      |  |  |  |  |
|-----------|--------------------------------------------------|-------------------------------------------------------------------------------|----------------------------------|--|--|--|--|
| 01        | Ojha, Berndtsson,<br>Chnadramouli                | Fluid Mechanics and Machinery                                                 | Oxford University Press          |  |  |  |  |
| 02        | Som S K , Biswas G.                              | Introduction to Fluid Mechanics<br>and Fluid Machines 3 <sup>rd</sup> Edition | Tata McGraw-Hill Co.<br>Ltd.     |  |  |  |  |
| 03        | Modi P.N. Seth<br>S M                            | Hydraulics and Fluid Mechanics<br>including Hydraulic Machines                | Standard Book House<br>New Delhi |  |  |  |  |
| 04        | Subramanya K.                                    | Fluid Mechanics and Hydraulic<br>Machines: problems and solution              | Tata McGraw-Hill Co.<br>Ltd.     |  |  |  |  |
| 05        | Product catalogues of various pump manufacturers |                                                                               |                                  |  |  |  |  |

**Course Name : Diploma in Fabrication Technology & Erection Engineering** 

Course Code: FE/FGSemester: FourthSubject Title: Welding Technology

Subject Code : 17455

# **Teaching and Examination Scheme:**

| Teac | ching Scł | neme | Examination Scheme |     |     |    |     |       |
|------|-----------|------|--------------------|-----|-----|----|-----|-------|
| TH   | TU        | PR   | PAPER<br>HRS       | TH  | PR  | OR | TW  | TOTAL |
| 03   |           | 02   | 03                 | 100 | 25# |    | 25@ | 150   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

To teach students to understand facts concepts principles and procedures of gas and arc welding, brazing, soldering.

# **Objectives:**

#### The student will be able to:

- 1. Make student familiar with gas welding process.
- 2. Understand phenomenon of manual metal arc welding.
- 3. Describe and use the welding arc & metal transfer mechanism.
- 4. Identify weld defects.
- 5. Use the knowledge of joint design and weld metallurgy
- 6. Compare various metal joining processes welding, brazing & soldering.

#### **Learning Structure:**



# **Details:** Contents

| Chapter | Description                                                        | Marks      | Hours |
|---------|--------------------------------------------------------------------|------------|-------|
|         | Gas Welding                                                        |            |       |
| 1       | Theory                                                             |            |       |
|         | • Types of joints and terminology & symbols of welding             |            |       |
|         | • Definition of gas welding.                                       |            |       |
|         | • Oxy acetylene welding.                                           |            | 0.0   |
|         | • Types of welding flames.                                         | 16         | 08    |
|         | • Gas welding equipment.                                           |            |       |
|         | • Gas welding techniques.                                          |            |       |
|         | • Advantages & limitations of gas welding.                         |            |       |
|         | • Filler metals and fluxes                                         |            |       |
|         | Manual Metal Arc Welding                                           |            |       |
|         | Theory                                                             |            |       |
|         | • Electric arc definition                                          |            |       |
|         | • Arc structure & mechanism, arc characteristics, arc stability,   |            |       |
|         | arc blow                                                           |            |       |
|         | • Metal transfer mechanism-Free flight type, short circuit type    |            |       |
|         | pulse transfer type                                                |            |       |
|         | • Arc welding power sources both D.C. & A.C.                       |            |       |
|         | • Factor affecting 7 selection of power sources                    |            |       |
|         | • Polarity, current voltage, electrical travel, arc length         |            |       |
| 2       | Positions flat, horizontal vertical overhead                       | 24         | 18    |
|         | • Electrodes sizes, composition, coating, classification & coding, |            |       |
|         | manufacturing of electrodes, care & storage of electrodes          |            |       |
|         |                                                                    |            |       |
|         | Practice:                                                          |            |       |
|         | Straight line deposition - down hand                               |            |       |
|         | But welding - down hand                                            |            |       |
|         | • T-joint - down hand                                              |            |       |
|         | Straight-line deposition - Vertical                                |            |       |
|         | But welding - Vertical                                             |            |       |
|         | T-joint - Vertical                                                 |            |       |
|         | Welding of Different Metals                                        |            |       |
|         | Theory                                                             |            |       |
|         | • Weldability and factors affecting it.                            |            |       |
|         | • Welding of mild steel & iron- processes used & explanation of    |            |       |
| 2       | metal arc welding.                                                 | •          |       |
| 3       | • Welding of cast iron- processes used & explanation of metal      | 20         | 08    |
|         | arc welding.                                                       |            |       |
|         | • Welding of alloy steels, stainless steels- processes used &      |            |       |
|         | Welding of eluminum & other new fermine metals                     |            |       |
|         | • weiding of aluminum & other non-terrous metals - processes       |            |       |
|         | Welding Metallurgy & Weld Defects                                  |            |       |
|         | Theory:                                                            |            |       |
| 4       | <ul> <li>Solidification of metals in welding</li> </ul>            | 24         | 08    |
| г       | • Heat affected zone and structure of weld metal for MS            | <b>~</b> T | 00    |
|         | Copper, and Aluminum etc.                                          |            |       |

|   | <ul> <li>Heat treatment used in welding.</li> </ul>             |     |    |
|---|-----------------------------------------------------------------|-----|----|
|   | <ul> <li>Weld defects.</li> </ul>                               |     |    |
|   | ✓ Types of defects & their causes                               |     |    |
|   | ✓ Remedial Procedures                                           |     |    |
|   | Brazing & Soldering                                             |     |    |
|   | Theory:                                                         |     |    |
|   | Definition of brazing & soldering                               |     |    |
|   | • Difference between brazing, soldering, welding                |     |    |
|   | Principle of brazing                                            |     |    |
| 5 | • Filler metals, joint preparation & design                     | 16  | 06 |
|   | • application & limitations                                     |     |    |
|   | • Processes, torch, furnace, vacuum, induction Dip. Resistance, |     |    |
|   | carbon arc etc. of brazing.                                     |     |    |
|   | Principle of soldering                                          |     |    |
|   | • Soldering joint & design.                                     |     |    |
|   | Total                                                           | 100 | 48 |

# **Practicals:**

# Skill to be developed Intellectual Skill:

- 1. Identify the joining methods of welding
- 2. Understand welding of different materials
- 3. Specify different arc welding parameters.

# Moral Skill:

- 1. Edge preparation for making the welding joint
- 2. Cleaning of edges.
- 3. Use welding machine & equipment.
- 4. Set the tool, job & decide parameter of machines.
- 5. Inspect the dimensions of the job using measuring instruments
- 6. Evaluation of weld quality

# Learning Resources:

**Books:** 

| Author               | Title                           | Edition | Year of<br>Publication | Publisher &<br>Address |
|----------------------|---------------------------------|---------|------------------------|------------------------|
| O.P. Khanna          | Welding Technology              |         | 1994                   | Dhanpatrai & Sons      |
| L. Little            | Welding & Welding<br>Technology | 10th    | 1986                   | TMC, New Delhi         |
| Agarwal &<br>Maghani | Welding Engineering             |         |                        |                        |

**Course Name : Diploma in Fabrication Technology & Erection Engineering** 

Course Code: FE/FGSemester: FourthSubject Title: Fabrication Process

Subject Code : 17456

# **Teaching and Examination Scheme:**

| Teac | ching Scl | neme | Examination Scheme |     |     |    |     |       |
|------|-----------|------|--------------------|-----|-----|----|-----|-------|
| TH   | TU        | PR   | PAPER<br>HRS       | TH  | PR  | OR | TW  | TOTAL |
| 03   |           | 02   | 03                 | 100 | 50# |    | 25@ | 175   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

This subject will help the students to know the basic requirements of fabrication & the orderly sequence in which a component is prepared for fabrication.

#### **Objectives:**

The student will be able to:

- Know basic marking / measuring processes. Identify & select various marking / measuring tools in sheet metal shops.
- To know the methods used for straightening & stiffening in sheet metal works.
- To know recent trends of materials in fabrication.
- To know the layout employed for fabrication processes.
- To know importance of surface cleaning prior to coating.

#### **Learning Structure:**



# **THEORY:**

| Topic and Contents                                                     | Marks | Hours |
|------------------------------------------------------------------------|-------|-------|
| 1. Measurement                                                         |       |       |
| Introduction 04 Marks                                                  |       |       |
| 1. Definition and meaning of :                                         |       |       |
| Quantity, measurement, metrology, measure                              |       |       |
| Precision & accuracy,                                                  |       |       |
| Repeatability,                                                         |       |       |
| Calibration,                                                           |       |       |
| Sensitivity & readability                                              |       |       |
| 2. Sources of error                                                    |       |       |
| 3. Classification of measurements                                      |       |       |
| Standards of measurements 04 Marks                                     |       |       |
| 1. Introduction to standards                                           |       |       |
| 2. Line standard                                                       |       |       |
| 3. End standard                                                        |       |       |
| 4. Angular standard                                                    |       |       |
| Marking process 16Marks                                                |       |       |
| 1. Tools used in marking                                               |       |       |
| 2. Marking methods for large size plates                               |       |       |
| 3. Use of chalk line for marking long straight line                    |       |       |
| 4. Shop method of drawing an ellipse                                   |       |       |
| 5. Plotting ellipse using trammels                                     |       |       |
| 6. Shop method of drawing a circle                                     |       |       |
| 7. Method of marking out bolt holes for flanges                        |       |       |
| 8. Marking out a bracket from a datum surface                          |       |       |
| 9. Procedure for marking out instrument panel                          |       |       |
| 10. Marking of holes in angle sections, channel sections, T- sections, |       |       |
| columns and beams                                                      | 48    | 28    |
| Instruments for datum measurements 04 Marks                            |       |       |
| 1. Vertical datum- plumb line                                          |       |       |
| 2. Horizontal datum- spirit level                                      |       |       |
| 3. Alignment testing- use of tensioned wire, surveyor's level          |       |       |
| Geometric shape 08 Marks                                               |       |       |
| 1. Straightness testing- straight edge method, spirit level method     |       |       |
| 2. Flatness testing- comparison with flat circles, use of spirit level |       |       |
| 3. Squareness testing- engineer's square, block square                 |       |       |
| 4. Roundness measurement – Diametral, circumferential confining        |       |       |
| gauge, rotating on centres, assessment using a V-block, roundness      |       |       |
| measuring machine                                                      |       |       |
| Templates 12 Marks                                                     |       |       |
| 1. The need of templates                                               |       |       |
| 2. Materials used for templates                                        |       |       |
| 3. Information given on templates                                      |       |       |
| 4. Use of templates                                                    |       |       |
| <ul> <li>Templates for setting out sheet metal fabrications</li> </ul> |       |       |
| Templates for hopper plates                                            |       |       |
| Box templates                                                          |       |       |
| Steel templates (ordinary and bushed)                                  |       |       |
| 5. Templates as means of checking                                      |       |       |
| 6. Templates as a means of marking hole positions                      |       |       |

| 7. Templates as means of to provide an economical arrangement of |     |     |
|------------------------------------------------------------------|-----|-----|
| layout for press-work                                            |     |     |
| 8. Templates as a guide for cutting processes                    |     |     |
| 9. Protection and storage of templates and tools                 |     |     |
| 10. Comparison of methods of direct marking and use of templates |     |     |
| 2. Straightening Methods                                         |     |     |
| Mechanical straightening                                         |     |     |
| 1. Manual                                                        |     |     |
| 2. Machine straightening                                         |     |     |
|                                                                  | 08  | 04  |
| Thermal methods                                                  |     |     |
| 1. Hot shrinking                                                 |     |     |
| 2. Use of heat strips                                            |     |     |
| 3. Use of heat triangles                                         |     |     |
| 4. Principle of hot straightening for structural sections        |     |     |
| 3. Stiffening of Fabricated Material                             |     |     |
| Methods of stiffening sheet metal                                |     |     |
| Reasons for stiffening                                           |     |     |
| Stiffening of large panels                                       | 12  | 04  |
| 1. Use of applied stiffeners                                     |     |     |
| 2. Use of angle stiffeners                                       |     |     |
| Need for web stiffeners                                          |     |     |
| 4. Composite Materials in Fabrication                            |     |     |
| Introduction to composite material                               |     |     |
| Classification of composites                                     |     |     |
| Composition of composites                                        | 08  | 04  |
| Processing of composites                                         |     |     |
| Joining of composites                                            |     |     |
| Applications                                                     |     |     |
| 5. Surface Cleaning                                              |     |     |
| Introduction                                                     |     |     |
| Need for coating & cleaning                                      |     |     |
| Methods of surface cleaning                                      | 12  | 04  |
| 1. Chemical method                                               | 12  | 01  |
| 2. Mechanical method                                             |     |     |
| 3. Thermal method                                                |     |     |
| 4. Dry method                                                    |     |     |
| 6. Factory / Workshop Layout                                     |     |     |
| Introduction                                                     |     |     |
| Definition of Factory layout                                     |     |     |
| Importance of layout                                             | 10  | 0.4 |
| Essentials of layout                                             | 12  | 04  |
| Types of layout                                                  |     |     |
| Factors influencing layout                                       |     |     |
| Dynamics plant layout                                            |     |     |
| Examples                                                         | 100 | 40  |
| I Otal                                                           | 100 | 40  |

# Practical:

# Skill to be developed;

# Intellectual skills

- 1. Ability to read job drawings.
- 2. Ability to identify & select proper material & tools for marking / measuring.

# Motor skills

- 1. Ability to set work piece for measurement on measuring instruments / devices.
- 2. Ability to inspect the job for confirming desired dimensions and shape.
- 3. Ability to recognize errors from mistakes and take remedial actions.

# **Practicals**:

# **1.** Demonstration and use of :

- Vernier calliper,
- Micrometer screw gauge,
- Vernier height gauge,
- Vernier depth gauge,
- Feeler gauge, radius gauge & screw pitch gauge
- Slip gauges,
- Universal Bevel Protractor,
- Sine bar
- Angle gauges,

# 2. Study of Engineer's rule,

3. Study of Steel rule and tape (Layout preparation)

#### Learning Resources: Books:

| Sr.<br>No. | Author                    | Title                                 | Publisher & Address      |  |  |
|------------|---------------------------|---------------------------------------|--------------------------|--|--|
| 1          | Kadam Manish J            | Metrology & Quality Control           | Everest Pub. House       |  |  |
| 2          | Hume K.J.<br>Sharp G.H.   | Practical Metrology                   | ELBS Macdonald & company |  |  |
| 3          | R. K. Jain                | Metrology                             | Khanna Publications      |  |  |
| 4          | Kenyon W. Pitman          | Basic welding and fabrication         | Pitman Pub. Ltd.         |  |  |
| 5          | F.J. M. Smith/<br>Longman | Basic fabrication and welding<br>Engg | Longman Craft Studies.   |  |  |

'G' Scheme

**Course Name : Diploma in Fabrication Technology & Erection Engineering** 

Course Code: FE/FGSemester: FourthSubject Title: Process Equipment

Subject Code : 17457

# **Teaching and Examination Scheme**

| Teaching Scheme |    |    |              | Examinati | on Scheme |    |     |       |
|-----------------|----|----|--------------|-----------|-----------|----|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH        | PR        | OR | TW  | TOTAL |
| 04              |    | 02 | 03           | 100       |           |    | 25@ | 125   |

# **Rationale:**

It is intended that the students understand facts, concepts regarding construction and working of process equipment used in the fabrication industry.

Objectives: The students will be able to-

- 1. Learn pressure vessel terminology.
- 2. Study design loads on process equipments.
- 3. Find stresses / thickness of vessels & dished ends.
- 4. Study of supports.
- 5. Design the process equipment.
- 6. Study & decide the materials & welding processes used in pressure vessel construction.

# Learning Structure:


#### **Theory:**

| Topic and Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Marks | Hrs. |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|
| Pressure Vessels                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 12    | 08   |
| Introduction, types, accessories & mountings, terminology.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 12    | 08   |
| Design of Pressure Vessels                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |      |
| Introduction, design approach, design pressure design temperature, dead load,<br>wind load, piping load, earthquake loads, and combination of design loads,<br>allowable stress range, general design criterion, stresses in ring, cylinder,<br>sphere, poisson ratio, dilation of pressure vessels, membrane stress, thick<br>cylinder, thick sphere, intersecting sphere, thermal stresses, ultra high<br>pressure vessel , multishell construction, discontinuity stresses in vessels,<br>stresses in bi-metallic joints, deformation and stresses in flanges and flanged<br>joints, gaskets, reinforced circular plates, stacked plates and built up plates. | 24    | 16   |
| Membrane Stress Analysis in Various Parts of Vessels                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |      |
| Cylindrical shell, spherical shell, hemispherical heads, semi ellipsoidal heads,<br>torispherical heads, conical heads (simple problems)<br>Supports skirts, support legs, support lugs, anchor bolts, saddles, stiffeners.<br>Design for thickness; shell, dish ends, nozzles, flanges, bolt size & numbers,<br>dilation & ligament efficiency.                                                                                                                                                                                                                                                                                                                 | 24    | 16   |
| Design Construction Features                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |      |
| Stress concentrations, Nozzle reinforcement, placement and shape, fatique concentration, stresses concentration in circular and elliptical opening.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 16    | 08   |
| Weld Design (Theory only)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |      |
| Introduction, groove welds, fillet welds, plug weld, defects in welds, NDT of welds, stress concentration factors, welding processes, welding symbols, welded joints, bolted joints, vessel supports and attachments, gaskets.                                                                                                                                                                                                                                                                                                                                                                                                                                   | 12    | 06   |
| Construction Materials                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |      |
| General considerations, Non corrosive service, ferrous and non ferrous materials for corrosive service, bolting material, selection of material for hydrogen service, aluminum alloys, stainless steels, method of attaching protective layers.                                                                                                                                                                                                                                                                                                                                                                                                                  | 12    | 10   |
| Note: Derivation / Proof of any formula is not expected                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |      |
| TOTAL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 100   | 64   |

## Assignments:

Eight assignments based on above theory content. Details of the assignments be written

## **Implementation Strategies:**

The subject matter will be taught as per the teaching scheme for Theory and practical. The subject teacher will prepare and provide learning material/handout for supplementing/ complementing classroom instructions.

## References: Books:

| Author               | Title                                 | Edition | Year of<br>Publication | Publisher & Address               |
|----------------------|---------------------------------------|---------|------------------------|-----------------------------------|
| Henry H.             | Pressure Vessel design                |         |                        |                                   |
| Bednar               | handbook                              |         |                        |                                   |
| John F. Harvey       | Theory and design of pressure vessel  | 1st     | 1987                   | C.B.S. Pub. Delhi                 |
| Eugene F.<br>Megyesy | Pressure Vessel<br>Handbook           |         | 1992                   | Press Vessel Handbook<br>Pub. Cl. |
|                      | ASME Boiler & Pressure<br>Vessel Code |         | 1992                   | ASME, New York                    |
|                      | Boiler & Pressure Vessel<br>Code      |         | 1980                   | ASME, USA                         |
|                      | Unfired Pressure Vessels              |         | 1946                   | ASME, New York                    |
| Joshi &<br>Mahajan   | Process Equipment<br>Design           |         | 1996                   | Macmillan, New Delhi.             |

## Course Name : Diploma in Fabrication Technology & Erection Engineering

Course Code : FE/FG Semester : Fourth Subject Title : Professional Practices-II Subject Code : **17048** 

## **Teaching and Examination Scheme:**

| Teac | ching Scł | neme | Examination Scheme |    |    |    |     |       |  |
|------|-----------|------|--------------------|----|----|----|-----|-------|--|
| TH   | TU        | PR   | PAPER<br>HRS       | TH | PR | OR | TW  | TOTAL |  |
|      |           | 03   |                    |    |    |    | 50@ | 50    |  |

## **Rationale:**

The purpose of introducing Professional practices is to fulfill the need of students to stand in today's global market with knowledge and confidence. This can be achieved by arranging industrial visits, expert lectures attitude to present them-selves, get alternative solutions and validation of the selected alternatives, socially relevant activities, and modular courses. Professional Practices is helpful in broadening technology base of students beyond curriculum. Model making exercises allow students to think more creatively and innovatively and inculcating habit of working with their own hands. Modular courses are introduced with a view of learning and acquiring higher technology skills through industry experts and consultants from the respective fields.

## **Objectives:**

The student will be able to:

- 1) Acquire information from different sources.
- 2) Prepare notes for given topics
- 3) Present seminar using power projection system.
- 4) Interact with peers to share thoughts.
- 5) Work in a team and develop team spirit.

## **Intellectual Skill:**

Student will be able to-

- 1) Search information from various resources.
- 2) Prepare notes on selected topics.
- 3) Participate in group discussions.

#### **Motor Skills:**

- 1) Observe industrial practices during visits.
- 2) Prepare slides / charts for presentation in seminar.
- 3) Develop a model

## **Learning Structure:**



## **Content:**

| Topic & Content                                                                               | Hours |  |  |  |  |  |
|-----------------------------------------------------------------------------------------------|-------|--|--|--|--|--|
| 1. Information Search:-                                                                       |       |  |  |  |  |  |
| Information search be made through manufacturers catalogue, Hand books, magazines             |       |  |  |  |  |  |
| journal and websites, and submit a report on any Two Topics in a group of 3 to 4              |       |  |  |  |  |  |
| students, report size shall not be more than 10 pages.                                        |       |  |  |  |  |  |
| Following topics are suggested, any other equivalent topics may be selected.                  |       |  |  |  |  |  |
| 1. Present scenario of electric power generation in Maharashtra state /India.                 |       |  |  |  |  |  |
| 2. Composite materials – Types, properties & application                                      |       |  |  |  |  |  |
| 3. Material handling equipments commonly used in industries.                                  |       |  |  |  |  |  |
| 4. Advances in Automobile engines.                                                            |       |  |  |  |  |  |
| 5. Hydraulic steering systems of Automobile.                                                  |       |  |  |  |  |  |
| 6. Mechanisms used to produce straight-line motion.                                           |       |  |  |  |  |  |
| 7. Mechanisms used for generating intermittent motion.                                        |       |  |  |  |  |  |
| 8. Advanced surface coating techniques like chemical vapor deposition, ion                    | 10    |  |  |  |  |  |
| implantation, physical vapor deposition.                                                      |       |  |  |  |  |  |
| 9. Types of cutting tools- specification, materials and applications.                         |       |  |  |  |  |  |
| 10. Booking of E-Tickets for Railways/Buses/Air travel.                                       |       |  |  |  |  |  |
| 11. Profiles of 2 multinational companies.                                                    |       |  |  |  |  |  |
| 12. Engine lubricants, coolants and additives                                                 |       |  |  |  |  |  |
| 13. Power steering, power windows                                                             |       |  |  |  |  |  |
| 14. ABS(anti lock braking systems)                                                            |       |  |  |  |  |  |
| 15. MPFI(multi point fuel injection) system                                                   |       |  |  |  |  |  |
| 16. Role of MIDC, MSSIDC, DIC, Financial institutions in development of                       |       |  |  |  |  |  |
| industrial sector.                                                                            |       |  |  |  |  |  |
| 17. Solar energy systems - Components and their functions, applications                       |       |  |  |  |  |  |
| 18. Design data book - Study and use of types of data.                                        |       |  |  |  |  |  |
| 2. Lectures by professionals/Industry Experts-                                                |       |  |  |  |  |  |
| Two lectures of two hour duration be arranged on any two topics suggested below or            |       |  |  |  |  |  |
| any other suitable topics to acquire practical information beyond scope of                    |       |  |  |  |  |  |
| curriculum.                                                                                   |       |  |  |  |  |  |
| Students shall prepare a brief report of each lecture as a part of their term work.           |       |  |  |  |  |  |
| 1. Components of project Report.                                                              |       |  |  |  |  |  |
| 2. Various loan schemes of banks, LIC and other agencies for education and other              |       |  |  |  |  |  |
| purposes.                                                                                     |       |  |  |  |  |  |
| 3. Use of plastics & rubbers in Automobiles industries.                                       |       |  |  |  |  |  |
| 4. Type of processes used to protect material surfaces from environmental effect.             | 0.6   |  |  |  |  |  |
| 5. Product life cycle.                                                                        | 06    |  |  |  |  |  |
| 6. Industrial application of mechatronics.                                                    |       |  |  |  |  |  |
| 7. Special features of CNC machines                                                           |       |  |  |  |  |  |
| 8. Gear manufacturing & gear teeth finishing processes.                                       |       |  |  |  |  |  |
| 9. Geal boxes-industrial & Automobile applications.                                           |       |  |  |  |  |  |
| 10. super-miniming operation when industrial applications.                                    |       |  |  |  |  |  |
| 11. processing methods for plastic components.<br>12. Features of modern boilers              |       |  |  |  |  |  |
| 12. Features of modern boners                                                                 |       |  |  |  |  |  |
| 14 Industrial drives-Types, components, comparison and applications                           |       |  |  |  |  |  |
| 15 Introduction to Apprenticeshin Training Scheme                                             |       |  |  |  |  |  |
| 3. Seminars:                                                                                  |       |  |  |  |  |  |
| One seminar be arranged on the subjects related to 4 <sup>th</sup> semester. Or topics beyond | 06    |  |  |  |  |  |
| curriculum.                                                                                   |       |  |  |  |  |  |

| Each student shall submit a report up to 10 pages and deliver the seminar.                 |    |  |  |  |  |  |  |
|--------------------------------------------------------------------------------------------|----|--|--|--|--|--|--|
| batch size - 2-3 students.                                                                 |    |  |  |  |  |  |  |
| Source of information - books, magazine, Journals, Website ,surveys,                       |    |  |  |  |  |  |  |
|                                                                                            |    |  |  |  |  |  |  |
| Topics suggested for guidance-                                                             |    |  |  |  |  |  |  |
|                                                                                            |    |  |  |  |  |  |  |
| 1. Clutches - Types, Principles, working, & applications.                                  |    |  |  |  |  |  |  |
| 2. High pressure boilers.                                                                  |    |  |  |  |  |  |  |
| 3. Heat exchangers - Types, working applications.                                          |    |  |  |  |  |  |  |
| 4. Hydraulic turbines - Types, working & applications.                                     |    |  |  |  |  |  |  |
| 5. Hydraulic pumps - Types, working & applications.                                        |    |  |  |  |  |  |  |
| 6. Sensors - Lypes, principle & applications.                                              |    |  |  |  |  |  |  |
| 7. Super conductor technology - Types, principle & applications.                           |    |  |  |  |  |  |  |
| 8. Semi conductors- Types, materials & applications.                                       |    |  |  |  |  |  |  |
| 9. Industrial brakes- Types, construction, working & applications.                         |    |  |  |  |  |  |  |
| 4. Industrial visits                                                                       |    |  |  |  |  |  |  |
| Structured industrial visits be arranged and report of the same shall be submitted by each |    |  |  |  |  |  |  |
| student to form a part of the term work.                                                   |    |  |  |  |  |  |  |
| No of visits- At least one                                                                 |    |  |  |  |  |  |  |
| Scale of industry- medium scale unit, large scale unit.                                    |    |  |  |  |  |  |  |
| Group size- practical batch                                                                |    |  |  |  |  |  |  |
| Report-not exceeding 7 to 10 pages.                                                        |    |  |  |  |  |  |  |
| Purpose :                                                                                  |    |  |  |  |  |  |  |
| To study the profile of industry                                                           |    |  |  |  |  |  |  |
| To see the advanced manufacturing processes & machinery.                                   |    |  |  |  |  |  |  |
| To observe working of CNC machines, work centres, flexible manufacturing                   |    |  |  |  |  |  |  |
| systems                                                                                    |    |  |  |  |  |  |  |
| To observe working in foundry, forging shop, press shop, heat treatment shop etc.          |    |  |  |  |  |  |  |
| To observe chip less manufacturing machines & processes.                                   |    |  |  |  |  |  |  |
| To study process sheets, quality control charts & production drawings, metallurgical       |    |  |  |  |  |  |  |
| testing laboratory                                                                         | 08 |  |  |  |  |  |  |
| To observe Tool room, standards room etc.                                                  |    |  |  |  |  |  |  |
|                                                                                            |    |  |  |  |  |  |  |
| Following types of industries may be visited in & around the institute.                    |    |  |  |  |  |  |  |
| 1. Foundry                                                                                 |    |  |  |  |  |  |  |
| 2. Forging units                                                                           |    |  |  |  |  |  |  |
| 3. Sheet metal processing unit                                                             |    |  |  |  |  |  |  |
| 4. Machine/ Automobile component manufacturing unit                                        |    |  |  |  |  |  |  |
| 5. Fabrication unit/ powder metallurgy component manufacturing unit.                       |    |  |  |  |  |  |  |
| 6. Machine tool manufacturing unit.                                                        |    |  |  |  |  |  |  |
| /. Any processing industry like chemical, textile, sugar, agriculture, fertilizer          |    |  |  |  |  |  |  |
| industries.                                                                                |    |  |  |  |  |  |  |
| 8. Auto workshop / tour wheeler garage.                                                    |    |  |  |  |  |  |  |
| 9. City water supply pumping station                                                       |    |  |  |  |  |  |  |
| 10. Hydro electric power plant,                                                            |    |  |  |  |  |  |  |
| 11. Wind mills, Solar Park                                                                 |    |  |  |  |  |  |  |

| 5. Socially Relevant Activities                                                                  |    |  |  |  |  |  |  |
|--------------------------------------------------------------------------------------------------|----|--|--|--|--|--|--|
| Conduct any one activity through active participation of students and write the report.          |    |  |  |  |  |  |  |
| Group of students- maximum 4                                                                     |    |  |  |  |  |  |  |
| Report- Not more than 6 pages                                                                    |    |  |  |  |  |  |  |
| List of suggested activities- (activities may be thought in terms of campus improvement)         |    |  |  |  |  |  |  |
| 1. Awareness about carbon credit                                                                 | 06 |  |  |  |  |  |  |
| 2. Anticorruption movement                                                                       |    |  |  |  |  |  |  |
| 3. Awareness about cyber crimes.                                                                 |    |  |  |  |  |  |  |
| 4. Developing good citizens.                                                                     |    |  |  |  |  |  |  |
| 5 Management of E- WASTE                                                                         |    |  |  |  |  |  |  |
| 6 Recycling of waste materials                                                                   |    |  |  |  |  |  |  |
| 7 Accident prevention & enforcement of safely rules                                              |    |  |  |  |  |  |  |
| 8 Awareness about pollution and pollution control                                                |    |  |  |  |  |  |  |
| 9. (Any other relevant activity may be performed)                                                |    |  |  |  |  |  |  |
| 6 Mini Drojosta                                                                                  |    |  |  |  |  |  |  |
| <b>6.</b> Will Projects<br>Students in a group of 4, shall perform any one activity listed below |    |  |  |  |  |  |  |
| Students, in a group of 4, shall perform any one activity listed below.                          |    |  |  |  |  |  |  |
| 1. Model making out of card board paper, wood, thermocol, plastics, metal, clay                  |    |  |  |  |  |  |  |
| etc                                                                                              |    |  |  |  |  |  |  |
| a) Any new idea/principle converted into model                                                   |    |  |  |  |  |  |  |
| b) Mechanisms                                                                                    |    |  |  |  |  |  |  |
| c) Jigs/fixtures                                                                                 |    |  |  |  |  |  |  |
| d) Material handling device, etc.                                                                |    |  |  |  |  |  |  |
| 2. Toy making with simple operating mechanisms                                                   |    |  |  |  |  |  |  |
| 3. Layout of workshop/department/college                                                         |    |  |  |  |  |  |  |
| 4. Experimental set up/testing of a parameter                                                    |    |  |  |  |  |  |  |
| 5. Display board indicating different type of machine components like bearing,                   |    |  |  |  |  |  |  |
| fasteners, couplings, pipe fitting, valves, cams & followers, exploded views of                  |    |  |  |  |  |  |  |
| assemblies, type of welding equipment ,welding rods (drawings, photo graphs )                    |    |  |  |  |  |  |  |
| 6. Any relevant project which will make students to collect information & work                   |    |  |  |  |  |  |  |
| with their own hands.                                                                            |    |  |  |  |  |  |  |
| 7. Students shall arrange exhibition of all mini projects in the class/hall and present          |    |  |  |  |  |  |  |
| the task to the audience/ experts/examiners. The student shall submit a brief                    | 12 |  |  |  |  |  |  |
| report (Max. 5 pages) of the mini project.                                                       |    |  |  |  |  |  |  |
| OR                                                                                               |    |  |  |  |  |  |  |
| Modular course:                                                                                  |    |  |  |  |  |  |  |
|                                                                                                  |    |  |  |  |  |  |  |
| Modular courses on any one of the suggested or equivalent topic be undertaken by a               |    |  |  |  |  |  |  |
| group of 15 to 20 students.                                                                      |    |  |  |  |  |  |  |
| 1. Advance features in CAD                                                                       |    |  |  |  |  |  |  |
| 2. Meshing of solid model using any suitable software                                            |    |  |  |  |  |  |  |
| 3 Developing Unfold Sheet or Hyperblank by using Blanking Software                               |    |  |  |  |  |  |  |
| 4 CAM Software                                                                                   |    |  |  |  |  |  |  |
| 5 Basics of PLC programming                                                                      |    |  |  |  |  |  |  |
| 6 Applications of mechatronics                                                                   |    |  |  |  |  |  |  |
| 7 Pining Technology                                                                              |    |  |  |  |  |  |  |
| 7. Tiping recimology<br>8. Modern packaging technology                                           |    |  |  |  |  |  |  |
| 0. Enterprise Descuree Planning                                                                  |    |  |  |  |  |  |  |
| 9. Enterprise Resource Framming                                                                  |    |  |  |  |  |  |  |
| 10. Dio-pileumane Robots                                                                         |    |  |  |  |  |  |  |
| 11. DIO-IIIIIIIICTY                                                                              |    |  |  |  |  |  |  |

## Learning Resources: 1. Books:

| Sr.<br>No. | Author                                                                                                        | Title                                              | Publisher                                             |  |  |  |  |
|------------|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------|-------------------------------------------------------|--|--|--|--|
| 01         | NRDC, Publication Bi<br>Monthly Journal                                                                       | Invention Intelligence<br>Journal                  | National Research<br>Development Corporation,<br>GOI. |  |  |  |  |
| 02         | DK Publishing                                                                                                 | How things works encyclopedia                      | DK Publishing                                         |  |  |  |  |
| 03         | Trott                                                                                                         | Innovation mgmt.& new product development          | Pearson Education                                     |  |  |  |  |
| 04         | E.H. McGrath, S.J.                                                                                            | Basic Managerial Skills for<br>All – Ninth Edition | РНІ                                                   |  |  |  |  |
| 05         | Apprenticeship Training Scheme:- Compiled By – BOAT (Western Region), Mumbai,<br>Available on MSBTE Web Site. |                                                    |                                                       |  |  |  |  |

## 2. Web sites

www.engineeringforchange.org

www.wikipedia.com

www.slideshare.com

www.teachertube.com

# Course Name : All Branches of Diploma in Engineering & Technology Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG Industrial Training (Optional) after 4<sup>th</sup> semester examination.

Note:- Examination in Professional Practices of 5<sup>th</sup> Semester.

## INDUSTRIAL TRAINING (OPTIONAL)

## Rational:-

There was a common suggestion from the industry as well as other stakeholders that curriculum of Engineering and Technology courses should have Industrial training as part of the curriculum. When this issue of industrial training was discussed it was found that it will be difficult to make industrial training compulsory for all students of all courses as it will be difficult to find placement for all the students. It is therefore now proposed that this training can be included in the curriculum as optional training for student who is willing to undertake such training on their own. The institutes will help them in getting placement or also providing them requisite documents which the student may need to get the placement.

Details:- Student can undergo training in related industries as guided by subject teachers / HOD.

- The training will be for four weeks duration in the summer vacation after the fourth semester examination is over.
- The student undergoing such training will have to submit a report of the training duly certified by the competent authority from the industry clearly indicating the achievements of the student during training. This submission is to be made after joining the institute for Fifth semester.
- The student completing this training will have to deliver a seminar on the training activities based on the report in the subject Professional Practices at Fifth Semester.
- The student undergoing this training will be exempted from attending activities under Professional Practices at Fifth semester except the seminar.
- The students who will not undergo such training will have to attend Professional Practices Classes/activities of fifth semester and will have to complete the tasks given during the semester under this head.
- There work will be evaluated on their submissions as per requirement and will be given marks out of 50. Or student may have to give seminar on training in Industry he attended.
- Institute shall encourage and guide students for Industry training.
- Evaluation:- Report of Training attended and delivery of seminar and actual experience in Industry will be evaluated in fifth semester under Profession Practices-III and marks will be given accordingly out of 50.

w.e.f Academic Year 2012-13

'G' Scheme

WITH EFFECT FROM 2012-13

**DURATION : 16 WEEKS** 

**SCHEME : G** 

#### MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES COURSE NAME : DIPLOMA IN INFORMATION TECHNOLOGY

**COURSE CODE : IF** 

#### **DURATION OF COURSE : 6 SEMESTERS**

**SEMESTER : FOURTH** 

## **PATTERN : FULL TIME - SEMESTER**

|           |                                                                                                     |                  |             | TEACHING     |    | TEACHING EXAMINATION SCHEME |        |      |               |     |        |     |        |     |               |         |
|-----------|-----------------------------------------------------------------------------------------------------|------------------|-------------|--------------|----|-----------------------------|--------|------|---------------|-----|--------|-----|--------|-----|---------------|---------|
| SR.<br>NO | SUBJECT TITLE                                                                                       | Abbrevi<br>ation | SUB<br>CODE | SUB SCHEME P |    | PAPER                       | TH (1) |      | <b>PR</b> (4) |     | OR (8) |     | TW (9) |     | SW<br>(17400) |         |
| 110.      |                                                                                                     | ation            | CODE        | ТН           | TU | PR                          | HRS.   | Max  | Min           | Max | Min    | Max | Min    | Max | Min           | (17400) |
| 1         | Environmental Studies \$                                                                            | EST              | 17401       | 01           |    | 02                          | 01     | 50#* | 20            |     |        |     |        | 25@ | 10            |         |
| 2         | Computer Hardware &<br>Maintenance β                                                                | CHM              | 17428       | 03           |    | 02                          | 03     | 100  | 40            | 25# | 10     |     |        | 25@ | 10            |         |
| 3         | Data Communication &<br>Networking                                                                  | DCN              | 17430       | 03           |    | 02                          | 03     | 100  | 40            | 25# | 10     |     |        | 25@ | 10            | 50      |
| 4         | Microprocessor and<br>Programming β                                                                 | MAP              | 17431       | 03           |    | 02                          | 03     | 100  | 40            | 25# | 10     |     |        | 25@ | 10            | 50      |
| 5         | Object Oriented Programming $\beta$                                                                 | OOP              | 17432       | 03           |    | 04                          | 03     | 100  | 40            | 50# | 20     |     |        | 25@ | 10            |         |
| 6         | Applied Multimedia Technology                                                                       | AMT              | 17041       |              |    | 04                          |        |      |               | 50# | 20     |     |        | 50@ | 20            |         |
| 7         | Professional Practices-II β                                                                         | PPT              | 17042       |              |    | 03                          |        |      |               |     |        |     |        | 50@ | 20            |         |
|           |                                                                                                     | r                | TOTAL       | 13           |    | 19                          |        | 450  |               | 175 |        |     |        | 225 |               | 50      |
| **        | * Industrial Training (Ontional) Evamination in 5 <sup>th</sup> Semaster Professional Practices-III |                  |             |              |    |                             |        |      |               |     |        |     |        |     |               |         |

Student Contact Hours Per Week: 32 Hrs.

## THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.

Total Marks : 900

@- Internal Assessment, # - External Assessment, No Theory Examination, \$ - Common to all branches, #\* - Online Examination,

 $\beta$  - Common to CO, CM, CD, CW

Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work.

\*\* Industrial Training (Optional) - Student can undergo Industrial Training of four weeks after fourth semester examination during summer vacation.

Assessment will be done in Fifth semester under Professional Practices-III. They will be exempted from activities of Professional Practices-III of 5<sup>th</sup> Semester

Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subjects is to be converted out of 50 marks as sessional work (SW).

> Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

> Code number for TH, PR, OR and TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.

MSBTE – Final Copy Dt. 30/08/2013

# Course Name : All Branches of Diploma in Engineering & Technology Course Code : AE/CE/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG/AU

Semester : Fourth

Subject Title : Environmental Studies

Subject Code : 17401

**Teaching and Examination Scheme:** 

| Teac | ching Scl | heme | Examination Scheme |      |    |    |     |       |  |
|------|-----------|------|--------------------|------|----|----|-----|-------|--|
| TH   | TU        | PR   | PAPER<br>HRS       | TH   | PR | OR | TW  | TOTAL |  |
| 01   |           | 02   | 01                 | 50#* |    |    | 25@ | 75    |  |

#### **#\* Online Theory Examination**

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Environment essentially comprises of our living ambience, which gives us the zest and verve in all our activities. The turn of the twentieth century saw the gradual onset of its degradation by our callous deeds without any concern for the well being of our surrounding we are today facing a grave environmental crisis. The unceasing industrial growth and economic development of the last 300 years or so have resulted in huge ecological problems such as overexploitation of natural resources, degraded land, disappearing forests, endangered species, dangerous toxins, global warming etc.

It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

The curriculum covers the aspects about environment such as Environment and Ecology, Environmental impacts on human activities, Water resources and water quality, Mineral resources and mining, Forests, etc.

General Objectives: The student will be able to,

- 1. Understand importance of environment
- 2. Know key issues about environment
- 3. Understands the reasons for environment degradation
- 4. Know aspects about improvement methods
- 5. Know initiatives taken by the world bodies to restrict and reduce degradation

## **Learning Structure:**



## Theory:

| Topic and Contents                                                  | Hours | Marks |
|---------------------------------------------------------------------|-------|-------|
| Topic 1: Nature of Environmental Studies                            |       |       |
| Specific Objectives:                                                |       |       |
| Define the terms related to Environmental Studies                   |       |       |
| > State importance of awareness about environment in general public | 0.4   |       |
| Contents:                                                           | 01    | 04    |
| • Definition, Scope and Importance of the environmental studies     |       |       |
| • Importance of the studies irrespective of course                  |       |       |
| • Need for creating public awareness about environmental issues     |       |       |
| Topic 2: Natural Resources and Associated Problems                  |       |       |
| Specific Objectives:                                                |       |       |
| > Define natural resources and identify problems associated with    |       |       |
| them                                                                |       |       |
| > Identify uses and their overexploitation                          |       |       |
| > Identify alternate resources and their importance for environment |       |       |
| Contents:                                                           |       |       |
| 2.1 Renewable and Non renewable resources                           |       |       |
| • Definition                                                        |       |       |
| • Associated problems                                               |       |       |
| 2.2 Forest Resources                                                |       |       |
| General description of forest resources                             |       |       |
| • Functions and benefits of forest resources                        |       |       |
| • Effects on environment due to deforestation Timber                |       |       |
| extraction. Building of dams, waterways etc.                        |       |       |
| 2.3 Water Resources                                                 | 04    | 10    |
| • Hydrosphere: Different sources of water                           |       |       |
| • Use and overexploitation of surface and ground water              |       |       |
| • Effect of floods draught dams etc. on water resources and         |       |       |
| community                                                           |       |       |
| 2.4 Mineral Resources:                                              |       |       |
| • Cotocorios of minoral resources                                   |       |       |
| Categories of minima activities                                     |       |       |
| • Basics of mining activities                                       |       |       |
| • Mine safety                                                       |       |       |
| • Effect of mining on environment                                   |       |       |
| 2.5 Food Resources:                                                 |       |       |
| • Food for all                                                      |       |       |
| • Effects of modern agriculture                                     |       |       |
| World food problem                                                  |       |       |
| Topic 3. Ecosystems                                                 |       |       |
| Concept of Ecosystem                                                |       |       |
| Structure and functions of ecosystem                                | 01    | 04    |
| • Energy flow in ecosystem                                          |       |       |
| • Major ecosystems in the world                                     |       |       |
| Topic 4. Biodiversity and Its Conservation                          |       |       |
| Definition of Biodiversity                                          | 02    | 07    |
| Levels of biodiversity                                              | 02    | 06    |
| Value of biodiversity                                               |       |       |

| <ul> <li>Air (Prevention and Control of Pollution) Act</li> <li>Water (Prevention and Control of Pollution) Act</li> <li>Wildlife Protection Act</li> <li>Forest Conservation Act<br/>Population Growth: Aspects, importance and effect on<br/>environment</li> <li>Human Health and Human Rights</li> </ul> | 02 | 08 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|
| <ul> <li>Air (Prevention and Control of Pollution) Act</li> <li>Water (Prevention and Control of Pollution) Act</li> <li>Wildlife Protection Act</li> <li>Forest Conservation Act<br/>Population Growth: Aspects, importance and effect on<br/>environment</li> </ul>                                        | 02 | 08 |
| <ul> <li>Air (Prevention and Control of Pollution) Act</li> <li>Water (Prevention and Control of Pollution) Act</li> <li>Wildlife Protection Act</li> <li>Forest Conservation Act</li> <li>Population Growth: Aspects, importance and effect on</li> </ul>                                                   | 02 | 08 |
| <ul> <li>Air (Prevention and Control of Pollution) Act</li> <li>Water (Prevention and Control of Pollution) Act</li> <li>Wildlife Protection Act</li> <li>Forest Conservation Act</li> </ul>                                                                                                                 | 02 | 08 |
| <ul> <li>Air (Prevention and Control of Pollution) Act</li> <li>Water (Prevention and Control of Pollution) Act</li> <li>Wildlife Protection Act</li> </ul>                                                                                                                                                  | 02 | 08 |
| <ul> <li>Air (Prevention and Control of Pollution) Act</li> <li>Water (Prevention and Control of Pollution) Act</li> </ul>                                                                                                                                                                                   | 02 | 00 |
| Air (Prevention and Control of Pollution) Act                                                                                                                                                                                                                                                                |    |    |
|                                                                                                                                                                                                                                                                                                              |    |    |
| Environmental Protection Act                                                                                                                                                                                                                                                                                 |    |    |
| Brief description of the following acts and their provisions:                                                                                                                                                                                                                                                |    |    |
| Topic 7. Environmental Protection                                                                                                                                                                                                                                                                            |    |    |
| <ul> <li>Concept of Carbon Credits and its advantages</li> </ul>                                                                                                                                                                                                                                             | 1  |    |
| and their effect on climate                                                                                                                                                                                                                                                                                  |    |    |
| Depletion Nuclear Accidents and Holocaust: Basic concepts                                                                                                                                                                                                                                                    |    |    |
| Climate Change Global warming Acid rain Ozone Laver                                                                                                                                                                                                                                                          | 03 | 10 |
| • water conservation, watershed management, Kalli water<br>harvesting: Definition Methods and Benefits                                                                                                                                                                                                       |    |    |
| Weter concertation Wetershed management Dain water                                                                                                                                                                                                                                                           |    |    |
| • Concept of development sustainable development                                                                                                                                                                                                                                                             |    |    |
| Noise Pollution: Definition, sources, effects, prevention                                                                                                                                                                                                                                                    |    |    |
| <ul> <li>Son Pollution: Definition, sources, effects, prevention</li> <li>Noise Pollution: Definition, sources, effects, prevention</li> </ul>                                                                                                                                                               |    |    |
| Soil Dollution: Definition sources offects provertion                                                                                                                                                                                                                                                        |    |    |
| • Water Pollution: Definition, Classification, sources, effects,                                                                                                                                                                                                                                             |    |    |
| prevention                                                                                                                                                                                                                                                                                                   | 03 | 08 |
| • Air pollution: Definition, Classification, sources, effects,                                                                                                                                                                                                                                               |    |    |
| • Definition                                                                                                                                                                                                                                                                                                 |    |    |
| Topic 5. Environmental Pollution                                                                                                                                                                                                                                                                             |    |    |
| Conservation of biodiversity                                                                                                                                                                                                                                                                                 |    |    |
| • Threats to biodiversity                                                                                                                                                                                                                                                                                    |    |    |

## Practical: Skills to be developed:

## Intellectual Skills:

- 1. Collection of information, data
- 2. Analysis of data
- 3. Report writing

## Motor Skills:

- 1. Presentation Skills
- 2. Use of multi media

## **List of Projects:**

**Note:** Any one project of the following:

- 1. Visit to a local area to document environmental assets such as river / forest / grassland / hill / mountain
- 2. Visit to a local polluted site: Urban/Rural/Industrial/Agricultural
- 3. Study of common plants, insects, birds
- 4. Study of simple ecosystems of ponds, river, hill slopes etc

Prepare a project report on the findings of the visit illustrating environment related facts, analysis and conclusion. Also suggest remedies to improve environment.

Learning Resources: Books:

| Sr.<br>No. | Author                                                | Title                                        | Publisher               |  |  |
|------------|-------------------------------------------------------|----------------------------------------------|-------------------------|--|--|
| 01         | Anindita Basak                                        | Environmental Studies                        | Pearson Education       |  |  |
| 02         | R. Rajgopalan                                         | Environmental Studies<br>from Crises to Cure | Oxford University Press |  |  |
| 03         | Dr. R. J. Ranjit Daniels, Dr.<br>Jagdish Krishnaswamy | Environmental Studies                        | Wiley India             |  |  |

| Course Name   | : Computer Engineering Group      |
|---------------|-----------------------------------|
| Course Code   | : CO/CD/CM/CW/IF                  |
| Semester      | : Fourth                          |
| Subject Title | : Computer Hardware & Maintenance |
| Subject Code  | : 17428                           |

#### **Teaching and Examination Scheme:**

| Teac | hing Scl | heme | Examination Scheme |     |     |    |     |       |
|------|----------|------|--------------------|-----|-----|----|-----|-------|
| TH   | TU       | PR   | PAPER<br>HRS       | TH  | PR  | OR | TW  | TOTAL |
| 03   |          | 02   | 03                 | 100 | 25# |    | 25@ | 150   |

## NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

## **Rationale:**

The aim of the subject is to teach the basic working of the computer motherboard, peripherals and add-on cards. The subject helps the students to do the maintenance of the Computer, peripherals and its add-on cards. The students will be able to select the proper peripheral as per their specification and requirement. This is the core technology subject. The pre-requisite of the subject is Microprocessor. The subject is practical oriented and will develop the debugging skills in the students.

## **Objectives:**

The student will be able to:

- 1. Debug and repair the faults in system.
- 2. Assemble the system.
- 3. Load the operating system and device drivers in the system.

## **Learning Structure:**



## Theory:

| Sr.<br>No | Theory                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Hrs. | Marks |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|
| 1         | <ul> <li>Motherboard &amp; Its Component</li> <li>Specific Objectives</li> <li>➤ To Understand the various components of Motherboard.</li> <li>➤ To Know about the different memories in PC &amp; their usage.</li> <li>➤ To Understand the selection of different components of PC.</li> <li>1.1 CPU - Concept like address lines, data lines, internal registers.</li> <li>1.2 Modes of operation of CPU - Real mode, IA-32 mode, IA-32 Virtual Real Mode.</li> <li>1.3 Process Technologies, Dual Independent Bus Architecture, Hyper Threading Technologies &amp; its requirement.</li> <li>1.4 Processor socket &amp; slots.</li> <li>1.5 Chipset basic, chipset Architecture, North / South bridge &amp; Hub Architecture.</li> <li>1.6 Latest chipset for PC</li> <li>1.7 Overview &amp; features of PCI, PCI –X, PCI express, AGP bus.</li> <li>1.8 Logical memory organization conventional memory, extended memory, expanded memory.</li> <li>1.9 Overview &amp; features of SDRAM, DDR, DDR2, DDR3.</li> <li>1.10 Concept of Cache memory:</li> <li>1.11 L1 Cache, L2 Cache, L3 Cache, Cache Hit &amp; Cache Miss.</li> <li>1.13 BIOS – Basics &amp; CMOS Set Up.</li> <li>1.14 Motherboard Selection Criteria.</li> </ul> | 12   | 24    |
| 2         | <ul> <li>Storage Devices &amp; Interfacing.</li> <li><u>Objective</u> <ul> <li>To understand the Recording techniques in storage devices.</li> <li>To understand the working of storage devices.</li> </ul> </li> <li>2.1 Recording Techniques: FM, MFM, RLL, perpendicular recording</li> <li>2.2 Hard Disk construction and working.</li> <li>2.3 Terms related to Hard Disk.</li> <li>Track, sector, cylinder, cluster, landing zone, MBR, zone recording, write pre-compensation.</li> <li>2.4 Formatting: Low level, High level &amp; partitioning.</li> <li>2.5 FAT Basics: Introduction to file system, FAT 16, FAT 32, NTFS,</li> <li>2.6 Hard Disk Interface: Features of IDE, SCSI, PATA, SATA, Cables &amp; Jumpers.</li> <li>2.7 CD ROM Drive: Construction, recording.(Block diagram)</li> <li>2.8 DVD: Construction, Recording. (Block Diagram)</li> <li>2.9 Blue-ray Disc specification.</li> </ul>                                                                                                                                                                                                                                                                                                                    | 08   | 24    |

|   | Display Davicas & Interfacing                                                                                                                               |     |    |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|
|   | Objective                                                                                                                                                   |     |    |
|   | <ul> <li>To understand the construction and working of display devices</li> <li>Like CPT, LCD</li> </ul>                                                    |     |    |
|   | The URI, LUD.                                                                                                                                               |     |    |
|   | <ul> <li>To understand the interfacing of above devices to PC.</li> <li>2.1 CDT: Disch discourse &amp; conditions of manual basis of a solution.</li> </ul> |     |    |
|   | 3.1 CK I: - Block diagram & working of monochrome & colour Monitor                                                                                          |     |    |
| 2 | 3.2 Characteristics of CKT Monitor :-                                                                                                                       | 0.6 | 10 |
| 3 | DOT Pitch, Resolution, Horizontal Scanning frequency, Vertical                                                                                              | 06  | 12 |
|   | scanning frequency, Interlaced Scanning, Non-Interfaced scanning,                                                                                           |     |    |
|   | Aspect ratio.                                                                                                                                               |     |    |
|   | 3.3 LCD Monitor: - Functional Block Diagram of LCD monitor,                                                                                                 |     |    |
|   | working principle, Passive matrix, Active matrix LCD display.                                                                                               |     |    |
|   | 3.4 Touch Screen Display – The construction and working principle                                                                                           |     |    |
|   | 3.4 Plasma Display Technology: - Construction & working principle.                                                                                          |     |    |
|   | 3.5 Basic Block Diagram of Video Accelerator card                                                                                                           |     |    |
|   | Input and Output Devices                                                                                                                                    |     |    |
|   | <u>Objective</u>                                                                                                                                            |     |    |
|   | To understand the construction and working of Input /Output                                                                                                 |     |    |
|   | Devices.                                                                                                                                                    |     |    |
|   | To understand the Interfacing of the above peripherals.                                                                                                     |     |    |
|   | 4.1 Keyboard: Types of key switches: Membrane, Mechanical, Rubber                                                                                           | 0.5 | 10 |
| 4 | dome, Capacitive, optoelectronic and interfacing.                                                                                                           | 06  | 12 |
|   | 4.2 Mouse: Opto-mechanical, optical (New design)                                                                                                            |     |    |
|   | 4.3 Scanner: Flat Bed, Sheet-fed, Handheld: Block diagram of flat Bed                                                                                       |     |    |
|   | and specifications, OCR, TWAIN, Resolution, Interpolation.                                                                                                  |     |    |
|   | 4.4 Modem: Internal and External: Block diagram and specifications.                                                                                         |     |    |
|   | 4.5 Printer: Printer Characteristics, Dot matrix, Inkjet, Laser: block                                                                                      |     |    |
|   | Decrea Secondaria                                                                                                                                           |     |    |
|   | Power Supplies<br>Objective                                                                                                                                 |     |    |
|   | Defective<br>To understand the working of SMDS                                                                                                              |     |    |
|   | To understand the power problems                                                                                                                            |     |    |
|   | 5 1 Block diagram and working of SMPS                                                                                                                       |     |    |
|   | 5.2 Signal description and pin-out diagram of AT and ATX connectors                                                                                         |     |    |
| 5 | 5.3 Power supply characteristics: Rated wattage. Efficiency, Regulation.                                                                                    | 04  | 08 |
| - | Ripple, Load regulation, Line regulation.                                                                                                                   |     |    |
|   | 5.4 Power problems: Blackout, Brownout, surges and spikes.                                                                                                  |     |    |
|   | 5.5 Symptoms of power problems.                                                                                                                             |     |    |
|   | 5.6 Protection devices: circuit breaker, surge suppressor.                                                                                                  |     |    |
|   | 5.7 Uninterrupted Power Supply, ONline and OFFline UPS, working of                                                                                          |     |    |
|   | UPS: Block diagram, advantages and disadvantages, Ratings                                                                                                   |     |    |
|   | Interfaces                                                                                                                                                  |     |    |
|   | <u>Objective</u>                                                                                                                                            |     |    |
|   | To understand the ports of PC.                                                                                                                              |     |    |
|   | To understand interfacing techniques of devices to ports                                                                                                    |     |    |
|   | 6.1 SCSI, SCSI cables and connectors, SCSI drive configuration.                                                                                             |     |    |
| 6 | 6.2 USB features.                                                                                                                                           | 06  | 12 |
|   | 6.3 RS 232 : (Voltages and 9 pin description)                                                                                                               |     |    |
|   | 6.4 Centronics (interface diagram, important signals and timing                                                                                             |     |    |
|   | waveform)                                                                                                                                                   |     |    |
|   | 6.5 Firewire features                                                                                                                                       |     |    |
|   | 6.6 Blue tooth                                                                                                                                              |     |    |

|   | PC Troubleshooting, Maintenance and Tools.                         |    |     |
|---|--------------------------------------------------------------------|----|-----|
|   | <b>Objective</b>                                                   |    |     |
|   | To understand the preventive maintenance of PC                     |    |     |
|   | To understand the diagnostic tools of PC                           |    |     |
|   | 7.1 POST: POST sequence, Beep codes, visual display codes.         |    |     |
| 7 | 7.2 Preventive maintenance: Active, Passive, periodic maintenance  | 06 | 08  |
|   | procedure.                                                         |    |     |
|   | 7.3 Diagnostic Tools: logic Analyzer, logic probe.                 |    |     |
|   | 7.4 Diagnostic software for trouble shooting PC.                   |    |     |
|   | BGA workstation and its applications for reballing of north bridge |    |     |
|   | and south bridge                                                   |    |     |
|   | Total                                                              | 48 | 100 |

## **PRACTICAL:**

Skills to be developed:

## **Intellectual Skills:**

- Understanding basic hardware of computer
- Fault finding of input/output devices.
- Troubleshooting of input/output devices
- Proper connection of input/output devices.

#### **Motor Skills:**

• Proper handling of Computer System Hardware.

## List of Practical:

- 01. Identify and draw the motherboard layout of Intel i3 processor and understand connection and layout of the H67 or P67chipset.
- 02. Perform Basic Input/output System (BIOS) setting and configuration setup using Complementary Metal Oxide Semiconductor (CMOS).
- 03. Format, partition and install a Hard Disk Drive (HDD) and format a pen drive.
- 04. Understand layout, characteristics and functions of different components of Hard Disk Drive (HDD) as a storage device.
- 05. Install Video Graphics Array (VGA) or Super Video Graphics Array (SVGA) display cards.
- 06. Install and understand the working of printer.
- 07. Install and understand the working of Input/output devices such as scanner and modem.
- 08. Connect Switched Mode Power Supply (SMPS) and identify different parts of SMPS. Understand the working of SMPS and Uninterrupted Power Supply (UPS).
- 09. Use diagnostic software to identify installed computer peripherals and test their working condition.
- 10. Find faults related to Monitor, CPU, Hard disk, Printer and other peripherals.
- 11. Form a pico net using Bluetooth devices and transfer data.
- 12. Assemble PC and install an operating system.

## Learning Resources: Books:

| Sr.<br>No. | Author                           | Title                                                     | Publisher        |
|------------|----------------------------------|-----------------------------------------------------------|------------------|
| 01         | Scott Muller                     | Upgrading & Repairing PCs                                 | Pearson          |
| 02         | Mark Minasi                      | The Complete PC Upgrade &<br>Maintenance guide            | Wiley India      |
| 03         | Barry Press and<br>Maricia Press | PC Upgrade and Repair                                     | Wiley India      |
| 04         | Begelow                          | Bigelow's Troubleshooting,<br>Maintaining & Repairing PCs | Tata McGraw Hill |
| 05         | Mike Meyers Scott<br>Jernigan    | Managing & Troubleshooting PCs                            | Tata McGraw Hill |
| 06         | D.Balasubramanian                | Computer Installation & Servicing                         | Tata McGraw Hill |

| Course Name   | : Diploma in Information Technology |
|---------------|-------------------------------------|
| Course Code   | : IF                                |
| Semester      | : Fourth                            |
| Subject Title | : Data Communication & Networking   |
| Subject Code  | : 17430                             |

#### **Teaching and Examination Scheme:**

| Tea | ching Sch | eme | Examination Scheme |     |     |    |     |       |
|-----|-----------|-----|--------------------|-----|-----|----|-----|-------|
| TH  | TU        | PR  | PAPER<br>HRS       | TH  | PR  | OR | TW  | TOTAL |
| 03  |           | 02  | 03                 | 100 | 25# |    | 25@ | 150   |

## NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

## **Rationale:**

The world in the information era has become network centric. A Computer networks has been growing with rapid technological progress. Computer communication through networking becomes essential part of our life. We can manage many application like Air Line Reservation, Railway Reservation, E-banking, E-Governance, On-Line shopping, E-learning etc. by clicking mouse button from our own place. Because of this, world become the global village. By considering importance of networking towards all aspects of our life, we here introduce basic concept of networks, network classification, network topologies, network devices, Transmission media, Network reference models, concept of TCP/IP.

This knowledge explores the student for understanding current network management technology.

## **Objectives:**

To develop following skills:

## **Intellectual Skills:**

- > Understand network & can identifying benefits of networks.
- > Understand and describe communication media.
- Compare different types of Topology.
- Compare different types of network devices.
- Compare OSI and TCP/IP protocol suite.
- ➢ Configuration of TCP/IP

## Motor Skills:

- 1. Able to handle Computer Network.
- 2. To develop a small Computer Network.

## **Learning Structure:**



## Theory:

| Chapter | Name of the Topic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Hours | Marks |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
|         | <ul> <li>Introduction to Data Communication and Networking</li> <li>Objectives:-</li> <li>➤ Understand Basic Concept of Data Communication</li> <li>➤ Understand Analog and Digital Transmission Methods.</li> <li>➤ Differentiate between Baud rate and Bit rate.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |       |
| 01      | <ul> <li>1.1 Introduction, Fundamental Concepts, Data Communication, protocols, Standards, Standard organizations, Bandwidth and Data Transmission Rate.</li> <li>1.2 Analog Signal, Analog Transmission, Digital Signal ,Digital Transmission, Digital Signal Analog Transmission, Baud Rate and Bits per second</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 10    | 20    |
|         | <ul> <li>1.3 Modes of Data Transmission and Multiplexing, Parallel and Serial<br/>Communication, Asynchronous, Synchronous and Isochronous<br/>Communication, Simplex, Half-Duplex, Full Duplex,<br/>Multiplexing and Demultiplexing, Types of Multiplexing: TDM,<br/>FDM, TDM Vs FDM</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |       |
| 02      | <ul> <li>Transmission Errors: Detection and Correction, Transmission<br/>Media and Network Topologies</li> <li>Objectives:-</li> <li>&gt; Understand Errors and Error Correction</li> <li>&gt; Understand Types of Medias.</li> <li>&gt; Understand various Network Topologies and Network Control<br/>Devices</li> <li>2.1 Introduction, Error Classification, Types of Errors and Error<br/>Detection</li> <li>2.2 Types of Transmission Media- 1) Guided Media: Cable<br/>Characteristics, Types of Cable-Twisted Pair Cable, Co-axial<br/>Cable, Fiber Optic Cable. 2) Unguided media: Types of<br/>Communication Band-Microwave Communication, Radio wave<br/>Communication, Satellite Communication, Infrared<br/>Communication.</li> <li>2.3 Introduction IEEE Standards for LAN,MAN and WAN 802.1,<br/>802.2, 802.3, 802.4, 802.5, 802.11</li> <li>2.4 Latest Technologies in Wireless Network-Bluetooth Architecture,<br/>Wi-Fi, Wi- Max</li> <li>2.5 Cellular (Mobile) Telephone - Band in Cellular Telephony, Calls<br/>using Mobile Phones, Transmitting receiving / Handoff operations</li> <li>2.6 Network Topologies, Switching: Packet , Circuit</li> <li>2.7 Introduction Star, Ring, Tree, Bus, Mesh, Hybrid, Basics of<br/>Switching, Router.</li> </ul> | 12    | 22    |
| 03      | <ul> <li>OSI Model, LAN,WAN,MAN, MAC Sublayer</li> <li>Objectives:-</li> <li>&gt; Understand OSI Model</li> <li>&gt; Understand LAN/WAN/MAN</li> <li>3.1 Introduction- Layered Architecture , Peer-to- Peer Processes-<br/>Interfaces between Layer, Protocols, Organization of the Layers,<br/>Encapsulation.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 10    | 22    |

|    | Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 48 | 100 |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
| 05 | <ul> <li>Addresses, Concept of IP Address and IP datagram Packet, ARP,<br/>RARP, ICMP, Data Fragmentation and Reassembly, Comparison<br/>of OSI and TCP/IP Protocol Suites.</li> <li>5.2 TCP and UDP :Introduction, TCP Basics, Features of TCP,<br/>Relationship between TCP and IP, Ports and Sockets,<br/>Connections, TCP Connections, Packet Format, Persistent TCP<br/>Connection, UDP and UDP Packet .</li> <li>5.3 Introduction DNS, TCP, FTP TFTP</li> </ul>                                                                                                                                                                                                                                                                                            | 08 | 18  |
| 04 | <ul> <li>Objectives:-</li> <li>Understand Internetworking and Issues</li> <li>Understand Internetworking Issues</li> <li>Understand the concept of ISP</li> <li>4.1 Introduction-Why Internetworking, Problems in<br/>Internetworking, Dealing with Incompatibility, Vistual Network,<br/>Internetworking Devices, Repeaters, Bridges, Routers, Gateways</li> <li>4.2 Brief History of Internet, Growth of Internet, Internet Topology,<br/>Internal Architecture of ISP.</li> <li>4.3 Ways of Accessing the Internet : Introduction, Dial Up access<br/>for an Individual User, Leased Lines, DSL and Cable Modems</li> <li>TCP/IP, ARP, RARP and ICMP, TCP vs UDP, DNS, Email, FTP</li> <li>5.1 Introduction TCP/IP Basics Why IP addresses Logical</li> </ul> | 08 | 18  |
|    | Internetworking Concepts, Devices, Internet Basics, History And Architecture                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |    |     |
|    | <ul> <li>3.2 Layers of the OSI Reference Model (Functions of each Layer &amp; Protocols used) – Physical Layer, Data-Link Layer, Network Layer, Transport Layer, Session Layer, Presentation Layer, Application Layer.</li> <li>3.3 LAN, Ethernet, Virtual LAN, Fast and Gigabit Ethernet, Token Ring, FDDI, Comparison of Ethernet, Token Ring FDDI, MAN, Distributed Queue Dual Bus, SMDS, WAN and its architecture, WAN transmission Mechanism, WAN Addressing.</li> </ul>                                                                                                                                                                                                                                                                                    |    |     |
|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |    |     |

## List of Practical:

| Sr.<br>No. | Title of Experiment                                                                                                                              | No. of Hours |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| 1          | To observe Components of Network in your Computer Network Lab.                                                                                   | 02           |
| 2          | To understand Transmission Media and Network Control devices.                                                                                    | 04           |
| 3          | To Prepare a Straight Cable and Network Cross over Cable and test by Line Tester.                                                                | 04           |
| 4          | To Connect Computers in Star Topology using Wired Media and any Network control Device.                                                          | 02           |
| 5          | To Install Network Interface Card to locate MAC address of Computer.                                                                             | 02           |
| 6          | To Configure Peer-to-Peer Network.                                                                                                               | 02           |
| 7          | To Share Printer and Folder in Network.                                                                                                          | 04           |
| 8          | To Install TCP/IP Protocols (version 4 and /version 6) and configure<br>advanced TCP/IP Protocols. Install Wireshark software and configure as a | 04           |

|    | packet sniffer.                                                                                                                                                      |    |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 9  | To Run Basic TCP/IP Utilities and Networking commands with all options<br>(Ping,Ping ::1, ipconfig, Tracert, Netstat, Wireshark, ARP,<br>NBTSTAT.EXE, WINIPCFG.EXE), | 04 |
| 10 | Capture TCP, UDP, IP, ARP, ICMP, Telnet, FTP packets using Wireshark packet sniffer software and verify header fields.                                               | 04 |

## Learning Resources:

## Books:

| Sr. No. | Title                                                 | Author              | Publisher                                      |
|---------|-------------------------------------------------------|---------------------|------------------------------------------------|
| 1       | Data Communications and Networks                      | Achyut S. Godbole   | Tata McGraw Hill                               |
| 2       | Data Communications and<br>Networking (Forth Edition) | Behrouz A. Forouzan | Tata McGraw Hill                               |
| 3       | Complete Reference Networking                         | Craig Zacker        | Tata McGraw Hill                               |
| 4       | Computer Networking                                   | Tularam M Bansod    | Dreamtech, Wiley                               |
| 5       | Networking + Certification<br>(Second Edition)        | Microsoft Press     | PHI(Prentice-Hall of India<br>Private Limited) |
| 6       | Computer Network by                                   | Andrew S. Tanenbaum | Pearson                                        |

Course Name : Computer Engineering Group Course Code : CO/CD/CM/CW/IF Semester : Fourth Subject Title : Microprocessor and Programming Subject Code : 17431

**Teaching and Examination Scheme:** 

| Teaching Scheme |    |    |              | Examinati | on Scheme |    |     |       |
|-----------------|----|----|--------------|-----------|-----------|----|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH        | PR        | OR | TW  | TOTAL |
| 03              |    | 02 | 03           | 100       | 25#       |    | 25@ | 150   |

## NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

## **Rationale:**

Microprocessor is brain of computer. Intel family is widely used all over the world. 8085 is the 8-bit CPU and 8086 is the 16-bit CPU. 8086 is the base of all upward developed processors. It is more powerful and efficient computing machine. It overcomes all major limitations of the previous processors. It is able to get interfaced with 8-bit, 16-bit systems. IBM PC is introduced in 1980 with 10MB hard disk, one double side double density floppy disk drive, KBD, monitor and asynchronous communications adapter.

This subject covers Basics of 8085, architecture of 8086 along instruction set. It also covers assembly language programming with effective use of procedure and macros. This will act as base for the advanced assembly language programming for next generation microprocessors.

## **General objectives:**

Students will be able to:

- 1. Understand the execution of instructions in pipelining and address generation.
- 2. Write syntax of given instructions.
- 3. Apply instructions in Assembly Language Program for different problem statements.
- 4. Use the procedures and macros in assembly language programming.

## **Learning Structure:**



## Theory

| Name of Topics                                               | Hours | Marks |
|--------------------------------------------------------------|-------|-------|
| Topic 1: Basics of Microprocessor                            |       |       |
| Specific Objective: Students will be able to                 |       |       |
| ➢ Draw the architecture of 8085                              |       |       |
| Define the functions of different pins of 8085               |       |       |
| Identify status of different flags                           |       |       |
| 1.1 Evolution of Microprocessor and types                    | 04    | 08    |
| 1.2 8085 Microprocessor,                                     |       |       |
| Salient features                                             |       |       |
| • Pin description,                                           |       |       |
| • Architecture of 8085 - Functional Block diagram,           |       |       |
| Register organization,                                       |       |       |
| Topic 2 :16 Bit Microprocessor: 8086                         |       |       |
| Specific Objective: Students will be able to                 |       |       |
| Define the functions of different pins                       |       |       |
| Draw functional block diagram of 8086                        |       |       |
| ➢ Understand the operating modes of 8086                     |       |       |
| 2.1 8086 Microprocessor,                                     |       |       |
| Salient features                                             |       |       |
| Pin descriptions                                             |       |       |
| • Architecture of 8086 - Functional Block diagram            |       |       |
| Register organization                                        |       |       |
| <ul> <li>Concepts of pipelining</li> </ul>                   | 12    | 24    |
| Concepts of piperining,     Momory segmentation              |       |       |
| Methody segmentation     Deviced memory addresses concretion |       |       |
| • Physical memory addresses generation.                      |       |       |
| 2.2 Operating Modes of 8080                                  |       |       |
| • 8284 Clock Generator                                       |       |       |
| • 8288 Bus Controller                                        |       |       |
| • 74LS245 Bi-directional Buffer                              |       |       |
| • 74LS373 Octal Latch                                        |       |       |
| Minimum Mode operation and its timing diagram                |       |       |
| Maximum Mode operation and its timing diagram                |       |       |
| <b>Topic 3 : Instruction Set of 8086 Microprocessor</b>      |       |       |
| Specific Objective: Students will be able to                 |       |       |
| Understand the different types of instructions               |       |       |
| Identify the addressing modes of instructions                |       |       |
| State the operation of an instructions                       |       |       |
| 3.1 Machine Language Instruction format,                     |       |       |
| addressing modes                                             |       |       |
| 3.2 Instruction set, Groups of Instructions                  | 10    | 20    |
| Arithmetic Instructions                                      |       |       |
| Logical Instructions                                         |       |       |
| Data transfer instructions                                   |       |       |
| Bit manipulation instructions                                |       |       |
| String Operation Instructions,                               |       |       |
| Program control transfer or branching Instructions           |       |       |
| Process control Instructions                                 |       |       |
| Topic 4 : The Art of Assembly Language Programming           | 04    | 08    |

| Specific Objective: Students will be able to                          |    |     |
|-----------------------------------------------------------------------|----|-----|
| Know the program development steps                                    |    |     |
| Use the different program development tools                           |    |     |
| Illustrate the functions of assembler directive and operators         |    |     |
| 4.1 Program development steps                                         |    |     |
| • Defining problem,                                                   |    |     |
| Writing Algorithms                                                    |    |     |
| • Flowchart                                                           |    |     |
| Initialization checklist                                              |    |     |
| Choosing instructions                                                 |    |     |
| • Converting algorithms to assembly language programs.                |    |     |
| 4.2 Assembly Language Programming Tools                               |    |     |
| • Editors                                                             |    |     |
| • Assembler                                                           |    |     |
| • Linker                                                              |    |     |
| • Debugger.                                                           |    |     |
| 4.3 Assembler directives and Operators                                |    |     |
| Topic 5: 8086 Assembly Language Programming.                          |    |     |
| Specific Objective: Students will be able to                          |    |     |
| Write a appropriate programs using editor                             |    |     |
| Run program using assembler and linker                                |    |     |
| Debug program using debugger                                          |    |     |
| 5.1 Model of 8086 assembly language programs                          |    |     |
| 5.2 Programming using assembler -                                     |    |     |
| • Arithmetic operations on Hex and BCD numbers - Addition,            |    |     |
| Subtraction, Multiplication and Division                              | 10 | 24  |
| Sum of Series                                                         | 12 | 24  |
| Smallest and Largest numbers from array                               |    |     |
| <ul> <li>Sorting numbers in Ascending and Descending order</li> </ul> |    |     |
| • Finding ODD/EVEN numbers in the array                               |    |     |
| <ul> <li>Finding Positive and Negative Numbers in array</li> </ul>    |    |     |
| Block transfer                                                        |    |     |
| • String Operations - Length, Reverse, Compare, Concatenation, Copy   |    |     |
| • Count Numbers of '1' and '0' in 8/16 bit number                     |    |     |
| BCD to Hex and Hex to BCD number conversion                           |    |     |
| Topic 6 : Procedure and Macro in Assembly Language Program            |    |     |
| Specific Objective: Students will be able to                          |    |     |
| Understand the purpose of procedure and macros                        |    |     |
| Use procedure and macros                                              |    |     |
| 6.1 Procedure                                                         |    |     |
| Defining Procedure - Directives used, FAR and NEAR                    | 06 | 16  |
| CALL and RET instructions.                                            |    |     |
| Reentrant and Recursive procedures.                                   | ſ  |     |
| Assembly Language Programs using Procedure                            |    |     |
| 6.2 Defining Macros.                                                  | ſ  |     |
| Assembly Language Programs using Macros.                              |    |     |
| Total                                                                 | 48 | 100 |

## Skills to be developed:

## Intellectual skills:

- Use of programming language constructs in program implementation.
- To be able to apply different logics to solve given problem.
- To be able to write program using different implementations for the same problem
- Study different types of errors as syntax semantic, fatal, linker & logical
- Debugging of programs
- Understanding different steps to develop program such as
  - Problem definition
  - Analysis
  - Design of logic
  - ➢ Coding
  - ➢ Testing
  - > Maintenance (Modifications, error corrections, making changes etc.)

## Motor skills:

• Proper handling of Computer System.

## **Practicals:**

## List of Practical:

- 1. Identify the Assembly Language programming tools like Assembler, linker, debugger, editor.
- 2. Write an Assembly Language Program to add / subtract two 16 bit numbers.
- 3. Write an ALP to find sum of series of numbers.
- 4. Write an ALP to multiply two 16 bit unsigned/ signed numbers.
- 5. Write an ALP to divide two unsigned/ signed numbers (32/16, 16/8, 16/16, 8/8)
- 6. Write an ALP to add / Sub / multiply / Divide two BCD numbers.
- 7. Write an ALP to find smallest/ largest number from array of n numbers.
- 8. Write an ALP to arrange numbers in array in ascending/ descending order.
- 9. Write an ALP to perform block transfer data using string instructions / without using string instructions.
- 10. Write an ALP to compare two strings using string instructions / without using string instructions.
- 11. Write an ALP to display string in reverse order, string length, Concatenation of two strings.
- 12. Write an ALP to convert Hex to Decimal, Decimal to Hex.

## **Learning Resources**

1. Books

| Sr.<br>No. | Name of Book                                                                       | Author          | Publication      |
|------------|------------------------------------------------------------------------------------|-----------------|------------------|
| 1.         | Microprocessor & interfacing<br>(programming & hardware)<br>Revised Second Edition | Douglas V. Hall | Tata McGraw Hill |

| 2. | Microprocessor Architecture,<br>Programming and Applications with<br>the 8085 | Ramesh S. Gaonkar                 | Penram International<br>Publishing (India) |
|----|-------------------------------------------------------------------------------|-----------------------------------|--------------------------------------------|
| 3. | The 8088 and 8086 Microprocessors                                             | Walter A. Triebel, Avtar<br>Singh | Pearson Publications                       |
| 4. | The 8086.8088 Family, Design,<br>Programming, and Interfacing                 | John Uffenback                    | РНІ                                        |

## 2. Websites:

www.intel.com www.pcguide.com/ref/CPU www.CPU-World.com/Arch/ www.techsource .com / engineering- parts/microprocessor.html

| Course Name   | : Computer Engineering Group  |
|---------------|-------------------------------|
| Course Code   | : CO/CD/CM/CW/IF              |
| Semester      | : Fourth                      |
| Subject Title | : Object Oriented Programming |
| Subject Code  | : 17432                       |

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |     | Examination | on Scheme |     |       |
|-----------------|----|----|--------------|-----|-------------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH  | PR          | OR        | TW  | TOTAL |
| 03              |    | 04 | 03           | 100 | 50#         |           | 25@ | 175   |

#### NOTE:

> Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.

# > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

The ability to organize & process information is key to success in modern age. Object Oriented Programming has become the most preferred approach for software projects. It offers a new and powerful way to cope up with complexity of real world problems. Among the OOP languages available, C++ is one of the most widely used language.

Instead of viewing program as a series of steps to be carried out, OOP approach views it as a group of objects that have certain properties & can take appropriate actions.

Object Oriented Concepts like inheritance, polymorphism, data abstraction and encapsulation etc. requires knowledge of C++, which also acting as base for programming languages like Java, Object Oriented Modeling & Designing (OOMD), VC++.

## **Objectives:**

To develop following skills:

## Intellectual Skills:

- 1. Understand the concepts of OOP.
- 2. Implement programs based on OOP concepts.
- 3. Understand basic fundamentals of C++.
- 4. Develop small software applications using C++.

## **Motor Skills:**

1. Proper Handling of Computer System.

#### MSBTE – Final Copy Dt. 30/08/2013

## **Learning Structure:**



## Theory:

| Topic<br>No | Contents                                                                | Hours | Marks |
|-------------|-------------------------------------------------------------------------|-------|-------|
| 110         | Principles of Object Oriented Programming                               |       |       |
|             | Objectives:                                                             |       |       |
|             | <ul> <li>State OOP's basic Concepts.</li> </ul>                         |       |       |
|             | Difference between OOP & POP.                                           |       |       |
|             | $\succ$ C++ Programming structure.                                      |       |       |
|             | 1.1 Its need & requirement, Procedure Oriented Programming (POP)        |       |       |
| 1           | verses Object Oriented Programming (OOP). Basic concepts of             | 06    | 12    |
|             | Object Oriented Programming, Object Oriented Languages.                 |       |       |
|             | Applications of OOP.                                                    |       |       |
|             | 1.2 Beginning with C++: What is C++?, keywords, variables,              |       |       |
|             | constants basic data types, operators, scope resolution operator,       |       |       |
|             | memory management operators, console input/output, structure of         |       |       |
|             | C++ program.                                                            |       |       |
|             | Classes & Objects:                                                      |       |       |
|             | Objectives:                                                             |       |       |
|             | Defining classes & objects.                                             |       |       |
|             | Declaring & using static data member & static member                    |       |       |
|             | function, friend function.                                              |       |       |
| 2           | Programs based on classes & objects.                                    |       |       |
|             | 2.1 Structures in C++.                                                  | 08    | 20    |
|             | 2.2 Class & Object: Introduction, specifying a class, access specifies, |       |       |
|             | defining member functions, creating Objects, memory allocations         |       |       |
|             | for objects.                                                            |       |       |
|             | 2.3 Array of Objects, Object as function arguments.                     |       |       |
|             | 2.4 Static data members, static member function, friend Function        |       |       |
|             | Constructors & Destructors                                              |       |       |
|             | Objectives:                                                             |       |       |
|             | State Concepts of constructor & destructor, types of                    |       |       |
|             | constructor.                                                            |       |       |
| 3           | Programs based on constructor & destructors                             | 08    | 14    |
|             | 3.1 Concepts of Constructors, Types of constructors:                    |       |       |
|             | Default, Parameterized, Copy.                                           |       |       |
|             | 3.2 Overloaded Constructors : Multiple Constructors in a Class,         |       |       |
|             | 2.2 Destructors with default arguments.                                 |       |       |
|             | 5.5 Destructors.                                                        |       |       |
|             | Objectives:                                                             |       |       |
|             | Concept of Inheritance & its types                                      |       |       |
|             | <ul> <li>Types of Visibility modes</li> </ul>                           |       |       |
| 4           | <ul> <li>Programs based on Inheritance</li> </ul>                       | 08    | 20    |
| -           | 4.1 Introduction defining a derived class visibility modes & effects    | 00    | 20    |
|             | 4.2 Types of Inheritance · Single multilevel multiple                   |       |       |
|             | hierarchical hybrid                                                     |       |       |
|             | 4.3 Virtual base class, abstract class, constructors in derived class.  |       |       |
|             | Pointers in C++                                                         |       |       |
| -           | Objectives:                                                             | 10    | 10    |
| 5           | Declare Pointer & Pointer arithmetic.                                   | 10    | 18    |
|             | Pointer to Arrays, string & Object.                                     |       |       |

|   | address operator, Pointer arithmetic.                                                                                                                                |    |     |  |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|--|
|   | <ul><li>5.2 Pointer to Array: Searching, Insertion, deletion</li><li>5.3 Pointer to String: Searching, finding length, comparisons, concatenation, reverse</li></ul> |    |     |  |
|   |                                                                                                                                                                      |    |     |  |
|   | 5.4 Pointer to Object: Pointer to Object, this pointer, Pointer to                                                                                                   |    |     |  |
|   | derived class.                                                                                                                                                       |    |     |  |
|   | Polymorphism                                                                                                                                                         |    |     |  |
|   | Objectives:                                                                                                                                                          |    |     |  |
|   | Polymorphism concept & its types.                                                                                                                                    |    |     |  |
|   | Program for overloading operators & functions.                                                                                                                       |    |     |  |
| 6 | 6.1 Introduction, Types of polymorphism: Compile time, Run time                                                                                                      | 00 | 16  |  |
| 0 | 6.2 Compile time Polymorphism: Function overloading, operator                                                                                                        | 08 | 10  |  |
|   | overloading: Overloading unary and binary operators, Rules for                                                                                                       |    |     |  |
|   | operator overloading.                                                                                                                                                |    |     |  |
|   | 6.3 Run time polymorphism: Virtual functions, rules for virtual                                                                                                      |    |     |  |
|   | functions, pure virtual function.                                                                                                                                    |    |     |  |
|   | Total                                                                                                                                                                | 48 | 100 |  |

## List of Practical:

| Sr. No. | Title of Experiment                                                                                                                                                             |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | Write a program to Input & Output data for exchanging values of two variables.                                                                                                  |
| 2       | Develop a program to declare a class 'person' having data members name, age & salary.<br>Accept and display this data for one object.                                           |
| 3       | Write a program to declare a class 'employee' having data members name and age.<br>Accept and display the data for three objects.                                               |
| 4       | Write a program to show how static member is shared by multiple objects of the same class.                                                                                      |
| 5       | Develop a program to find out the mean value of a given number using friend function.                                                                                           |
| 6       | Develop a program to print student details of 'stud' class using constructor and destructor                                                                                     |
| 7       | Write a program to find prime number using default argument in constructor                                                                                                      |
| 8       | Write a program to find out the payroll system using single level inheritance.                                                                                                  |
| 9       | <ul><li>A. Write a program to find student details using multiple inheritance.</li><li>B. Write a program to compute total marks of student using virtual base class.</li></ul> |
| 10      | Write a program to evaluate the largest number of an array using pointer                                                                                                        |
| 11      | Write a program to search a character in a string using pointer.                                                                                                                |
| 12      | Write a program to input and display code and price for two items using pointer to object.                                                                                      |
| 13      | Write a program to display roll_no and name of student using 'this' pointer.                                                                                                    |
| 14 | Write a program to using function overloading to calculate volume of cube, cylinder & rectangular box |
|----|-------------------------------------------------------------------------------------------------------|
| 15 | Write a program to overload unary '' operator                                                         |
| 16 | Write a program to display the output using the virtual function.                                     |

## Learning Resources:

1. Books:

| Sr.<br>No. | Author           | Title                                                        | Publisher    |
|------------|------------------|--------------------------------------------------------------|--------------|
| 1          | E. Balagurusamy  | Object oriented Programming with C++                         | Mc Graw Hill |
| 2          | Rajesh K. Shukla | Object oriented Programming in C++                           | Wiley India  |
| 3          | B. M. Harwani    | C++ for Beginners                                            | SPD          |
| 4          | Robert Lafore    | Object Oriented Programming in C++ (4 <sup>th</sup> edition) | Pearson      |

## 2. CDs, PPTs Etc.:

www.vikaspublishing.com/teachermanual.aspx (PPTs available)

www.pearsoned.co.in/prc (After Registration resources are available)

## 3. Websites:

www.cplusplus.com www.learncpp.com www.sourcecodesworld.com www.softeam.com Course Name : Diploma in Information TechnologyCourse Code : IFSemester : FourthSubject Title : Applied Multimedia TechnologySubject Code : 17041

#### **Teaching and Examination Scheme**

| Teac | ching Sch | neme |              |    | Examinati | on Scheme |     |       |
|------|-----------|------|--------------|----|-----------|-----------|-----|-------|
| TH   | TU        | PR   | PAPER<br>HRS | TH | PR        | OR        | TW  | TOTAL |
|      |           | 04   |              |    | 50#       |           | 50@ | 100   |

#### **Rationale:**

Technology moves on a tremendous pace. In modern society, multimedia technology deals with developments in communication, internet, hardware technologies and tools.

The contents of this subject portray the present and future developments in the area of multimedia.

It is a practical oriented subject which provides the students an insight into various fonts, basic shapes, images, audio formats, video formats, animation controls and tools.

#### **General Objectives:**

Students will be able to

- > To know multimedia fundamentals and multimedia architecture.
- > To understand need of data compression and various compression techniques.
- > To know concepts of text, image, audio, video and animation
- ➤ To use multimedia tool-Flash, Adobe, Dreamweaver

#### Learning Structure:



#### **Learning Structure:**



#### **Content:**

Note: Contents of theory should be taught in practical period with the help of LCD projector.

| Sr. No. | Activity                                                                      | Hours |  |  |  |  |  |  |
|---------|-------------------------------------------------------------------------------|-------|--|--|--|--|--|--|
|         | Introduction to Flash                                                         |       |  |  |  |  |  |  |
|         | <ul> <li>Introduction to Multimedia tool – Flash</li> </ul>                   |       |  |  |  |  |  |  |
|         | Creating & Modifying elements                                                 |       |  |  |  |  |  |  |
| 1       | • Line tool, fill/attributes, different shapes, text tools & pen tool         | 04    |  |  |  |  |  |  |
| -       | Activity:                                                                     | 04    |  |  |  |  |  |  |
|         | Selecting lines fill with arrow tool, selecting shapes, using lasso tool      |       |  |  |  |  |  |  |
|         | performing basic editing tools, selecting & deselecting elements,             |       |  |  |  |  |  |  |
|         | modifying created objects.                                                    |       |  |  |  |  |  |  |
|         | Dream weaver and Firework                                                     |       |  |  |  |  |  |  |
|         | Activity:                                                                     |       |  |  |  |  |  |  |
|         | • To set up website in Dreamweaver.                                           |       |  |  |  |  |  |  |
| 2       | • To create content using Microsoft Word.                                     | 02    |  |  |  |  |  |  |
| -       | • To copy content from Word and paste in web page.                            | 03    |  |  |  |  |  |  |
|         | • To create CSS DIV to hold navigation index.                                 |       |  |  |  |  |  |  |
|         | • To create page navigation index.                                            |       |  |  |  |  |  |  |
|         | • To link page index to page content using anchors.                           |       |  |  |  |  |  |  |
|         | Theory: compression and Decompression                                         |       |  |  |  |  |  |  |
|         | <ul> <li>Need, Types, Evaluating &amp; Visibility</li> </ul>                  |       |  |  |  |  |  |  |
|         | • Evaluating the Compression System, Types of compression,                    | 1     |  |  |  |  |  |  |
|         | Need of Data Compression                                                      |       |  |  |  |  |  |  |
|         | Color Gray Scale and Still Video Image                                        |       |  |  |  |  |  |  |
|         | Color Characteristics                                                         |       |  |  |  |  |  |  |
| 3       | Color Model                                                                   | 02    |  |  |  |  |  |  |
| 5       | Activity:                                                                     | 03    |  |  |  |  |  |  |
|         | Find answers through software and try to incorporate in the practicals        |       |  |  |  |  |  |  |
|         | How much Compression require?                                                 |       |  |  |  |  |  |  |
|         | • How Good is Picture,                                                        |       |  |  |  |  |  |  |
|         | • How fast Does it Compress or Decompress.                                    |       |  |  |  |  |  |  |
|         | • What is effect of hardware on the multimedia application development?       |       |  |  |  |  |  |  |
|         | • Does it take. Redundancy & Usability in consideration?                      |       |  |  |  |  |  |  |
|         | Theory: Jpeg Architecture. Formats                                            |       |  |  |  |  |  |  |
| 4       | Activity:                                                                     | 02    |  |  |  |  |  |  |
|         | Use theory concepts in the practicals                                         |       |  |  |  |  |  |  |
|         | Theory:                                                                       |       |  |  |  |  |  |  |
| 5       | Mpeg architecture and File format                                             | 02    |  |  |  |  |  |  |
| -       | • MPEG-objectives, Architecture, BIT stream syntax performance                |       |  |  |  |  |  |  |
|         | • MPEG2 & MPEG4                                                               |       |  |  |  |  |  |  |
|         | Theory:                                                                       |       |  |  |  |  |  |  |
|         | Revision of Basic tag, Cascaded, Inline and Embedded style, Javascript for    |       |  |  |  |  |  |  |
| 6       | Client side validation like Blank check, String check for name, Numeric check |       |  |  |  |  |  |  |
| 0       | for telephone number, validate email address, date of birth                   |       |  |  |  |  |  |  |
|         | Activity:                                                                     |       |  |  |  |  |  |  |
|         | Construction of website using text, picture/Graphics / Audio /Video using     |       |  |  |  |  |  |  |
|         | flash, HTML, DHMTL, CSS, Scripts                                              |       |  |  |  |  |  |  |

#### **Intellectual skills:**

- To create and edit images using image editing software
- To create animation, build and play movie
- To integrate Audio and Video
- To integrate Multimedia in web page

## Motor Skills:

Proper handling of computer system with multimedia system

## List of Practical:

| Sr. No | Name Practical                                                                                                                                                                          | Hours |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 1      | Design an Advertisement in Flash                                                                                                                                                        | 2     |
| 2      | Implement C/VB program to Read BMP, Jpeg, GIF image and display                                                                                                                         | 2     |
| 3      | Write program for Small Website college, Mall, School, Theatre etc. which include basic components                                                                                      | 2     |
| 4      | Create multimedia database for student ID card preparation ie. storage image in data base                                                                                               | 2     |
| 5      | Edit the sample movie clip using Adobe premiere software                                                                                                                                | 2     |
| 6      | Design a game/application in flash                                                                                                                                                      | 2     |
| 7      | Implement Calculator and Media Player with voice control:<br>Button, Label ,Text box control of VB, How use OCX control in VB ,<br>Mediaplayer, DirectSS and Direct SR component of VB. | 2     |
| 8      | Implement C/VB program to Display color, height, width, resolution ,and other such tag value of Different image formats                                                                 | 2     |

## **Learning Resources:**

| Sr. No. | Author                      | Title                               | Publisher        |
|---------|-----------------------------|-------------------------------------|------------------|
| 1       | Chris Grover                | Flash CS6: The Missing Manual       | Shroff Publisher |
| 2       | Ze-Nian Li, Mark S.<br>Drew | Fundamentals of Multimedia          | PHI              |
| 3       | David sawyer                | Dreamweaver CS6: The Missing Manual | Shroff Publisher |

## Weblinks:

- 1) www.mediacollege.com/adobe/premiere/pro/
- 2) www.echoecho.com/flash.htm

## Equipment List/ Tools:-

Hardware Tools:-

- 1) Computer System (Pentium-IV or Higher Version).
- 2) LCD Projector.
- Software Tool:-1) Flash
  - 2) Dreamweaver
  - 3) Adobe Premiere (video editing software)

Course Name : Computer Engineering Group Course Code : CO/CD/CM/CW/IF Semester : Fourth Subject Title : Professional Practices-II Subject Code : **17042** 

### **Teaching and Examination Scheme:**

| Teac | hing Scl | heme |              |    | Examinati | on Scheme |     |       |
|------|----------|------|--------------|----|-----------|-----------|-----|-------|
| TH   | TU       | PR   | PAPER<br>HRS | TH | PR        | OR        | TW  | TOTAL |
|      |          | 03   |              |    |           |           | 50@ | 50    |

#### **Rationale:**

Our world is witnessing a measure change in communication pattern with expansion of industrial sphere, as industries demanding more competitive and challenging students.

To create multicultural working professionals, student must have positive attitude, confidence, and ability to communicate in addition to basic technological skill.

The purpose of introducing professional practices is to provide opportunity to diploma holder to undergo activities which will enable them to develop confidence. The semester is planned with expert lectures, seminar on technical topics and soft skills, group discussion along with mini project.

#### **Objectives**:

#### **Intellectual Skills:**

Students should be able to:

- 1. Acquire the knowledge from different resources.
- 2. Present a given topic effectively in a seminar and build a stage-daring.
- 3. Interact with colleague through group discussion.

## **Learning Structure:**



#### **Contents:**

| Activity | Name of Activity                                                           | Hours |  |  |  |  |  |  |  |
|----------|----------------------------------------------------------------------------|-------|--|--|--|--|--|--|--|
|          | Lectures by professional, industrial experts to be organized from          |       |  |  |  |  |  |  |  |
|          | following or any other suitable technical areas.                           |       |  |  |  |  |  |  |  |
|          | [Any two]: -                                                               |       |  |  |  |  |  |  |  |
| 1        | 1. Advanced technical writing skill                                        |       |  |  |  |  |  |  |  |
|          | 2. SAP modules and career.                                                 | 04    |  |  |  |  |  |  |  |
| 1        | 3. Career trends in computer / IT field                                    | 04    |  |  |  |  |  |  |  |
|          | 4. Intelligent computer system.                                            |       |  |  |  |  |  |  |  |
|          | 5. Advanced trends in hardware technology.                                 |       |  |  |  |  |  |  |  |
|          | 6. Advanced programming languages in IT field.                             |       |  |  |  |  |  |  |  |
|          | 7. Introduction to Apprenticeship Training Scheme                          |       |  |  |  |  |  |  |  |
|          | Information search: -                                                      |       |  |  |  |  |  |  |  |
|          | Form group of 6 students. Information should be collected from             |       |  |  |  |  |  |  |  |
|          | internet, news papers, journals, book etc.                                 |       |  |  |  |  |  |  |  |
|          | Each student should submit write-up about 8-10 pages from following        |       |  |  |  |  |  |  |  |
|          | allocated topic or any other suitable topic suggested by teacher.          |       |  |  |  |  |  |  |  |
|          | 1. Human machine interface                                                 |       |  |  |  |  |  |  |  |
| 2        | 2. Dynamic languages                                                       | 0.6   |  |  |  |  |  |  |  |
| 2        | 3. Robotic surgery                                                         | 06    |  |  |  |  |  |  |  |
|          | 4. Virtual keyboard                                                        |       |  |  |  |  |  |  |  |
|          | 5. Wireless USB                                                            |       |  |  |  |  |  |  |  |
|          | 6. Concept of cloud computing                                              |       |  |  |  |  |  |  |  |
|          | 7. Bubble sensing                                                          |       |  |  |  |  |  |  |  |
|          | 8. Blu – ray disc                                                          |       |  |  |  |  |  |  |  |
|          | 9. Or any other suitable topic                                             |       |  |  |  |  |  |  |  |
|          | Seminar: -                                                                 |       |  |  |  |  |  |  |  |
|          | Form a group of 6 students and deliver seminar on any one of the           |       |  |  |  |  |  |  |  |
|          | following technical topic or any other suitable subject topic suggested by |       |  |  |  |  |  |  |  |
|          | teacher for 10 minutes. seminar should be presented in power point         |       |  |  |  |  |  |  |  |
|          | presentation. Students should draw notes about 8-10 pages on respected     |       |  |  |  |  |  |  |  |
|          | topic.                                                                     |       |  |  |  |  |  |  |  |
|          | 1. Trouble shooting methods for various computer peripherals.              |       |  |  |  |  |  |  |  |
| 3        | 2. Viruses / antivirus and firewalls [checkpoints]                         | 16    |  |  |  |  |  |  |  |
|          | 3. Protocols suits: - SLIP and PPP, ARP, IP- V6, ICMP-V6, TCP &            |       |  |  |  |  |  |  |  |
|          | UDP [each protocol may be separate topic].                                 |       |  |  |  |  |  |  |  |
|          | 4. Stream classes in C++.                                                  |       |  |  |  |  |  |  |  |
|          | 5. Exception handling in C++.                                              |       |  |  |  |  |  |  |  |
|          | 6. Pointers in C++.                                                        |       |  |  |  |  |  |  |  |
|          | 7. Interrupts useful for microprocessor programming.                       |       |  |  |  |  |  |  |  |
|          | 8. Or any other suitable topic.                                            |       |  |  |  |  |  |  |  |
|          | Group discussion: -                                                        |       |  |  |  |  |  |  |  |
|          | Form a group of 6 students. Teacher should allocate a topic from the       |       |  |  |  |  |  |  |  |
|          | following list or any other suggested topic and do the group discussion    |       |  |  |  |  |  |  |  |
|          | for 10 minutes.                                                            |       |  |  |  |  |  |  |  |
| Λ        | 1. Is china a threat to the Indian software industry?                      | 10    |  |  |  |  |  |  |  |
| 4        | 2. Education is only business in these days.                               | 12    |  |  |  |  |  |  |  |
|          | 3. Is male and female equal in all aspects?                                |       |  |  |  |  |  |  |  |
|          | 4. Opinion about reservation in education sector.                          |       |  |  |  |  |  |  |  |
|          | 5. Boom in retail sector?                                                  |       |  |  |  |  |  |  |  |
|          | 6. Whether software is dominant over hardware or vice-versa?               |       |  |  |  |  |  |  |  |

|                                                                      | 7. Or any other topic.                                                   |    |  |  |  |  |  |  |  |  |
|----------------------------------------------------------------------|--------------------------------------------------------------------------|----|--|--|--|--|--|--|--|--|
|                                                                      | Mini projects / activities: -                                            |    |  |  |  |  |  |  |  |  |
| Form a group of 6 students. Teacher should allocate a topic for mini |                                                                          |    |  |  |  |  |  |  |  |  |
|                                                                      | project from the following topics or any other suggest topic and develop |    |  |  |  |  |  |  |  |  |
|                                                                      | the mini project.                                                        |    |  |  |  |  |  |  |  |  |
|                                                                      | 1. Web site development system.                                          |    |  |  |  |  |  |  |  |  |
| 5                                                                    | 2. Database management system project                                    | 10 |  |  |  |  |  |  |  |  |
|                                                                      | 3. Animation project using C and C++.                                    |    |  |  |  |  |  |  |  |  |
|                                                                      | 4. System project using front end and back end.                          |    |  |  |  |  |  |  |  |  |
|                                                                      | 5. Game designing.                                                       |    |  |  |  |  |  |  |  |  |
|                                                                      | 6. Assembly of computer system and installation of application           |    |  |  |  |  |  |  |  |  |
|                                                                      | software.                                                                |    |  |  |  |  |  |  |  |  |
|                                                                      | TOTAL                                                                    | 48 |  |  |  |  |  |  |  |  |

## **Learning Resources:**

## 1. Books:

| Sr. No. | Title                                                                                                       |
|---------|-------------------------------------------------------------------------------------------------------------|
| 1.      | Fourth semester subjects reference books                                                                    |
| 2.      | Journals and magazines – IEEE Journals, IT technologies.                                                    |
| 3.      | Local news papers and events                                                                                |
| 4.      | Apprenticeship Training Scheme :- Compiled By – BOAT (Western Region), Mumbai, Available on MSBTE Web Site. |

## 2. Websites:

1. http://www.wikipedia.com

2. http://www.seminarforyou.com

# Course Name : All Branches of Diploma in Engineering & Technology Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG Industrial Training (Optional) after 4<sup>th</sup> semester examination.

Note:- Examination in Professional Practices of 5<sup>th</sup> Semester.

## INDUSTRIAL TRAINING (OPTIONAL)

## Rational:-

There was a common suggestion from the industry as well as other stakeholders that curriculum of Engineering and Technology courses should have Industrial training as part of the curriculum. When this issue of industrial training was discussed it was found that it will be difficult to make industrial training compulsory for all students of all courses as it will be difficult to find placement for all the students. It is therefore now proposed that this training can be included in the curriculum as optional training for student who is willing to undertake such training on their own. The institutes will help them in getting placement or also providing them requisite documents which the student may need to get the placement.

Details:- Student can undergo training in related industries as guided by subject teachers / HOD.

- The training will be for four weeks duration in the summer vacation after the fourth semester examination is over.
- The student undergoing such training will have to submit a report of the training duly certified by the competent authority from the industry clearly indicating the achievements of the student during training. This submission is to be made after joining the institute for Fifth semester.
- The student completing this training will have to deliver a seminar on the training activities based on the report in the subject Professional Practices at Fifth Semester.
- The student undergoing this training will be exempted from attending activities under Professional Practices at Fifth semester except the seminar.
- The students who will not undergo such training will have to attend Professional Practices Classes/activities of fifth semester and will have to complete the tasks given during the semester under this head.
- There work will be evaluated on their submissions as per requirement and will be given marks out of 50. Or student may have to give seminar on training in Industry he attended.
- Institute shall encourage and guide students for Industry training.
- Evaluation:- Report of Training attended and delivery of seminar and actual experience in Industry will be evaluated in fifth semester under Profession Practices-III and marks will be given accordingly out of 50.

w.e.f Academic Year 2012-13

'G' Scheme

WITH EFFECT FROM 2012-13

**DURATION: 16 WEEKS** 

SCHEME : G

# MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI

## TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES

# COURSE NAME : INDUSTRIAL ELECTRONICS, INSTRUMENTATION, INSTRUMENTATION & CONTROL AND INDUSTRIAL ELECTRONICS (SANDWICH PATTERN) ENGINEERING GROUP

## **COURSE CODE : IE/IS/IC/IU**

| <b>DURATION OF COURSE : 6 SEMESTERS</b> | for IE/IS/IC and 8 SEMESTERS for IU |  |
|-----------------------------------------|-------------------------------------|--|
|-----------------------------------------|-------------------------------------|--|

#### **SEMESTER : FOURTH**

## FULL TIME / PART TIME : FULL TIME

|           | SUBJECT TITLE                          | SUBJECT TITLE    |             | TEACHING   |      | EXAMINATION SCHEME |                        |           |         |         |                      |      |        |     |               |         |
|-----------|----------------------------------------|------------------|-------------|------------|------|--------------------|------------------------|-----------|---------|---------|----------------------|------|--------|-----|---------------|---------|
| SR.<br>NO |                                        | Abbrevi<br>ation | SUB<br>CODE | SUB SCHEME |      | PAPER              | TH (1)                 |           | PR (4)  |         | OR (8)               |      | TW (9) |     | SW<br>(17400) |         |
| 110.      |                                        | ation            | CODE        | ТН         | TU   | PR                 | HRS.                   | Max       | Min     | Max     | Min                  | Max  | Min    | Max | Min           | (17400) |
| 1         | Environmental Studies \$               | EST              | 17401       | 01         |      | 02                 | 01                     | 50#*      | 20      |         |                      |      |        | 25@ | 10            |         |
| 2         | Industrial Measurements β              | IME              | 17434       | 03         |      | 02                 | 03                     | 100       | 40      |         |                      |      |        | 25@ | 10            |         |
| 3         | Power Electronics                      | PEL              | 17444       | 03         |      | 02                 | 03                     | 100       | 40      | 25#     | 10                   |      |        | 25@ | 10            |         |
| 4         | Linear Integrated Circuits β           | LIC              | 17445       | 04         |      | 02                 | 03                     | 100       | 40      | 50#     | 20                   |      |        | 25@ | 10            | 50      |
| 5         | Principles of Communication<br>Systems | PCS              | 17472       | 03         |      | 02                 | 03                     | 100       | 40      | 25#     | 10                   |      |        | 25@ | 10            | 50      |
| 6         | Visual Basic β                         | VBA              | 17043       | 01         |      | 02                 |                        |           |         |         |                      |      |        | 25@ | 10            |         |
| 7         | Professional Practices-II β            | PPT              | 17044       |            |      | 03                 |                        |           |         |         |                      |      |        | 50@ | 20            |         |
|           |                                        | r                | TOTAL       | 15         |      | 15                 | -                      | 450       |         | 100     |                      |      |        | 200 | -             | 50      |
| **        | Industrial Training (Optional)         |                  |             | Exa        | mina | tion ir            | n 5 <sup>th</sup> Seme | ester Pro | ofessio | nal Pra | nctices <sup>.</sup> | -III |        |     |               |         |

Student Contact Hours Per Week: 30 Hrs.

## THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.

#### Total Marks : 800

@- Internal Assessment, # - External Assessment, No Theory Examination, \$ - Common to all branches, #\* - Online Theory Examination, β -

Common to DE / EV / MU

Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work.

\*\* Industrial Training (Optional) - Student can undergo Industrial Training of four weeks after fourth semester examination during summer vacation.

## Assessment will be done in Fifth semester under Professional Practices-III. They will be exempted from activities of Professional Practices-III of 5<sup>th</sup> Semester.

- Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subjects is to be converted out of 50 marks as sessional work (SW).
- > Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.
- > Code number for TH, PR, OR and TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.

MSBTE – Final Copy Dt. 30/08/2013

Course Name : All Branches of Diploma in Engineering & Technology Course Code : AE/CE/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/

#### ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG/AU

Semester : Fourth

Subject Title : Environmental Studies

Subject Code : 17401

**Teaching and Examination Scheme:** 

| Teac | hing Scl | heme | Examination Scheme |      |    |    |     |       |
|------|----------|------|--------------------|------|----|----|-----|-------|
| TH   | TU       | PR   | PAPER<br>HRS       | TH   | PR | OR | TW  | TOTAL |
| 01   |          | 02   | 01                 | 50#* |    |    | 25@ | 75    |

#### **#\* Online Theory Examination**

NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Environment essentially comprises of our living ambience, which gives us the zest and verve in all our activities. The turn of the twentieth century saw the gradual onset of its degradation by our callous deeds without any concern for the well being of our surrounding we are today facing a grave environmental crisis. The unceasing industrial growth and economic development of the last 300 years or so have resulted in huge ecological problems such as overexploitation of natural resources, degraded land, disappearing forests, endangered species, dangerous toxins, global warming etc.

It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

The curriculum covers the aspects about environment such as Environment and Ecology, Environmental impacts on human activities, Water resources and water quality, Mineral resources and mining, Forests, etc.

General Objectives: The student will be able to,

- 1. Understand importance of environment
- 2. Know key issues about environment
- 3. Understands the reasons for environment degradation
- 4. Know aspects about improvement methods
- 5. Know initiatives taken by the world bodies to restrict and reduce degradation

## **Learning Structure:**



## Theory:

| Topic and Contents                                                | Hours | Marks |
|-------------------------------------------------------------------|-------|-------|
| Topic 1: Nature of Environmental Studies                          |       |       |
| Specific Objectives:                                              |       |       |
| Define the terms related to Environmental Studies                 |       |       |
| State importance of awareness about environment in general public | 01    | 04    |
| Contents:                                                         | 01    | 04    |
| • Definition, Scope and Importance of the environmental studies   |       |       |
| Importance of the studies irrespective of course                  |       |       |
| Need for creating public awareness about environmental issues     |       |       |
| <b>Topic 2: Natural Resources and Associated Problems</b>         |       |       |
| Specific Objectives:                                              |       |       |
| Define natural resources and identify problems associated with    |       |       |
| them                                                              |       |       |
| Identify uses and their overexploitation                          |       |       |
| Identify alternate resources and their importance for environment |       |       |
| Contents:                                                         |       |       |
| 2.1 Renewable and Non renewable resources                         |       |       |
| • Definition                                                      |       |       |
| Associated problems                                               |       |       |
| 2.2 Forest Resources                                              |       |       |
| • General description of forest resources                         |       |       |
| • Functions and benefits of forest resources                      |       |       |
| • Effects on environment due to deforestation, Timber             |       |       |
| extraction, Building of dams, waterways etc.                      | 04    | 10    |
| 2.3 Water Resources                                               | 01    | 10    |
| • Hydrosphere: Different sources of water                         |       |       |
| • Use and overexploitation of surface and ground water            |       |       |
| • Effect of floods, draught, dams etc. on water resources and     |       |       |
| community                                                         |       |       |
| 2.4 Mineral Resources:                                            |       |       |
| Categories of mineral resources                                   |       |       |
| Basics of mining activities                                       |       |       |
| • Mine safety                                                     |       |       |
| • Effect of mining on environment                                 |       |       |
| 2.5 Food Resources:                                               |       |       |
|                                                                   |       |       |
| • Food for all                                                    |       |       |
| • Effects of modern agriculture                                   |       |       |
| World food problem                                                |       |       |
| Topic 3. Ecosystems                                               |       |       |
| Concept of Ecosystem                                              |       |       |
| • Structure and functions of ecosystem                            | 01    | 04    |
| • Energy flow in ecosystem                                        |       |       |
| Major ecosystems in the world                                     |       |       |
| Topic 4. Biodiversity and Its Conservation                        |       |       |
| Definition of Biodiversity                                        | 02    | 06    |
| • Levels of biodiversity                                          |       |       |

| <ul> <li>Wildlife Protection Act</li> <li>Forest Conservation Act<br/>Population Growth: Aspects, importance and effect on<br/>environment</li> <li>Human Health and Human Rights</li> </ul> | )2 | 08 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|
| <ul> <li>Wildlife Protection Act</li> <li>Forest Conservation Act<br/>Population Growth: Aspects, importance and effect on<br/>environment</li> </ul>                                        | )2 | 08 |
| <ul> <li>Wildlife Protection Act</li> <li>Forest Conservation Act<br/>Population Growth: Aspects, importance and effect on</li> </ul>                                                        | )2 | 08 |
| <ul> <li>Wildlife Protection Act</li> <li>Forest Conservation Act</li> </ul>                                                                                                                 | )2 | 08 |
| Wildlife Protection Act                                                                                                                                                                      | 02 | 08 |
|                                                                                                                                                                                              |    | 00 |
| • Water (Prevention and Control of Pollution) Act                                                                                                                                            |    |    |
| • Air (Prevention and Control of Pollution) Act                                                                                                                                              |    | j  |
| • Environmental Protection Act                                                                                                                                                               | 1  |    |
| Brief description of the following acts and their provisions:                                                                                                                                |    |    |
| Topic 7. Environmental Protection                                                                                                                                                            |    |    |
| <ul> <li>Concept of Carbon Credits and its advantages</li> </ul>                                                                                                                             |    |    |
| and their effect on climate                                                                                                                                                                  |    |    |
| Depletion Nuclear Accidents and Holocaust Basic concepts                                                                                                                                     |    |    |
| Climate Change Global warming Acid rain Ozone Laver                                                                                                                                          | )3 | 10 |
| • water conservation, watershed management, Kall water<br>harvesting: Definition Methods and Benefits                                                                                        |    |    |
| Concept of development, sustainable development     Water conservation. Watershed management. Bein water                                                                                     |    |    |
| 1 opic 6. Social Issues and Environment                                                                                                                                                      |    |    |
| Noise Pollution: Definition, sources, effects, prevention                                                                                                                                    |    |    |
| • Son Pollution: Definition, sources, effects, prevention                                                                                                                                    |    |    |
| prevention                                                                                                                                                                                   |    |    |
| • Water Pollution: Definition, Classification, sources, effects,                                                                                                                             |    |    |
| prevention                                                                                                                                                                                   | )3 | 08 |
| • Air pollution: Definition, Classification, sources, effects,                                                                                                                               |    |    |
| • Definition                                                                                                                                                                                 |    |    |
| Topic 5. Environmental Pollution                                                                                                                                                             |    |    |
| Conservation of biodiversity                                                                                                                                                                 |    |    |
| Threats to biodiversity                                                                                                                                                                      |    |    |
| Value of biodiversity                                                                                                                                                                        |    |    |

#### Practical: Skills to be developed:

## **Intellectual Skills**:

- 1. Collection of information, data
- 2. Analysis of data
- 3. Report writing

## Motor Skills:

- 1. Presentation Skills
- 2. Use of multi media

## List of Projects:

Note: Any one project of the following:

- 1. Visit to a local area to document environmental assets such as river / forest / grassland / hill / mountain
- 2. Visit to a local polluted site: Urban/Rural/Industrial/Agricultural
- 3. Study of common plants, insects, birds

4. Study of simple ecosystems of ponds, river, hill slopes etc

Prepare a project report on the findings of the visit illustrating environment related facts, analysis and conclusion. Also suggest remedies to improve environment.

Learning Resources: Books:

| Sr.<br>No. | Author                                                | Title                                        | Publisher               |
|------------|-------------------------------------------------------|----------------------------------------------|-------------------------|
| 01         | Anindita Basak                                        | Environmental Studies                        | Pearson Education       |
| 02         | R. Rajgopalan                                         | Environmental Studies<br>from Crises to Cure | Oxford University Press |
| 03         | Dr. R. J. Ranjit Daniels, Dr.<br>Jagdish Krishnaswamy | Environmental Studies                        | Wiley India             |

| Course Name   | : Electronics Engineering Group |
|---------------|---------------------------------|
| Course Code   | : EJ/EX/ET/EN/IE/IS/IC/IU       |
| Semester      | : Fourth                        |
| Subject Title | : Industrial Measurements       |
| Subject Code  | : 17434                         |
|               |                                 |

**Teaching and Examination Scheme:** 

| Teac | ching Scl | neme | Examination Scheme |     |    |    |     |       |
|------|-----------|------|--------------------|-----|----|----|-----|-------|
| TH   | TU        | PR   | PAPER<br>HRS       | TH  | PR | OR | TW  | TOTAL |
| 03   |           | 02   | 03                 | 100 |    |    | 25@ | 125   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

The science of instrumentation system plays vital role in the development of technology. An electronic system has prime importance in the field of instrumentation. Most of the physical parameters can be converted into electrical signal with the use of transducers. The obtained electrical signal can be conditioned, processed, displayed and controlled with the use of advanced control system.

With the background of measuring instruments, this subject deals with measurement of different physical parameters like temperature, pressure etc. covering the entire gamut of industrial measurement. Different types of transducers used for measurement of different physical quantities with their construction, working principle, advantages, and disadvantages are studied through this subject.

#### **General Objectives:**

After studying this subject the students will be able to:

- 1) Understand the nature and working of instrumentation system used in industrial & general applications.
- 2) Classify the physical parameters with their proper units
- 3) Understand the concepts of different types of transducers

### **Learning Structure:**



## **Theory Contents:**

| Topic<br>No | Theory                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Hrs. | Marks |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|
|             | <ul> <li>Transducers:</li> <li>Specific Objectives:</li> <li>Draw and describe the block diagram of Instrumentation system.</li> <li>Compare different Transducers</li> <li>Draw and describe different Electronic Transducers.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |       |
| 1           | <ul> <li>Contents <ul> <li>Instrumentation System:<br/>Block diagram of Instrumentation system: Function of each<br/>block, Explanation of basic instrumentation systems</li> <li>Transducer:<br/>Need of Transducer:<br/>Classification of transducers: Active and Passive, Analog and<br/>Digital, Primary and Secondary.</li> <li>Electrical Transducers:<br/>Resistive transducers- Linear &amp; Angular potentiometers<br/>Capacitive transducer<br/>Inductive transducer –LVDT, RVDT (As a displacement<br/>transducer)<br/>Piezoelectric transducer<br/>(Principle of operation and applications of above)</li> <li>Selection criterion of transducers</li> </ul> </li> </ul>                                                                                                                                              | 08   | 16    |
| 2           | <ul> <li>Pressure measurement</li> <li>Draw and describe the non-elastic and elastic pressure transducers.</li> <li>Draw and describe electronic pressure transducers.</li> <li>Write procedure of calibration of elastic pressure gauges using dead weight tester.</li> <li>Contents <ul> <li>Pressure:</li> <li>Definition</li> <li>Types - Absolute, Gauge, Atmospheric, Vacuum( Definition, Units)</li> </ul> </li> <li>Classification of Pressure measuring devices</li> <li>Non elastic pressure transducer:</li> <li>U tube</li> <li>Inclined Tube</li> <li>Well type manometer</li> <li>Elastic pressure transducer:</li> <li>Bourdon Tube</li> <li>Bellows</li> <li>Diaphragm</li> <li>Capsule</li> <li>Electronic pressure transducers:</li> <li>Bourdon tube with LVDT</li> <li>Diaphragm with Strain gauge</li> </ul> | 08   | 20    |

|   | • Calibration of pressure gauge using dead weight tester<br><u>Note:</u> Each transducer should be studied on the basis of working                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |    |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|
|   | principle, construction, advantages, disadvantages and applications.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |    |    |
|   | <ul> <li>Flow Measurement</li> <li>List Of different types of flow.</li> <li>List of different types of flow measuring transducers.</li> <li>Draw and describe construction and working of different Flow measuring transducers.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |    |    |
| 3 | <ul> <li>Contents <ul> <li>Flow:</li> <li>Definition</li> <li>Types of Flow –Laminar, turbulent, Reynolds number</li> </ul> </li> <li>Classification of flow measuring transducers : <ul> <li>Variable head flow meter- Venturimeter, orifice plate meter</li> <li>Variable area flow meter – Rota meter</li> <li>Electromagnetic Flow meter</li> <li>Ultrasonic flow meter- Time difference and Doppler Type</li> </ul> </li> <li>Note: Each transducer should be studied on the basis of working</li> </ul>                                                                                                                                                                                                                                                                                                                     | 06 | 14 |
| 4 | <ul> <li>principle, construction, advantages, disadvantages and applications.</li> <li>Level Measurement <ul> <li>State the need of level measurement.</li> <li>List of different level measuring methods.</li> <li>Draw the construction and describe working of Level measuring transducers.</li> </ul> </li> <li>Contents <ul> <li>Level:</li> <li>Definition</li> <li>Need of level measurement</li> <li>Classification of level measurement methods:</li> <li>Float type – linear &amp; rotary potentiometer ( Contact type)</li> <li>Capacitive type (Contact type)</li> <li>Ultrasonic type (Non-contact type)</li> <li>RADAR type (Non-contact type)</li> </ul> </li> <li>Note: Each transducer should be studied on the basis of working principle, construction, advantages, disadvantages and applications.</li> </ul> | 08 | 16 |
| 5 | <ul> <li>Temperature measurement         <ul> <li>List different temperature measuring scales and its conversions.</li> <li>List different temperature measuring transducers.</li> <li>Draw the construction and describe working of different temperature transducers.</li> </ul> </li> <li>Contents         <ul> <li>Temperature :<br/>Definition and units<br/>First law of thermodynamics<br/>Different temperature scales &amp; their conversions</li> <li>Classification of temperature measuring transducers:</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                       | 10 | 20 |

| <ul> <li>Magnetic pick-up (Non contact type)</li> <li>pH Measurement</li> <li><u>Note:</u> Each transducer should be studied on the basis of working principle, construction, advantages, disadvantages and applications.</li> </ul> |                                                                                                                                         |                                                                                                                                           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| <ul> <li>Magnetic pick-up (Non contact type)</li> <li>pH Measurement</li> <li>Note: Each transducer should be studied on the basis of working</li> </ul>                                                                             |                                                                                                                                         |                                                                                                                                           |
| <ul><li>Magnetic pick-up (Non contact type)</li><li>pH Measurement</li></ul>                                                                                                                                                         |                                                                                                                                         |                                                                                                                                           |
| Magnetic pick-up (Non contact type)                                                                                                                                                                                                  |                                                                                                                                         |                                                                                                                                           |
|                                                                                                                                                                                                                                      |                                                                                                                                         |                                                                                                                                           |
| Photoelectric pick-up (Non contact type)                                                                                                                                                                                             |                                                                                                                                         |                                                                                                                                           |
| Classification of speed measurement methods                                                                                                                                                                                          |                                                                                                                                         |                                                                                                                                           |
| Definition                                                                                                                                                                                                                           |                                                                                                                                         |                                                                                                                                           |
| • Speed                                                                                                                                                                                                                              |                                                                                                                                         |                                                                                                                                           |
| Hygrometer- hair type, capacitive, resistive type                                                                                                                                                                                    |                                                                                                                                         |                                                                                                                                           |
| Psychrometer - Dry & wet Bulb thermometer type                                                                                                                                                                                       |                                                                                                                                         |                                                                                                                                           |
| Humidity measurement devices:                                                                                                                                                                                                        | 08                                                                                                                                      | 14                                                                                                                                        |
| Types - Absolute, relative                                                                                                                                                                                                           |                                                                                                                                         |                                                                                                                                           |
| Definition                                                                                                                                                                                                                           |                                                                                                                                         |                                                                                                                                           |
| • Humidity:                                                                                                                                                                                                                          |                                                                                                                                         |                                                                                                                                           |
| Contents                                                                                                                                                                                                                             |                                                                                                                                         |                                                                                                                                           |
| measuring transaucers.                                                                                                                                                                                                               |                                                                                                                                         |                                                                                                                                           |
| Draw the construction and describe working of Speed                                                                                                                                                                                  |                                                                                                                                         |                                                                                                                                           |
| transducers.                                                                                                                                                                                                                         |                                                                                                                                         |                                                                                                                                           |
| Draw the construction and describe working of Humidity                                                                                                                                                                               |                                                                                                                                         |                                                                                                                                           |
| List different types of humidity and its units.                                                                                                                                                                                      |                                                                                                                                         |                                                                                                                                           |
| Special Transducers and Measurements                                                                                                                                                                                                 |                                                                                                                                         |                                                                                                                                           |
| principle, construction, advantages, disadvantages and applications.                                                                                                                                                                 |                                                                                                                                         |                                                                                                                                           |
| Note: Each transducer should be studied on the basis of working                                                                                                                                                                      |                                                                                                                                         |                                                                                                                                           |
| Pyrometer - Optical, Radiation                                                                                                                                                                                                       |                                                                                                                                         |                                                                                                                                           |
| etc. (Based on material, temperature ranges)                                                                                                                                                                                         |                                                                                                                                         |                                                                                                                                           |
| Thermocouple – Seeback & Peltier effect , Types J. K. R. S. T                                                                                                                                                                        |                                                                                                                                         |                                                                                                                                           |
| RTD = (PT-100) - 2/3/4 wire systems (circuit diagram only)                                                                                                                                                                           |                                                                                                                                         |                                                                                                                                           |
| Thermistors                                                                                                                                                                                                                          |                                                                                                                                         |                                                                                                                                           |
| Fined System type mermometer.<br>Bimetallic thermometer                                                                                                                                                                              |                                                                                                                                         |                                                                                                                                           |
| Filled system type thermometer.                                                                                                                                                                                                      |                                                                                                                                         |                                                                                                                                           |
|                                                                                                                                                                                                                                      | Filled system type thermometer.<br>Bimetallic thermometer<br>Thermistors<br>RTD – (PT-100), 2/3/4 wire systems ( circuit diagram only ) | Filled system type thermometer.<br>Bimetallic thermometer<br>Thermistors<br>RTD – (PT-100) , 2 /3/4 wire systems ( circuit diagram only ) |

## **Practical:** Skills to be developed:

## **Intellectual Skills:**

- Selection of transducer based on application.
- > Interpretation of results.

## Motor Skills:

- > Connection of different transducers with measuring system.
- > Measurement of various physical parameters using transducers.
- > Observation and plotting the characteristics.

#### **List of Practicals:**

| Sr. No. | Title of the Experiment         |  |
|---------|---------------------------------|--|
| 1       | Measure displacement using LVDT |  |

| 2  | Measure weight using strain gauge pressure transducer with cantilever setup  |  |  |
|----|------------------------------------------------------------------------------|--|--|
| 3  | Measure pressure using Bourdon tube pressure gauge                           |  |  |
| 4  | Calibrate pressure gauge using Dead weight pressure gauge tester             |  |  |
| 5  | Determine the rate of flow of liquid in pipe using Rotameter                 |  |  |
| 6  | Calculate flow through pipe using orifice meter                              |  |  |
| 7  | Measure temperature of liquid using Resistance Temperature Detector (PT 100) |  |  |
| 8  | Measure temperature of liquid using thermocouple                             |  |  |
| 9  | Observe and interpret humidity of air using wet and dry bulb Hygrometer      |  |  |
| 10 | Measure speed of motor using non contact type photo electric tachometer.     |  |  |

### **Learning Resources:**

#### 1. Books:

| Sr.<br>No. | Author                         | Title                                                         | Publisher                                         |
|------------|--------------------------------|---------------------------------------------------------------|---------------------------------------------------|
| 01         | A.K.Sawhney                    | Electrical and Electronic<br>Measurements and Instrumentation | Dhanpat Rai & Sons.                               |
| 02         | S.K.Singh                      | Industrial Instrumentation & Control                          | Tata McGraw Hill Publishing<br>Co. Ltd; N. Delhi  |
| 03         | D. Patranabis                  | Principles of Industrial Instrumentation                      | Tata McGraw Hill Publishing<br>Co. Ltd; N. Delhi  |
| 04         | Rangan Mani<br>Sharma          | Instrumentation Systems and Devices                           | Tata McGraw Hill Publishing<br>Co. Ltd; N. Delhi  |
| 05         | Bela Liptak<br>Kriszta Venczel | Process Measurement<br>Instrument Engineers Handbook          | Chilton Book Co.                                  |
| 06         | B.C.Nakra<br>K.K.Chaudhry      | Instrumentation Measurement and Analysis                      | Tata McGraw Hill Publishing<br>Co. Ltd; N. Delhi. |

## 2. CD/ PPTs etc.:

- www.proprofs.com/webschool
- ➤ www.osvn.com

#### 3. Websites

- http://en.wikipedia.org/wiki/
- > www.youtube.com/ "here type name of instrument"
- ➢ www.controlnet.com

| Course Name   | : Electronics Engineering Group    |
|---------------|------------------------------------|
| Course Code   | : ET/EN/EX/EJ/DE/ED/EI/IE/IS/IC/IU |
| Semester      | : Fourth                           |
| Subject Title | : Power Electronics                |
| Subject Code  | : 17444                            |

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |     |     | Examination | on Scheme |       |
|-----------------|----|----|--------------|-----|-----|-------------|-----------|-------|
| TH              | TU | PR | PAPER<br>HRS | TH  | PR  | OR          | TW        | TOTAL |
| 03              |    | 02 | 03           | 100 | 25# |             | 25@       | 150   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Day by day the change in Electronics Industry is dynamic. The role of Diploma engineers changed over the years. Engineers should have concepts of industrial electronics. Electronic control circuits have major role in Industries for which study of power devices is essential.

Concepts of electronic devices and circuits along with their applications are necessary. Industrial electronic is the foundation subject to study industrial drives, and advanced industrial electronics.

#### **Objectives:**

Students will be able to:

- 1. Understand construction and operating principle of various power electronic devices.
- 2. Study construction and operation of controlled rectifiers, choppers and inverter and industrial control circuits.

#### **Learning Structure:**



#### Theory:

| Topic<br>No | Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Hours | Marks |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
| 110         | Power Electronics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |
|             | Specific Objectives:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |       |
|             | Realize construction, working principle of different Power                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |       |
|             | Devices.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |       |
|             | > To select proper power device for particular applications.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |       |
|             | Contents:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |       |
|             | • Introduction to power electronics.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |       |
| 1           | <ul> <li>Power transistor: Construction Operating Principle V-I</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 04    | 10    |
|             | characteristics and Uses of power transistors                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |       |
|             | Power MOSEET- Construction Operating Principle V-I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |       |
|             | characteristics and Uses of Depletion and Enhancement type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |       |
|             | nower MOSFET                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |       |
|             | • IGBT- Construction Operating Principle V-I characteristics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |       |
|             | and Uses of IGRT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |       |
|             | Thyristor Family Davies                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |       |
|             | Sneeific Objectives                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |       |
|             | <ul> <li>Classify different nower devices</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |       |
|             | <ul> <li>Classify different power devices.</li> <li>Identify thyristors and triggering devices</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |       |
|             | $\sim$ Describe the operation of the theory of the second se |       |       |
|             | <ul> <li>Describe the operation of thyristor.</li> <li>Interpret V-I characteristics of different newer devices</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |       |
|             | Contents:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |       |
|             | • SCP: Construction Operating Dringinle with Two transistor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       |       |
|             | • SCK. Construction, Operating Finiciple with Two transistor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 10    | 20    |
| 2           | Holding Current (L) Applications of SCP LASCP SCS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 10    | 20    |
|             | GTO and TDIAC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |       |
|             | Thuriston family devices LASCD SCS. CTO and TDLAC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |
|             | • Invisior family devices LASCK, SCS, GTO and TRIAC:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |       |
|             | construction, Operating Principle, V-1 characteristics and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |       |
|             | applications.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |       |
|             | • Inggering Devices- Construction, Operating Principle, v-1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       |       |
|             | characteristics and applications of UJ1, PU1, SUS, SBS and DIAC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |       |
|             | DIAU.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |       |
|             | TUFIL ON AND TUFIL OFF METHODS OF SCK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |       |
|             | Specific Unjectives:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |       |
|             | <ul> <li>Classify Turn ON and Turn OFF circuits.</li> <li>Compare low newer and kick newer triggering circuits.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |       |
|             | Compare low power and high power triggering circuits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |       |
|             | Contents:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |       |
|             | • Concept of Turn ON mechanism of SCR: High voltage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |       |
|             | triggering, thermal triggering, illumination triggering, dv/dt                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |       |
| 2           | triggering Gate triggering of SCR.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 00    | 1.6   |
| 3           | • Gate trigger circuits –Resistance triggering circuit, Resistance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 08    | 16    |
|             | Capacitance triggering circuit (Operation, applications and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       |       |
|             | limitations)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |       |
|             | • SCR triggering using UJT, PUT-Relaxation Oscillator circuit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |       |
|             | and Synchronized UJT triggering circuit: (Operation and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |       |
|             | applications).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |       |
|             | • Pulse transformer used in triggering circuit (Operation and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |       |
|             | applications).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |       |
|             | • Concept of Turn OFF mechanism and methods of - Class A-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |       |

|   | Series resonant commutation circuit,<br>Class B-Shunt resonant commutation circuit.                         |    |    |
|---|-------------------------------------------------------------------------------------------------------------|----|----|
|   | Class C-Complimentary Symmetry commutation circuit                                                          |    |    |
|   | Phase controlled Rectifiers                                                                                 |    |    |
|   | Specific Objectives:                                                                                        |    |    |
|   | Draw and explain concept of phase control.                                                                  |    |    |
|   | Draw and interpret the phase control waveforms.                                                             |    |    |
|   | Derive the expression of average voltage of control                                                         |    |    |
|   | rectifier.                                                                                                  |    |    |
|   | Solve the numerical examples on control rectifier.                                                          |    |    |
|   | Contents:                                                                                                   |    |    |
|   | • Concept of phase control. (Firing Angle $\alpha$ and conduction angle $(\emptyset)$ )                     |    |    |
| 4 | • Circuit diagram, working, equations for and Waveforms of V <sub>DC</sub> of following rectifiers.         | 16 | 24 |
|   | • Single phase half wave controlled rectifier with R, RL load. Effect of freewheeling diode.                |    |    |
|   | • Single phase centre tapped full wave controlled rectifier with R. RL load. Effect of freewheeling diode.  |    |    |
|   | • Single phase Bridge type full wave controlled rectifier with R,<br>RL load, Effect of freewheeling diode. |    |    |
|   | • Basic three phase half wave uncontrolled and controlled                                                   |    |    |
|   | rectifier.                                                                                                  |    |    |
|   | • Need and Uses of Polyphase rectifier.                                                                     |    |    |
|   | Converters                                                                                                  |    |    |
|   | Specific Objectives:                                                                                        |    |    |
|   | Understand the concept of Chopper.                                                                          |    |    |
|   | Realize the concept of Inverter.                                                                            |    |    |
|   | Explain operation of Chopper and Inverter.                                                                  |    |    |
|   | List different applications of Chopper and Inverter.                                                        |    |    |
|   | Contents:                                                                                                   |    |    |
| 5 | Concept of Choppers                                                                                         | 04 | 14 |
|   | <ul> <li>Chopper: basic circuit and its operation using MOSFET</li> </ul>                                   |    |    |
|   | <ul> <li>Step Up and Step down Chopper using MOSFET basic circuits.</li> </ul>                              |    |    |
|   | • Inverters-Need of an inverter, Classification of inverters                                                |    |    |
|   | Important applications of inverter.                                                                         |    |    |
|   | • Working principle of single phase half bridge inverter.                                                   |    |    |
|   | Definitions of performance parameters of inverter.                                                          |    |    |
|   | Industrial Control Circuits.                                                                                |    |    |
|   | Specific Objectives:                                                                                        |    |    |
|   | Understand the concept of Industrial Control Circuits.                                                      |    |    |
|   | Draw the Circuit diagram and explain working of                                                             |    |    |
|   | Industrial control circuits.                                                                                |    |    |
| 6 | Draw the Block diagram and explain working of SNIPS<br>and UDS                                              | 06 | 16 |
|   | allu UP3.<br>Contents:                                                                                      |    |    |
|   | Cultures.<br>Circuit diagram working and applications of •                                                  |    |    |
|   | • Low power DC flasher                                                                                      |    |    |
|   | <ul> <li>Low power DC hasher.</li> <li>Light dimmer circuit using DIAC TDIAC</li> </ul>                     |    |    |
|   | <ul> <li>Eight unmited encould using DIAC-TAIAC.</li> <li>Electronic timer using SCP</li> </ul>             |    |    |
|   | <ul> <li>Electronic timer using SCR.</li> </ul>                                                             |    |    |

| • Battery charger using SCR.                   |       |    |     |
|------------------------------------------------|-------|----|-----|
| <ul> <li>Emergency Lighting System.</li> </ul> |       |    |     |
| • Temperature Controller using SCR.            |       |    |     |
| • Speed Control of fan using TRIAC.            |       |    |     |
| • Block diagram and Concept of UPS.            |       |    |     |
| • Block diagram and Concept of SMPS.           |       |    |     |
|                                                | Total | 48 | 100 |

#### **Practical:**

Skills to be developed:

#### **Intellectual Skills:**

- 1) Selection of proper devices and instruments.
- 2) Interpretation of characteristics under various conditions.

#### **Motor Skills:**

- 1) Make accurate measurements.
- 2) Adjust proper firing angle.
- 3) Observe and draw the output waveforms
- 4) Conduct test on control circuits.

#### **List of Practicals:**

- 1) Plot output characteristics of power transistor.
- 2) Plot V-I characteristics of IGBT.
- 3) Determine the break over voltage using of DIAC.
- 4) Determine latching current and holding current using I-V characteristics of SCR.
- 5) Effect of variation of R, C in R and RC triggering circuits on firing angle of SCR.
- 6) Effect of variation of R in UJT Triggering technique.
- 7) Draw the output waveforms of three phase half wave Rectifier using diodes.
- 8) Draw the output waveform of half wave controlled rectifier with resistive load and determine load voltage.
- 9) Draw the output waveform of full wave controlled rectifier with resistive load, resistive-Inductive load, freewheeling Diode and determine load voltage.
- 10) Determine the effect of firing angle using DIAC and TRIAC on output power (using different loads such as bulb, motor or heater).

#### Learning Resources:

## 1. Books:

| Sr.<br>No | Author                        | Title                                                  | Publisher                                            |
|-----------|-------------------------------|--------------------------------------------------------|------------------------------------------------------|
| 01        | Alok Jain                     | Power Electronics and Its<br>Applications              | Penram International<br>Publishing (India) Pvt. Ltd. |
| 02        | S. K. Bhattacharya            | Fundamentals of Power<br>Electronics                   | ISTE Learning materials centre.                      |
| 03        | M D Singh<br>K B Khanchandani | Power Electronics                                      | Tata McGraw-Hill                                     |
| 04        | Muhammad H. Rashid            | Power Electronics Circuits<br>Devices and Applications | Prentice Hall of India                               |

## 2. Websites:

www.vikaspublishing.com www.scitechpublications.com www.tatamegrahill.com www.Phindia.com www.pearsoned.co.in www.wileyindia.com

| Course Name   | : Electronics Engineering Group          |
|---------------|------------------------------------------|
| Course Code   | : ET/EN/EX/EJ/IE/IS/IC/DE/EV/MU/IU/ED/EI |
| Semester      | : Fourth                                 |
| Subject Title | : Linear Integrated Circuits             |
| Subject Code  | : 17445                                  |

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |     | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|-----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH  | PR        | OR        | TW  | TOTAL |
| 04              |    | 02 | 03           | 100 | 50#       |           | 25@ | 175   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Modern age technology has developed on high density and high speed electronics circuits. Integrated circuits are basis of these high density circuits enabled to reduce size, weight and cost of equipments. They have intrinsic features such as low power consumption, low noise and ease of design.

Today the growth of any industry depends upon electronics to great extent. Contents of this subject are the basic building blocks of different analog circuits.

Basic operating and designing principle of such a large collection of circuits establishes a foundation for understanding new development in the electronics field, instrumentation and power control. This subject acquaints student with general analog principles and design methodologies using integrated circuit for system design.

Prerequisites various devices and circuits studied in elements of electronics and electronic devices and circuits. Prospects- LSI, MSI, VLSI.

#### **General Objectives:**

Students will be able to:

- Understand working principle of Op-Amp and IC555
- Develop electronics circuits using timer IC555 and Op-Amp

• Analyze the response of frequency selective circuits such as PLL with respect to the incoming signal.

## **Learning Structure:**

## **Application:**



## **Contents: Theory**

| Topic | Content                                                                                                | Hours | Marks          |
|-------|--------------------------------------------------------------------------------------------------------|-------|----------------|
|       | <b>Operational Amplifier (Op-Amp):</b>                                                                 |       |                |
|       | Specific Objectives :                                                                                  |       |                |
|       | Draw labeled block diagram of Op-Amp                                                                   |       |                |
|       | Specify and define Different parameters of Op-Amp                                                      |       |                |
|       | Interpret ideal transfer characteristics of Op-Amp                                                     |       |                |
|       | Contents:                                                                                              |       |                |
|       | • Importance of Op-Amp:                                                                                |       |                |
|       | Block diagram of Op-Amp and function of each block with the                                            |       |                |
|       | circuit such as balanced, Unbalanced, differential amplifiers                                          |       |                |
|       | with simple current source, level shifter and complementary                                            |       |                |
| 1     | push-pull amplifier. Equivalent Circuit, Circuit Symbols And                                           | 12    | 10             |
|       | Terminals. Op-Amp IC-741 pin diagram and function.                                                     |       |                |
|       | • Parameters of Op-Amp:                                                                                |       |                |
|       | Input offset voltage, Input offset current, Input bias current,                                        |       |                |
|       | differential input resistance, Input capacitance, Input voltage                                        |       |                |
|       | range, offset voltage adjustment range, Common Mode                                                    |       |                |
|       | Rejection Ratio (CMRR), Supply Voltage Rejection Ratio                                                 |       |                |
|       | (SVRR), large signal voltage gain and transfer characteristics,                                        |       |                |
|       | supply voltages, supply current, output voltage swing, output                                          |       |                |
|       | resistance, slew rate, gain bandwidth product, output short                                            |       |                |
|       | circuit current.                                                                                       |       |                |
|       | Op-Amp Configuration:                                                                                  |       |                |
|       | Specific Objectives: Students will be able to                                                          |       |                |
|       | Differentiate open and close loop configuration.                                                       |       |                |
|       | Identify inverting and non-inverting configuration.                                                    |       |                |
|       | > Construct integrator and differentiator.                                                             |       |                |
|       | <b>2.1</b> Open loop and closed loop configuration of Op-Amp [08]                                      |       |                |
|       | its comparison Virtual ground virtual short concept                                                    |       |                |
|       | Open loop configuration – Inverting , Non-inverting                                                    |       |                |
|       | Close loop configuration – Inverting, non- inverting,                                                  |       |                |
| 2     | differential amplifier, unity gain amplifier (voltage                                                  | 12    | 18             |
|       | follower), inverter(sign changer)                                                                      |       | -              |
|       |                                                                                                        |       |                |
|       | <b>2.2</b> Inverting and non-inverting configuration of [10]                                           |       |                |
|       | Adders (summing amplifier, scaling Amplifier, averaging                                                |       |                |
|       | amplifier) Subtractor.                                                                                 |       |                |
|       | Basic Integrator                                                                                       |       |                |
|       | Basic Differentiator                                                                                   |       |                |
|       | Basic concept of frequency compensation of Op-Amp and                                                  |       |                |
|       | Offset nulling.                                                                                        |       |                |
|       | Numerical based on designing of above circuit.                                                         |       |                |
|       | Applications of Up-Amp:                                                                                |       |                |
|       | Specific Objectives:                                                                                   |       |                |
| 2     | <ul> <li>Compute component values for instrumentation amplimer.</li> <li>Explain IC I M 324</li> </ul> | 10    | $\gamma\gamma$ |
| 5     | <ul> <li>Explain IC LIVI-524</li> <li>Explain different applications of On Amp</li> </ul>              | 12    | LL             |
|       | · Explain unrefent applications of Op-Amp.                                                             |       |                |
|       | <b>3.1</b> Need for signal conditioning and signal processing. [08]                                    |       |                |

|   | Circuit diagram, operation, derivation of output voltage<br>Equation. advantages and applications of Instrumentation<br>amplifier.<br>Pin diagram pin functions and specifications of IC LM 324<br>Voltage to current converter (with floating load, with grounded<br>load) Current to voltage converter.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |    |    |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|
|   | <b>3.2</b> Sample and hold circuit. [16]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |    |    |
|   | Logarithmic and antilogarithmic amplifiers (using Diodes)<br>Analog divider and analog multiplier<br>Comparator: Circuit diagrams and operation of<br>• Zero crossing detector,<br>• Schmitt trigger,<br>• Window detector,<br>• Phase detector,<br>• Active peak detector,<br>• Peak to peak detector                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |    |    |
| 4 | <ul> <li>Filters:</li> <li>Specific Objectives:</li> <li>Distinguish the types of filter</li> <li>Explain active and passive filter</li> <li>Explain different parameters of filter.</li> <li>Contents: <ul> <li>Introduction to filters ,Classification of filters,</li> <li>Concept of passive and active filters</li> <li>Merits and demerits of active filters over passive filters</li> <li>Ideal and actual characteristics, terms: - cut off frequency, Pass band, Stop band, center frequency, roll off rate, BW, Q-factor, first order and second order Butterworth filters, order of filter, Low pass filter, high pass filter, band pass filter ( wide band pass , narrow band pass filter) Band reject filter(wide band reject, narrow band reject filter), all pass filter. Numerical based on design of different filters.</li> </ul> </li> </ul> | 10 | 16 |
| 5 | <ul> <li>Timers</li> <li>Specific Objectives:</li> <li>Draw block diagram of IC 555</li> <li>Understand industrial applications of IC 555,565</li> <li>5.1 Introduction to timer IC 555 [10]</li> <li>Block diagram of IC 555 and its pin diagram and function of each pin.</li> <li>Concepts of different timer circuits used in industries: water level controller, Touch plate switch, frequency divider.</li> <li>Numericals based on timers.</li> <li>5.2 Phase Lock Loop</li> <li>Principle of operation, block diagram of PLL. [08]</li> <li>Applications of PLL as multiplier, FM demodulator.</li> <li>Pin diagram and pin functions of IC 565(PLL)</li> </ul>                                                                                                                                                                                         | 10 | 18 |

|   | Oscillators:                                                                                                                                         |    |     |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
|   | Specific Objectives:                                                                                                                                 |    |     |
|   | Explain concept of oscillators                                                                                                                       |    |     |
|   | Explain different types of oscillators                                                                                                               |    |     |
|   | Develop multivibrators and oscillators for given values.                                                                                             |    |     |
| 6 | Contents:                                                                                                                                            | 00 | 1.0 |
| 6 | • Concept of oscillators,                                                                                                                            | 08 | 16  |
|   | • Types of oscillators: Phase shift oscillators, Wien bridge oscillators using IC-741                                                                |    |     |
|   | • Types of Multivibrators: Monostable, Astable, Bistable using IC-555 and IC-741. Schmitt trigger, voltage controlled oscillator (VCO) using IC-555. |    |     |
|   | Total                                                                                                                                                | 64 | 100 |

## Practical:

### **Intellectual Skills:**

- 1. Interpret the waveforms.
- 2. Find faults in circuits.

#### Motor Skill:

1. Testing and Measurement.

## **List of Practicals:**

| Sr. No. | Title of the Experiment                                                                                        |
|---------|----------------------------------------------------------------------------------------------------------------|
|         | Determine the op-amp parameters:                                                                               |
| 01      | • Input Offset Voltage (V <sub>io</sub> )                                                                      |
| 01      | • Output Offset Voltage $(V_{00})$                                                                             |
|         | Common mode rejection ratio (CMRR)                                                                             |
| 02      | Determine the gain of Inverting and Non-inverting amplifier using op-amp and compare it with theoretical gain. |
| 03      | Verify the operation of Adder and Subtractor circuit using op-amp IC 741.                                      |
|         | Verify the working of active integrator and differentiator circuits using op-amp IC                            |
|         | 741 for following inputs:                                                                                      |
| 04      | • Sine waveform                                                                                                |
|         | • Square waveform                                                                                              |
|         | Rectangular waveform                                                                                           |
| 05      | Assemble V to I converter and I to V converter using IC 741 and measure the                                    |
| 05      | respective output.                                                                                             |
|         | Verify the working of following comparator circuits using op-amp IC 741 and draw                               |
| 06      | the input-output waveforms                                                                                     |
| 00      | • Zero crossing detector                                                                                       |
|         | Active peak detector                                                                                           |
| 07      | Assemble first order low pass Butterworth filter using op-amp and plot the frequency                           |
| 07      | response and determine its cutoff frequency.                                                                   |
| 08      | Assemble Astable multivibrator circuit using IC 741. Plot the output waveform and                              |
| 00      | determine the frequency of oscillations and duty cycle.                                                        |
| 09      | Assemble Monostable multivibrator circuit using IC 555. Plot the output waveform                               |
| 07      | and determine the on-time.                                                                                     |
| 10      | Assemble Schmitt trigger circuit using IC 555. Plot the output waveform and                                    |

|    | determine UTP and LTP                                                             |
|----|-----------------------------------------------------------------------------------|
| 11 | Assemble Instrumentation amplifier circuit using IC 324 and determine the overall |
|    | gain.                                                                             |
| 12 | Verify the operation of frequency Multiplier using PLL IC 565 and determine the   |
| 12 | output frequency.                                                                 |

## Learning Resources: Books:

| Sr.<br>No. | Author            | Title                                                              | Publisher        |  |
|------------|-------------------|--------------------------------------------------------------------|------------------|--|
| 01         | K.R. Botkar       | Integrated Circuit                                                 | Khanna           |  |
| 02         | Ramakant Gayakwad | Op-Amps and Linear Integrated Circuit                              | PHI              |  |
| 03         | Serigo Franco     | Design with Operational Amplifier and<br>Analog Integrated Circuit | Tata-McGraw Hill |  |
| 04         | Willam D. Stanley | Operation Amplifier with Linear<br>Integrated Circuit              | Person           |  |

| : Industrial Electronics, Instrumentation, Instrumentation & Control |
|----------------------------------------------------------------------|
| : IE/IS/IC/IU                                                        |
| : Fourth                                                             |
| : Principles of Communication Systems                                |
| : 17472                                                              |
|                                                                      |

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |     | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|-----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH  | PR        | OR        | TW  | TOTAL |
| 03              |    | 02 | 03           | 100 | 25#       |           | 25@ | 150   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

The Concept of global village has become reality only due to advancement in communication technology. In India communication has developed by leaps and bounds in last two decades. We are witness to the mobile and television revolution. In this Scenario, diploma passed out students should be aware about the principles, procedure and application of communication techniques, so that they can face the technological changes happening due to globalization & competition. The upcoming field of fibre optics plays a vital role in present communication systems. The knowledge of this subject will help the students to handle and operate different communication systems.

#### **General Objectives:**

After Studying this subject the students will be able to

- 1. Describe various communication systems.
- 2. Understand concept about the digital communication, multiplexing techniques and encoding techniques.
- 3. Understand basic fundamentals in satellite, mobile and data communication.
- 4. Understand the fundamentals of fibre optic communication.


# **Theory Contents:**

| Topic<br>No | Theory                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Hrs. | Marks |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|
| 1           | Fundamentals of Electronic Communication         Specific objectives:         > State basic terminology concepts regarding Electronic Communication.         > Know different techniques of analog communication.         Contents:         1.1 Basics of communication system [12]         Block diagram of communication system.         Electromagnetic spectrum         Concept of decibel bandwidth, information capacity in communication.         Terminology related to noise         sources of noise         Effects of noise.         Signal to noise ratio(SNR)         Noise flagre         Noise factor         Noise figure         Noise figure         Need for modulation         Classification of communication system.         Need for modulation         Understanding of AM, FM, & PM on the basis of definition, waveform, bandwidth. Modulation index, numerical based on modulation index.         FM modulation circuit using varactor diode.         Concept of demodulation- amplitude demodulation by diode detector.         1.2 Pulse Modulation         Block diagram for generation waveforms, working, principle, advantages, disadvantages & applications of PAM,PWM & PPM. (No Numericals) | 10   | 18    |
| 2           | <ul> <li>Digital Communication</li> <li>Specific objectives:</li> <li>&gt; Describe PCM</li> <li>&gt; Describe digital modulation techniques &amp; multiplexing techniques</li> <li>Contents:</li> <li>2.1 Fundamental Of Digital Communication [16]</li> <li>Block diagram for generation, working principle, waveforms, advantages, disadvantage and application of ASK, FSK, BPSK, OPSK, DPSK.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 12   | 24    |

|   | • Block diagram, working principle, waveforms, advantages, disadvantages & application of PCM, delta modulation, and adaptive delta modulation. |    |    |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------|----|----|
|   | 2.2 Multiplexing & Data Encoding Techniques. [08]                                                                                               |    |    |
|   | • Multiplexing technique:                                                                                                                       |    |    |
|   | Definitions, schematic diagram, principle, application,                                                                                         |    |    |
|   | advantages & disadvantage of TDM, FDM and WDM                                                                                                   |    |    |
|   | Data encoding techniques                                                                                                                        |    |    |
|   | Unipolar – NRZ,<br>Bolar – NRZ – RZ                                                                                                             |    |    |
|   | Polar – NRZ, RZ,<br>Manchester (calit phase) differential Manchester Bineler PZ                                                                 |    |    |
|   | • Manchester (spint phase), differential Manchester Bipolar KZ<br>(Pseudo ternary or AMI) and their waveforms.                                  |    |    |
|   | Satellite Communication.                                                                                                                        |    |    |
|   | Specific objectives:                                                                                                                            |    |    |
|   | <ul> <li>State basic concept regarding satellite communication.</li> </ul>                                                                      |    |    |
|   | > Define terms related to satellite communication                                                                                               |    |    |
|   | • History of satallita                                                                                                                          |    |    |
|   | <ul> <li>Terminology related to satellite communication: satellite</li> </ul>                                                                   |    |    |
| 3 | orbits, elevation angle, azimuth angle, foot print, station                                                                                     | 06 | 14 |
| 5 | keeping, altitude, geostationary satellite.                                                                                                     | 00 |    |
|   | • Block diagram of satellite communication. Frequency bands                                                                                     |    |    |
|   | used in satellite communication.                                                                                                                |    |    |
|   | • Diagram, working, principle of uplink model, transponder,                                                                                     |    |    |
|   | down link model.                                                                                                                                |    |    |
|   | • Diagram ,working, principle, advantages & disadvantages of                                                                                    |    |    |
|   | IDMA, FDMA, CDMA                                                                                                                                |    |    |
|   | Specific objectives:                                                                                                                            |    |    |
|   | <ul> <li>State the terminology related to cellular phone</li> </ul>                                                                             |    |    |
|   | > State the different concepts related to cell, interference, base                                                                              |    |    |
|   | station etc.                                                                                                                                    |    |    |
|   | Contents:                                                                                                                                       |    |    |
|   | Evolution of cellular telephone                                                                                                                 |    |    |
| 4 | • Concept of cell pattern, frequency reuse, interference - co                                                                                   | 06 | 12 |
|   | channel & adjacent channel, cell splitting, sectoring,                                                                                          |    |    |
|   | segmentation & dualization, roaming & handoffs.                                                                                                 |    |    |
|   | Diock diagram and working of mobile communication     Callular talophone call processing                                                        |    |    |
|   | <ul> <li>Contrai receptione can processing</li> <li>Mobile (cellular) to wire line (PSTN) call procedure</li> </ul>                             |    |    |
|   | <ul> <li>Mobile (cellular) to mobile (cellular) call procedure</li> </ul>                                                                       |    |    |
|   | <ul> <li>Wire line (PSTN) to mobile (cellular) call procedure.</li> </ul>                                                                       |    |    |

|   | Data Communication & Networking                                                                                                               |           |             |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------------|
|   | Specific objectives:                                                                                                                          |           |             |
|   | > Describe modes of data transmission                                                                                                         |           |             |
|   | > Describe the concepts of network topologies, types of network                                                                               |           |             |
|   | and the network models.                                                                                                                       |           |             |
|   | Contents:                                                                                                                                     |           |             |
|   | 5.1 Modes of transmission, topologies, categories and models of                                                                               |           |             |
|   | network. [14]                                                                                                                                 |           |             |
|   | • Modes of data transmission serial, parallel, synchronous,                                                                                   |           |             |
|   | asvnchronous                                                                                                                                  |           |             |
|   | • Network topologies                                                                                                                          |           |             |
|   | Diagram, working, advantage, disadvantages, and application of                                                                                |           |             |
|   | mesh, star, bus, ring                                                                                                                         |           |             |
|   | Network categories                                                                                                                            |           |             |
| 5 | Fundamentals of LAN WAN MAN                                                                                                                   | 08        | 20          |
|   | Network models                                                                                                                                |           |             |
|   | Architecture of OSL model TCP/IP model                                                                                                        |           |             |
|   | BS 222 (0 pin) standard for communication                                                                                                     |           |             |
|   | • KS-232 (9 pm) standard for communication<br>5.2 Connecting devices and network security [06]                                                |           |             |
|   | 5.2 Connecting devices and network security [00]                                                                                              |           |             |
|   | • MODEM- Block diagram and classification                                                                                                     |           |             |
|   | • INTERNET- Types of subscriber lines, operation of Internet                                                                                  |           |             |
|   | (only concepts), internet service providers in India.                                                                                         |           |             |
|   | • Connecting devices                                                                                                                          |           |             |
|   | Concept and operation of hubs, repeaters, bridges, routers,                                                                                   |           |             |
|   | gateway                                                                                                                                       |           |             |
|   | • Network security                                                                                                                            |           |             |
|   | Concept of message confidentiality, message integrity,                                                                                        |           |             |
|   | Terris () Fiber Ortica                                                                                                                        |           |             |
|   | 1 opic 6) Fiber Optics                                                                                                                        |           |             |
|   | Draw the fiber ontic communication link                                                                                                       |           |             |
|   | Draw the fiber power losses                                                                                                                   |           |             |
|   | <ul> <li>State the fiber power losses</li> <li>Differentiate between single mode and multimode fibers</li> </ul>                              |           |             |
|   | Differentiate between single mode and multimode moets. Identify the optical transmitters and receivers.                                       |           |             |
|   | Contents                                                                                                                                      |           |             |
|   | Contents [6]                                                                                                                                  |           |             |
|   | 0.1 Optical liber cable [0]                                                                                                                   |           |             |
|   | • Advantages of optical fiber cable                                                                                                           |           |             |
|   | • Propagation of energy in fiber: lotal internal reflection,                                                                                  |           |             |
| 6 | acceptance angle and numerical aperture.                                                                                                      | 06        | 12          |
|   | • Construction, characteristics, specification and application of                                                                             |           |             |
|   | Single mode step index fiber                                                                                                                  |           |             |
|   | Multimode step index fiber                                                                                                                    |           |             |
|   | Multimode graded index fiber                                                                                                                  |           |             |
|   | • Losses in optical fiber due to dispersion, scattering and bending.                                                                          |           |             |
|   | Connector loss, splice loss and coupling loss.                                                                                                |           |             |
|   | 6.2 Fiber Ontic Communication System                                                                                                          |           |             |
|   | Block diagram of ontical communication system     [0]                                                                                         |           |             |
|   | <ul> <li>Ontical Transmittare: LED and LASED (analifications)</li> </ul>                                                                      |           |             |
|   | <ul> <li>Optical Hansimutis, LED and LASER (Specifications)</li> <li>Optical Decentration DIN photodiada and evaluation photodiada</li> </ul> |           |             |
|   | • Optical Receivers. Fin photodiode and avaianche photodiode<br>Total                                                                         | <u>18</u> | 100         |
|   | Iotai                                                                                                                                         | τu        | <b>T</b> 00 |

# Practical's:

Skills to be developed:

# **Intellectual Skills**

- 1. Interpretation of result.
- 2. Selection of communication techniques based on application.

## **Motor Skills**

- 1. Make connections/arrange experimental set up carryout the tests.
- 2. Observe and record out puts.
- 3. Draw waveforms.
- 4. Locate the faults.

#### List of Experiments:

- 1. Measurement of modulation index of amplitude modulated wave and observe the effect of modulating signal voltage on it by Emitter / Base / Collector Modulation.(any one circuit)
- 2. Measurement of modulation index of the frequency modulated wave and observe the effect of modulating and Carrier signal voltage on Frequency Modulation.(construct the circuit by using IC8038)
- 3. Generate PAM and draw input / output waveform and measure amplitude of each pulse.
- 4. Generate PWM and draw input / output waveform and measure Width of each pulse.
- 5. Generate ASK Signal and draw input/output waveforms.
- 6. Generate FSK Signal and draw input/output waveforms.
- 7. Generate PSK Signal and draw input/output waveforms.
- 8. Generate PCM Signal and draw input/output waveforms.
- 9. Generate PPM Signal and draw input/output waveforms.
- 10. Identify the components required for LAN networking.
- 11. Preparation of patch cords and cross connection cables required for LAN.
- 12. Measurement of bending losses in fibre optic cable

#### **Learning Resources:**

#### 1. Books

| Sr.<br>No. | Title                                                     | Author       | Publisher               |
|------------|-----------------------------------------------------------|--------------|-------------------------|
| 1          | Electronic Communication System (V <sup>th</sup> Edition) | Wayne Tomasi | Prentice Hall of India. |
| 2          | Electronic Communication System                           | Kennedy      | Tata McGraw Hill        |
| 3          | Data Communication & Networking                           | Forouzan     | Tata McGraw Hill        |
| 4          | Mobile Cellular Telecommunication                         | William Lee  | McGraw Hill             |
| 5          | Electronic Communication                                  | Frenzel      | Tata MCgraw Hills       |

#### 2. Websites

- http://en.wikipedia.org/wiki/
- www.youtube.com/
- www.google.com(as a search engine)
- ➤ www.tech-faq.com
- www.howstuffworks.com
- ➤ www.williamson-labs.com

**Course Name : Electronics Engineering and & Video Engineering Group** 

Course Code : ET/EJ/IE/IS/EN/EX/IC/MU/EV/DE/IU/ED/EI

Semester : Fourth

Subject Title : Visual Basic

Subject Code : 17043

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |    | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH | PR        | OR        | TW  | TOTAL |
| 01              |    | 02 |              |    |           |           | 25@ | 25    |

## **Rationale:**

Today's most of the electronically operated devices, integrated circuits, controllers, equipments, gadgets are run by specific drivers/software. To understand design, develop and write drivers programming knowledge is required. To run the devices software has to be user friendly. New approach is to use graphical user interface. Graphical user interface can be implemented using visual software's.

Traditionally visual basic is the most popular, versatile, suitable, simple and commonly used visual programming language to write efficient, compact and portable interfaces, drivers/ software's.

The subject will enable the students to inculcate visual programming concepts and methodology used to write, debug, compile and execute simple visual basic programs using different powerful data types, built in visual controls and integrated visual basic environment (IDE) provided by Microsoft visual studio. Students will be exposed to event driven programming and bottom up approached used in objects oriented programming.

Students will understand how a complex interface can be easily implemented in visual basic with almost no programming expertise.

This course will lay the basic foundation of visual programming which will enable students to develop simple to complex programmable systems interfaces in the real world of work

#### **General Objectives**

Students will able to.

- 1. Learn visual programming development environment, concepts and methodology.
- 2. Use essential components (visual tools ) of Visual software's
- 3. Develop the skill of visual basic programming to build custom standalone applications
- 4. Develop applications with Multiple documents interface (MDI) using common dialog, menus and graphics
- 5. Use ADO for database connectivity with different databases.
- 6. Create simple reports using data report, Seagate crystal reports and integrating it with visual basic
- 7. Develop applications using class modules





# Theory

| Name of Topics                                                                                              | Hours |
|-------------------------------------------------------------------------------------------------------------|-------|
| Topic 1] Introduction to Visual Environment                                                                 |       |
| Specific Objectives:                                                                                        | l     |
| Familiar with IDE of Visual basic                                                                           | l     |
| Use concepts of object based language                                                                       | l     |
| Use basic elements of visual interface                                                                      | l     |
| > Use properties, events and methods at design time and runtime                                             | 00    |
| Create objects, place them on forms                                                                         | 02    |
| Contents:                                                                                                   | l     |
| 1.1 Concepts of visual programming, object, features, properties, methods, events,                          | l     |
| 1.2 Environment of VB – Menu bar, toolbar, project explorer, toolbox, properties                            | l     |
| window form designer form layout immediate window                                                           | l     |
| 1.3 Concept of project elements of projects form their properties methods and events                        | l     |
| Tonic 21 Introduction to Visual Basic                                                                       |       |
| Snecific Objectives.                                                                                        | l     |
| > Use different data types                                                                                  | l     |
| <ul> <li>Use neworful features of arrays and collections</li> </ul>                                         | l     |
| <ul> <li>Use powerrun reactures of arrays and conections</li> <li>Write procedures and functions</li> </ul> | l     |
| Write procedures and functions Call procedures and functions                                                | l     |
| Call procedures and functions Differentiate between procedure and functions                                 | l     |
| Differentiate between procedure and functions Use library for store for moth and store an enditions         | 00    |
| Use library functions for main and string operations                                                        | 02    |
| P Use Inputbox and Misgbox functions                                                                        | l     |
| Contents:                                                                                                   | l     |
| 2.1 Data types, variables, constants, arrays, collections                                                   | l     |
| 2.2 procedures, Arguments, function, return values, control flow statements, loop                           | l     |
| statements, Nested control structures, exit statement                                                       | l     |
| 2.3 Math operators & formulas, logical operators, string functions, special functions                       | l     |
| available in VB like Input Box (), Message Box (), Format ().                                               |       |
| Topic 3] Controls and Events                                                                                | l     |
| Specific Objectives:                                                                                        | l     |
| Use basic controls                                                                                          | l     |
| Select appropriate controls for given data                                                                  | l     |
| Set properties of different basic controls                                                                  | l     |
| Call methods and events of basic controls                                                                   | l     |
| Demonstrate the use of each control with simple examples                                                    | 02    |
| Contents:                                                                                                   | 02    |
| 3.1 Basic controls: Text box, list Box, Combo Box, Scroll Bar, frame, Option button,                        | l     |
| checkbox, command button, OLE controls                                                                      | l     |
| 3.2 File, Drive, directory, Picture box, Image and timer controls .Designing a form                         | l     |
| using controls, concepts of event & properties, changing properties (runtime &                              | l     |
| design time) Important events of each control & creating applications using                                 | l     |
| controls.                                                                                                   | l     |
| Topic 4] Advance Controls & Events                                                                          | <br>I |
| Specific Objectives:                                                                                        | l     |
| $\rightarrow$ Add extrinsic controls in an application                                                      | l     |
| > Use common dialog box control and its properties such open, save as, font.                                |       |
| color, print and help                                                                                       | 03    |
| Use rich text box to design simple ms-word like application                                                 | 1     |
| Use and create explorer like utilities using tree view and list controls                                    | 1     |
| <ul> <li>Familiar with windows common controls</li> </ul>                                                   | 1     |

| Contents:                                                                               |    |
|-----------------------------------------------------------------------------------------|----|
| 4.1 Common Dialog Box controls, The Tree view and List, View controls, the rich         |    |
| textbox controls                                                                        |    |
| 4.2 Windows common controls – status Bar, Tab control, image list control, Important    |    |
| properties, changing properties at design or run time, event handling.                  |    |
| Topic 5] Module, Class Module, Mdi, Menu Graphics                                       |    |
| Specific Objectives:                                                                    |    |
| Write class modules                                                                     |    |
| Define functions and procedures in class module                                         |    |
| Access functions and procedures from class module                                       |    |
| Use multiple document interface                                                         |    |
| Design menu based applications such as notepad editor                                   |    |
| Work with graphic functions and methods                                                 | 03 |
| Contents:                                                                               |    |
| 5.1 Concept of module, class module, using class module to define functions,            |    |
| procedures, variables and accessing them using objects                                  |    |
| 5.2 MDI- MDI form and child form, Creation and use in                                   |    |
| 5.3 Menu: Creating own menu using menu editor, popup menu.                              |    |
| 5.3 Graphics: Basic controls – Line & shape control, line method, circle method, Pset   |    |
| method, RGB () Functions, Paint picture () method, Load picture () function.            |    |
| Topic 6] Database and Report                                                            |    |
| Specific Objectives:                                                                    |    |
| Create database                                                                         |    |
| Use ADO and its properties, methods and events                                          |    |
| Select appropriate concepts such as back-end and front-end                              |    |
| Make database connectivity with different databases                                     |    |
| Generate report using Data Report and Crystal Report                                    |    |
| Contents:                                                                               | 04 |
| 6.1 Concept of database, Record, Record set, Data control & its important properties    | 04 |
| 6.2 validating data, entering data, visual data manager.                                |    |
| 6.3 Programming with ADO ( Active data objects ), using ADO Objects at design time-     |    |
| connection, command, record set, parameter, Creating & closing a connection;            |    |
| executing a command,                                                                    |    |
| 6.4 Using ADO Objects at run time, attaching visual controls to record set at run time, |    |
| Using delete, save, search, update exit, new, add, methods.                             |    |
| 6.5 Report generation using data report and crystal report                              |    |
| Total                                                                                   | 16 |

# **TERM WORK:-**

| Sr<br>No. | Name of the Experiments                                                                    |
|-----------|--------------------------------------------------------------------------------------------|
|           | a) Study and Understand Visual                                                             |
|           | Basic Environment                                                                          |
| 1         | b) Develop VB Project which                                                                |
| 1         | accepts User Name & Password                                                               |
|           | using three forms Login Form1                                                              |
|           | and Form2 to accept data, and                                                              |
|           | Form3 to display data.                                                                     |
| 2         | Design simple calculator to perform mathematical function using Control array like Windows |
| 2         | Calculator.                                                                                |
| 3         | Design GUI to Find Resistor Value from it's color code.                                    |
| 4         | Display student data using structure in loop. Implement it using Class module & Procedures |
| MODA      |                                                                                            |

| 5  | Demonstrate list boxes features with sorted list and selected item transfer facility.                                                                                                                                                                          |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6  | <ul><li>a) Design Color box using RGB function to observe color change using H- scroll bar.</li><li>b) Design project to demonstrate file, folder &amp; drive controls to explore drive &amp; folders.</li></ul>                                               |
| 7  | Design GUI for Testing AC series Circuit                                                                                                                                                                                                                       |
|    | Practice Experiment / Exercise                                                                                                                                                                                                                                 |
| 8  | <ul> <li>a) Design project to implement Common Dialog box controls such as open, save, Color, Font,<br/>Printer &amp; Help</li> <li>b) Design a menu structure like notepad using menu editor</li> </ul>                                                       |
| 9  | Design MDI application with 4 child forms & arrange forms with cascade, Tile Horizontal,<br>Tile Vertical arrangements                                                                                                                                         |
| 10 | Design student database project using ADO connectivity in design time and runtime and MS access as backend database engine, with basic features such as add, edit, update, save, cancel, delete feature and generate Report using Data Report / Crystal Report |
| 11 | Develop mini VB Project                                                                                                                                                                                                                                        |

# **Reference Books**:

| Sr.<br>No. | Author                            | Title                             | Publisher                   |
|------------|-----------------------------------|-----------------------------------|-----------------------------|
| 01         | MSDN library on Line<br>Reference |                                   | From Microsoft MSDN Library |
| 02         | Evangelos Petroustus              | Mastering VB6                     | WILEY India                 |
| 03         | Steven Holzner                    | Visual basic 6                    | Dream Tech. Press           |
| 04         | Content Development<br>Group      | Visual Basic 6.0<br>Programming   | Tata McGraw Hill            |
| 05         | Mohammed Azam                     | Programming with visual basic 6.0 | Vikas Publishers            |
| 06         | Nel Jerka                         | The complete referenceVB6         | Tata McGraw Hill Publishing |

Course Name : Electronics Engineering Group Course Code : ET/EJ/EN/EX/IE/IS/IC/DE/EV/MU/IU/ED/EI Semester : Fourth Subject Title : Professional Practices-II

Subject Code : 17044

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |    | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH | PR        | OR        | TW  | TOTAL |
|                 |    | 03 |              |    |           |           | 50@ | 50    |

#### **Rationale:**

Most of the diploma holders join industries. Due to globalization and competition in the industrial and service sectors the selection for the job is based on campus interviews or competitive tests.

While selecting candidates a normal practice adopted is to see general confidence, ability to communicate and attitude, in addition to basic technological concepts.

The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

# **Objectives:**

To develop the following skills:

# Intellectual skills:

- 1) Analyze information from different sources.
- 2) Prepare reports.

#### Motor skills:

- 1) Present given topic in a seminar.
- 2) Interact with peers to share thoughts.
- 3) Prepare a report on industrial visit, expert lecture.



# **Contents:**

| Activity | Content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Hours |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 1        | <ul> <li>Industrial Visits</li> <li>Structured industrial visits be arranged and report of the same should be submitted by the individual student to form a part of the term work.</li> <li>Minimum two industrial visits may be arranged in the following areas/ industries : <ul> <li>i) Electronic equipment manufacturing unit</li> <li>ii) Resistance welding unit</li> <li>iii) Industrial automation unit</li> <li>iv) Sugar mill, Paper mill, Cement Industry.</li> <li>v) Railway station control room.</li> <li>vi) Telephone Exchange.</li> <li>vii) Any other suitable Industry.</li> </ul> </li> </ul>                                       | 16    |
| 2        | Lectures by Professional / Industrial Expert to be organized from any<br>of the following areas (Any three)<br>i) Cyber laws.<br>ii) Fiber optics communication system<br>iii) Disaster management<br>iv) Atomic energy<br>v) Industrial Safety<br>vi) Computer security systems/Ethical hacking.<br>vii) Any other suitable topic<br>viii) Introduction to Apprenticeship Training Scheme<br>Information Search :<br>Information search can be done through manufacturers, catalogue, internet,<br>magazines; books etc. and submit a report on one of the<br>following topics:<br>i) GPS<br>ii) Market survey for motors used in electronic application | 08    |
|          | <ul> <li>iii) Electronic billing system.</li> <li>iv) Elevators installation and maintenance</li> <li>v) Any other suitable areas</li> </ul> Seminar : Seminar topic should be related to the subjects of fourth semester. Each                                                                                                                                                                                                                                                                                                                                                                                                                           |       |
| 4        | student shall submit a report of at least 10 pages and deliver a seminar<br>(Presentation time – 10 Minutes)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 10    |
| 5        | <b>Group Discussion</b> :<br>The students should discuss in group of six to eight students and write a brief report on the same as a part of term work. The topic of group discussion may be selected by the faculty members.                                                                                                                                                                                                                                                                                                                                                                                                                             | 08    |
|          | Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 48    |

# Learning Resources:

# 1. Books:

| Sr.<br>No. | Author               | Title                  | Publisher                     |  |
|------------|----------------------|------------------------|-------------------------------|--|
| 01         | NRDC, Publication Bi | Invention Intelligence | National Research Development |  |

|    | Monthly Journal                                                                                               | Journal                                            | Corporation, GOI. |  |  |
|----|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------|-------------------|--|--|
|    |                                                                                                               |                                                    |                   |  |  |
| 02 | DK Publishing                                                                                                 | How things works encyclopedia                      | DK Publishing     |  |  |
| 03 | Trott                                                                                                         | Innovation mgmt.& new product development          | Pearson Education |  |  |
| 04 | E.H. McGrath, S.J.                                                                                            | Basic Managerial Skills<br>for All – Ninth Edition | PHI               |  |  |
| 05 | Apprenticeship Training Scheme:- Compiled By – BOAT (Western Region), Mumbai,<br>Available on MSBTE Web Site. |                                                    |                   |  |  |

# 2. Web sites

www.engineeringforchange.org www.wikipedia.com www.slideshare.com www.teachertube.com

# Course Name : All Branches of Diploma in Engineering & Technology Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG Industrial Training (Optional) after 4<sup>th</sup> semester examination.

Note:- Examination in Professional Practices of 5<sup>th</sup> Semester.

# INDUSTRIAL TRAINING (OPTIONAL)

# Rational:-

There was a common suggestion from the industry as well as other stakeholders that curriculum of Engineering and Technology courses should have Industrial training as part of the curriculum. When this issue of industrial training was discussed it was found that it will be difficult to make industrial training compulsory for all students of all courses as it will be difficult to find placement for all the students. It is therefore now proposed that this training can be included in the curriculum as optional training for student who is willing to undertake such training on their own. The institutes will help them in getting placement or also providing them requisite documents which the student may need to get the placement.

Details:- Student can undergo training in related industries as guided by subject teachers / HOD.

- The training will be for four weeks duration in the summer vacation after the fourth semester examination is over.
- The student undergoing such training will have to submit a report of the training duly certified by the competent authority from the industry clearly indicating the achievements of the student during training. This submission is to be made after joining the institute for Fifth semester.
- The student completing this training will have to deliver a seminar on the training activities based on the report in the subject Professional Practices at Fifth Semester.
- The student undergoing this training will be exempted from attending activities under Professional Practices at Fifth semester except the seminar.
- The students who will not undergo such training will have to attend Professional Practices Classes/activities of fifth semester and will have to complete the tasks given during the semester under this head.
- There work will be evaluated on their submissions as per requirement and will be given marks out of 50. Or student may have to give seminar on training in Industry he attended.
- Institute shall encourage and guide students for Industry training.
- Evaluation:- Report of Training attended and delivery of seminar and actual experience in Industry will be evaluated in fifth semester under Profession Practices-III and marks will be given accordingly out of 50.

'G' Scheme

|                                                                                                                                                     | MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI                                                                                                                       |          |             |        |        |         |                       | CAL E    | BAI     |           |           |               |        |               |       |            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------|--------|--------|---------|-----------------------|----------|---------|-----------|-----------|---------------|--------|---------------|-------|------------|
|                                                                                                                                                     | TEACHIN                                                                                                                                                                      | NG AND   | EXAMINA     | TIO    | N SCI  | HEMI    | E FOR P               | OST S.   | S.C. D  | IPLOM     | A COU     | URSES         |        |               |       |            |
| CO                                                                                                                                                  | URSE NAME : MECHANICAL F                                                                                                                                                     | ENGINE   | ERING GE    | ROUP   | )      |         |                       |          |         |           |           |               |        |               |       |            |
| CO                                                                                                                                                  | URSE CODE : ME / MI / MH                                                                                                                                                     |          |             |        |        |         |                       |          |         |           |           |               |        |               |       |            |
| DU                                                                                                                                                  | RATION OF COURSE : 6 SEME                                                                                                                                                    | STERS f  | or ME (8 S  | EME    | STEF   | RS for  | MH/MI)                | )        |         | ,         | WITH      | EFFE          | CT FR  | <b>COM 20</b> | 12-13 |            |
| SEN                                                                                                                                                 | <b>IESTER : FOURTH</b>                                                                                                                                                       |          |             |        |        |         |                       |          |         |           | DURA      | TION          | : 16 V | VEEKS         | )     |            |
| PAT                                                                                                                                                 | TTERN : FULL TIME - SEMEST                                                                                                                                                   | 'ER      |             |        |        |         |                       |          |         |           | SCHE      | <b>ME : C</b> | T      |               |       |            |
|                                                                                                                                                     |                                                                                                                                                                              |          |             | TF     | CACHI  | NG      |                       |          | EX      | AMINAT    | TION SC   | CHEME         |        |               |       |            |
| SR.                                                                                                                                                 | SUBJECT TITLE                                                                                                                                                                | Abbrev   | SUB         | S      | CHEM   | E       | PAPER                 | TH       | (1)     | PR        | (4)       | OR            | (8)    | TW            | (9)   | SW (17400) |
| NU                                                                                                                                                  |                                                                                                                                                                              | lation   | CODE        | ТН     | TU     | PR      | HRS.                  | Max      | Min     | Max       | Min       | Max           | Min    | Max           | Min   | (17400)    |
| 1                                                                                                                                                   | Environmental Studies \$                                                                                                                                                     | EST      | 17401       | 01     |        | 02      | 01                    | 50#*     | 20      |           |           |               |        | 25@           | 10    |            |
| 2                                                                                                                                                   | Manufacturing Processes ß                                                                                                                                                    | MPR      | 17402       | 03     |        | 04      | 03                    | 100      | 40      | 25#       | 10        |               |        | 50@           | 20    | 1          |
| 3                                                                                                                                                   | Electrical Engineering                                                                                                                                                       | EEN      | 17404       | 03     |        | 02      | 03                    | 100      | 40      |           |           |               |        | 25@           | 10    |            |
| 4                                                                                                                                                   | Thermal Engineering                                                                                                                                                          | TEN      | 17410       | 04     |        | 02      | 03                    | 100      | 40      |           |           | 25#           | 10     | 25@           | 10    | 50         |
| 5                                                                                                                                                   | Fluid Mechanics & Machinery $\beta$                                                                                                                                          | FMM      | 17411       | 04     |        | 02      | 03                    | 100      | 40      | 25#       | 10        |               |        | 25@           | 10    |            |
| 6                                                                                                                                                   | Theory of Machines $\beta$                                                                                                                                                   | TOM      | 17412       | 03     |        | 02      | 03                    | 100      | 40      |           |           |               |        | 25@           | 10    |            |
| 7                                                                                                                                                   | Professional Practices-II β                                                                                                                                                  | PPT      | 17035       |        |        | 02      |                       |          |         |           |           |               |        | 50@           | 20    |            |
|                                                                                                                                                     |                                                                                                                                                                              |          | TOTAL       | 18     |        | 16      |                       | 550      |         | 50        |           | 25            |        | 225           |       | 50         |
| **                                                                                                                                                  | Industrial Training (Optional)                                                                                                                                               |          |             | Exa    | mina   | tion ii | n 5 <sup>th</sup> Sem | ester P  | rofessi | onal Pra  | actices-  | III           |        |               |       |            |
| Stuc                                                                                                                                                | lent Contact Hours Per Week: 34 Hi                                                                                                                                           | rs.      |             |        |        |         |                       |          |         |           |           |               |        |               |       |            |
| TH                                                                                                                                                  | EORY AND PRACTICAL PERIC                                                                                                                                                     | DDS OF ( | 50 MINUT    | ES EA  | ACH.   |         |                       |          |         |           |           |               |        |               |       |            |
| Total Marks : 900                                                                                                                                   |                                                                                                                                                                              |          |             |        |        |         |                       |          |         |           |           |               |        |               |       |            |
| @ - Internal Assessment, # - External Assessment, No Theory Examination, \$ - Common to all branches, #* - Online Examination,                      |                                                                                                                                                                              |          |             |        |        |         |                       |          |         |           |           |               |        |               |       |            |
| p - Common to AE, PG, P1, FE, FG                                                                                                                    |                                                                                                                                                                              |          |             |        |        |         |                       |          |         |           |           |               |        |               |       |            |
| Abbreviations: TH-Theory TU- Tutorial PR-Practical OR-Oral TW- Term Work SW- Sessional Work                                                         |                                                                                                                                                                              |          |             |        |        |         |                       |          |         |           |           |               |        |               |       |            |
| ** Industrial Training (Optional) - Student can undergo Industrial Training of four weeks after fourth semester examination during summer vacation. |                                                                                                                                                                              |          |             |        |        |         |                       |          |         |           |           |               |        |               |       |            |
| Asse                                                                                                                                                | Assessment will be done in Fifth semester under Professional Practices-III. They will be exempted from activities of Professional Practices-III of 5 <sup>th</sup> Semester. |          |             |        |        |         |                       |          |         |           |           |               |        |               |       |            |
|                                                                                                                                                     | Conduct two class tests each of f                                                                                                                                            | 25 marks | for each th | eory s | ubject | t. Sum  | of the to             | tal test | marks   | of all su | bjects is | s to be       | conver | ted out       | of 50 | marks as   |
|                                                                                                                                                     | sessional work (SW).                                                                                                                                                         |          |             | 5-5    | 5-1-   |         |                       |          |         |           | 5         |               |        |               | '     |            |

- Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.
   Code number for TH, PR, OR, TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.

**Course Name : All Branches of Diploma in Engineering & Technology** 

# Course Code : AE/CE/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG/AU

Semester : Fourth

Subject Title : Environmental Studies

Subject Code : 17401

**Teaching and Examination Scheme:** 

| Teaching Scheme |    |    |              |      | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|------|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH   | PR        | OR        | TW  | TOTAL |
| 01              |    | 02 | 01           | 50#* |           |           | 25@ | 75    |

#### **#\* - Online Theory Examination**

NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Environment essentially comprises of our living ambience, which gives us the zest and verve in all our activities. The turn of the twentieth century saw the gradual onset of its degradation by our callous deeds without any concern for the well being of our surrounding we are today facing a grave environmental crisis. The unceasing industrial growth and economic development of the last 300 years or so have resulted in huge ecological problems such as overexploitation of natural resources, degraded land, disappearing forests, endangered species, dangerous toxins, global warming etc.

It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

The curriculum covers the aspects about environment such as Environment and Ecology, Environmental impacts on human activities, Water resources and water quality, Mineral resources and mining, Forests, etc.

General Objectives: The student will be able to,

- 1. Understand importance of environment
- 2. Know key issues about environment
- 3. Understands the reasons for environment degradation
- 4. Know aspects about improvement methods
- 5. Know initiatives taken by the world bodies to restrict and reduce degradation



# Theory:

| Topic and Contents                                                                          | Hours | Marks |
|---------------------------------------------------------------------------------------------|-------|-------|
| Topic 1: Nature of Environmental Studies                                                    |       |       |
| Specific Objectives:                                                                        |       |       |
| Define the terms related to Environmental Studies                                           |       |       |
| State importance of awareness about environment in general public                           | 01    | 04    |
| Contents:                                                                                   | 01    | 04    |
| • Definition, Scope and Importance of the environmental studies                             |       |       |
| • Importance of the studies irrespective of course                                          |       |       |
| • Need for creating public awareness about environmental issues                             |       |       |
| Topic 2: Natural Resources and Associated Problems                                          |       |       |
| Specific Objectives:                                                                        |       |       |
| <ul> <li>Define natural resources and identify problems associated with<br/>them</li> </ul> |       |       |
| ➢ Identify uses and their overexploitation                                                  |       |       |
| Identify alternate resources and their importance for environment                           |       |       |
| Contents:                                                                                   |       |       |
| 2.1 Renewable and Non renewable resources                                                   |       |       |
| Definition                                                                                  |       |       |
| Associated problems                                                                         |       |       |
| 2.2 Forest Resources                                                                        |       |       |
| General description of forest resources                                                     |       |       |
| Functions and benefits of forest resources                                                  |       |       |
| • Effects on environment due to deforestation, Timber                                       |       |       |
| extraction, Building of dams, waterways etc.                                                | 0.4   | 10    |
| 2.3 Water Resources                                                                         | 04    | 10    |
| Hydrosphere: Different sources of water                                                     |       |       |
| • Use and overexploitation of surface and ground water                                      |       |       |
| • Effect of floods, draught, dams etc. on water resources and                               |       |       |
| community                                                                                   |       |       |
| 2.4 Mineral Resources:                                                                      |       |       |
| • Categories of mineral resources                                                           |       |       |
| Basics of mining activities                                                                 |       |       |
| Mine sefety                                                                                 |       |       |
| • Effect of mining on environment                                                           |       |       |
| 2.5 Food Resources:                                                                         |       |       |
|                                                                                             |       |       |
| • Food for all                                                                              |       |       |
| Effects of modern agriculture                                                               |       |       |
| World food problem                                                                          |       |       |
| Topic 3. Ecosystems                                                                         |       |       |
| Concept of Ecosystem                                                                        |       |       |
| Structure and functions of ecosystem                                                        | 01    | 04    |
| • Energy flow in ecosystem                                                                  |       |       |
| Major ecosystems in the world                                                               |       |       |
| Topic 4. Biodiversity and Its Conservation                                                  |       |       |
| Definition of Biodiversity                                                                  | 02    | 06    |
| • Levels of biodiversity                                                                    |       |       |

| Total                                                                                                                                                                            | 16 | 50 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|
| Human Health and Human Rights                                                                                                                                                    |    |    |
| environment                                                                                                                                                                      |    |    |
| Population Growth: Aspects, importance and effect on                                                                                                                             |    |    |
| Forest Conservation Act                                                                                                                                                          |    |    |
| Wildlife Protection Act                                                                                                                                                          | 02 | 08 |
| • Water (Prevention and Control of Pollution) Act                                                                                                                                | 00 | 00 |
| • Air (Prevention and Control of Pollution) Act                                                                                                                                  |    |    |
| • Environmental Protection Act                                                                                                                                                   |    |    |
| Brief description of the following acts and their provisions:                                                                                                                    |    |    |
| Topic 7. Environmental Protection                                                                                                                                                |    |    |
| <ul> <li>Concept of Carbon Credits and its advantages</li> </ul>                                                                                                                 |    |    |
| and their effect on climate                                                                                                                                                      |    |    |
| • Childle Change, Global Warning, Acturatin, Ozone Layer<br>Depletion, Nuclear Accidents and Holocaust: Basic concepts                                                           |    |    |
| Climate Change, Clobal warming, Acid rain, Ozone Laver                                                                                                                           | 03 | 10 |
| • water conservation, watershed management, Kain water<br>harvesting: Definition Methods and Benefits                                                                            |    |    |
| Concept of development, sustainable development     Water conservation. Watershed management. Bein water                                                                         |    |    |
| • Concert of development sustainable development                                                                                                                                 |    |    |
| Noise Pollution: Definition, sources, effects, prevention     Tonia 6. Social Issues and Environment                                                                             |    |    |
| <ul> <li>Son Ponution. Definition, sources, effects, prevention</li> <li>Noise Pollution: Definition, sources, effects, prevention</li> </ul>                                    |    |    |
| prevention<br>Soil Bollution: Definition sources offects provention                                                                                                              |    |    |
| • Water Pollution: Definition, Classification, sources, effects,                                                                                                                 |    |    |
| prevention                                                                                                                                                                       | 03 | 08 |
| • Air pollution: Definition, Classification, sources, effects,                                                                                                                   |    |    |
| • Definition                                                                                                                                                                     |    |    |
| Topic 5. Environmental Pollution                                                                                                                                                 |    |    |
| Conservation of biodiversity                                                                                                                                                     |    |    |
| • Threats to biodiversity                                                                                                                                                        |    |    |
| • Value of biodiversity                                                                                                                                                          |    |    |
| <ul> <li>Value of biodiversity</li> <li>Threats to biodiversity</li> <li>Conservation of biodiversity</li> </ul> Topic 5. Environmental Pollution <ul> <li>Definition</li> </ul> |    |    |
|                                                                                                                                                                                  | 1  |    |

#### Practical: Skills to be developed:

#### **Intellectual Skills**:

- 1. Collection of information, data
- 2. Analysis of data
- 3. Report writing

# **Motor Skills:**

- 1. Presentation Skills
- 2. Use of multi media

# List of Projects:

Note: Any one project of the following:

- 1. Visit to a local area to document environmental assets such as river / forest / grassland / hill / mountain
- 2. Visit to a local polluted site: Urban/Rural/Industrial/Agricultural
- 3. Study of common plants, insects, birds

4. Study of simple ecosystems of ponds, river, hill slopes etc

# Prepare a project report on the findings of the visit illustrating environment related facts, analysis and conclusion. Also suggest remedies to improve environment.

#### Learning Resources: Books:

| Sr.<br>No. | Author                                                | Title                                        | Publisher               |
|------------|-------------------------------------------------------|----------------------------------------------|-------------------------|
| 01         | Anindita Basak                                        | Environmental Studies                        | Pearson Education       |
| 02         | R. Rajgopalan                                         | Environmental Studies<br>from Crises to Cure | Oxford University Press |
| 03         | Dr. R. J. Ranjit Daniels, Dr.<br>Jagdish Krishnaswamy | Environmental Studies                        | Wiley India             |

Course Name : Mechanical Engineering Group Course Code : ME/PG/PT/MH/MI/FE/FG Semester : Fourth Subject Title : Manufacturing Processes Subject Code : 17402

#### **Teaching and Examination Scheme**

| Teaching Scheme |    |    |              |     | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|-----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH  | PR        | OR        | TW  | TOTAL |
| 03              |    | 04 | 03           | 100 | 25#       |           | 50@ | 175   |

#### **Rationale:**

Diploma technician often comes across various types of basic manufacturing processes. He / she is required to select, operate and control the appropriate processes for specific applications. He / she is also required to know about various cutting tools, latest improvements in manufacturing processes. This is a core technology subject. The diploma technician should know how the raw material gets processed through various processes and ultimately results into finished goods.

Hence it is essential that, he has understanding of basic manufacturing processes, machines, tools and equipments. With sound knowledge of this subject, the diploma technician will be able to handle and control practical situations more effectively and confidently.

# **Objectives:**

The student will be able to:

- 1) Use the basic machine tools like lathe and drilling.
- 2) Produce and inspect the job as per specified dimensions.
- 3) Select the specific manufacturing processes for the desired output.
- 4) Adopt safety practices while working on various machines.
- 5) Explain the different types of plastic moulding processes.
- 6) Select the basic manufacturing process for different components to be machined.



#### Theory:

| Topic and Content                                                                                                       | Hours | Marks |
|-------------------------------------------------------------------------------------------------------------------------|-------|-------|
| 1:Forming Processes                                                                                                     |       |       |
| Specific Objectives:                                                                                                    |       |       |
| > To list basic manufacturing processes and write working principal                                                     |       |       |
| of different manufacturing processes like Drop forging, Rolling                                                         |       |       |
| and Extrusion                                                                                                           |       |       |
| > To identify and select proper manufacturing process for a specific                                                    |       |       |
| component                                                                                                               |       |       |
| Content                                                                                                                 | 00    | 10    |
| 1.1 Drop forging: 06 Marks                                                                                              | 08    | 18    |
| Upset forging, press forging(die forging), open die & closed die forging,                                               |       |       |
| forging operations                                                                                                      |       |       |
| 1.2 Rolling: 06 Marks                                                                                                   |       |       |
| Principle of rolling, hot & cold rolling, Types of rolling mill, application of                                         |       |       |
| rolling                                                                                                                 |       |       |
| 1.3 Extrusion: 06 Marks                                                                                                 |       |       |
| Direct & indirect extrusion. Advantages, disadvantages and Applications.                                                |       |       |
| 2. Press working:                                                                                                       |       |       |
| Specific Objectives:                                                                                                    |       |       |
| To define Press working machine principal                                                                               |       |       |
| <ul> <li>To state various classification of press machine.</li> </ul>                                                   |       |       |
| <ul> <li>To state different operations performed on press machine and</li> </ul>                                        |       |       |
| their p[practical applications                                                                                          | 08    | 16    |
| Content                                                                                                                 | 00    | _     |
| 2.1 Press classification, press operations like punching/piercing, blanking,                                            |       |       |
| notching lancing 06 Marks                                                                                               |       |       |
| 2.2 Die set components and types of dies <b>06 Marks</b>                                                                |       |       |
| 2.3 Forming Operations: Bending drawing 04 Marks                                                                        |       |       |
| 3. Casting Processes:                                                                                                   |       |       |
| Snerific Objectives:                                                                                                    |       |       |
| To state different between nattern and model                                                                            |       |       |
| <ul> <li>To list different types of pattern and their applications</li> </ul>                                           |       |       |
| <ul> <li>To state various types of pattern allowances.</li> </ul>                                                       |       |       |
| <ul> <li>To state various types of pattern and values.</li> <li>To state various types of casting processes.</li> </ul> |       |       |
| Content                                                                                                                 |       |       |
| 3.1 Pattern making: 06 Marks                                                                                            |       |       |
| Basic steps in making casting. Pattern : types, materials and allowances.                                               |       |       |
| tools, color coding of patterns                                                                                         | 10    |       |
| 3.2 Moulding: 06 Marks                                                                                                  | 10    | 22    |
| Types of moulding sands, properties of sand, moulding methods, cores                                                    |       |       |
| and core prints, elements of gating system, bench moulding, floor                                                       |       |       |
| moulding, pit moulding, machine moulding.                                                                               |       |       |
| 3.3 Casting: 06 Marks                                                                                                   |       |       |
| Furnaces: Construction and working of cupola furnace, electric arc                                                      |       |       |
| furnace Methods & applications of - Centrifugal casting, shell                                                          |       |       |
| moulding, investment casting, Casting defects - Causes & remedies.                                                      |       |       |
| <b>3.4</b> Hot chamber and cold chamber die casting. Die casting defects - Causes &                                     |       |       |
| remedies. 04 Marks                                                                                                      |       |       |
| 4. Welding                                                                                                              | c-    |       |
| Specific Objectives:                                                                                                    | 07    | 14    |

| <ul> <li>To define Arc welding and Gas welding Principal.</li> <li>To state difference between soldering and brazing processes</li> </ul> |      |     |
|-------------------------------------------------------------------------------------------------------------------------------------------|------|-----|
| Content                                                                                                                                   |      |     |
| 4.1 Introduction & classification of welding processes -                                                                                  |      |     |
| Gas welding, carbon arc welding, shielded metal arc welding, TIG                                                                          |      |     |
| welding, MIG welding, plasma arc welding, resistance welding types-                                                                       |      |     |
| spot, seam projection, Electron beam welding, laser beam welding.                                                                         |      |     |
| welding defects. <b>10 Marks</b>                                                                                                          |      |     |
| 4.2 Introduction to soldering and brazing –                                                                                               |      |     |
| Process, fillers, heating methods & applications. 04 Marks                                                                                |      |     |
| 5. Machining Operations                                                                                                                   |      |     |
| Specific Objectives:                                                                                                                      |      |     |
| > To state the working principal of lathe and drilling machines.                                                                          |      |     |
| > To list out various operations performed on lathe and drilling                                                                          |      |     |
| machines                                                                                                                                  |      |     |
| Content                                                                                                                                   |      |     |
| 5.1 Lathe Machine: 12 Marks                                                                                                               |      |     |
| Introduction, classification and basic parts of center lathe & their                                                                      | 10   | 20  |
| functions, Lathe operations like facing, plain turning, taper turning, thread                                                             | 10   | 20  |
| cutting, chamfering, grooving, knurling. Cutting tool nomenclature & tool                                                                 |      |     |
| signature, cutting parameters.                                                                                                            |      |     |
| 5.2 Drilling Machine: 08 Marks                                                                                                            |      |     |
| Introduction, classification, basic parts of radial drilling machine and their                                                            |      |     |
| functions, twist drill nomenclature, drilling machine operations like                                                                     |      |     |
| drilling, reaming, boring, counter sinking, counter boring, spot facing.                                                                  |      |     |
| Cutting parameters.                                                                                                                       |      |     |
| 6. Plastic Moulding:                                                                                                                      |      |     |
| Specific Objectives:                                                                                                                      |      |     |
| To state different properties of plastics                                                                                                 |      |     |
| > To explain various plastic mauling methods like Injection, blow,                                                                        |      |     |
| compression molding                                                                                                                       | 05   | 10  |
| Content                                                                                                                                   |      |     |
| Introduction, Properties of plastics, types of plastics, plastic moulding                                                                 |      |     |
| methods - compression moulding, injection moulding, blow moulding,                                                                        |      |     |
| extrusion, vacuum forming and calendaring.                                                                                                |      |     |
| Tota                                                                                                                                      | l 48 | 100 |

# **Practical:**

Skills to be developed:

# Intellectual skills:

- 1) Identify basic manufacturing processes like forging, rolling and extrusion, for required component.
- 2) Specify need of pattern allowances.
- 3) Decide process parameters for different operations.
- 4) Decide tools required for a manufacturing process.
- 5) Identify a joining method for fabrication.

#### **Motor Skills:**

1) Operate lathe, drilling machine.

- 2) Set the tool and select the cutting parameters for machining operations.
- 3) Set the tools, job and decide cutting parameters.
- 4) Inspect various dimensions of jobs by using measuring instruments.
- 5) Make simple wooden / thermocole pattern.

# List of Practical:

- 1) One turning job on lathe containing the operations like plain turning, step turning, taper turning, grooving, knurling and chamfering.
- 2) One job using Spot welding machine. (Min. 4 spots on 0.5-1mm thick metal strip.)
- 3) One simple job on TIG / MIG welding setup or visit to TIG / MIG welding shop.
- 4) Moulding practice for any one pattern.
- 5) Industrial visit to observe plastic processing shop and report on the visit.
- 6) One composite job containing the operations like lathe with axial & across drilling (like Nut- Bolt assembly or any other equivalent job).
- 7) Demonstration of eccentric turning using four jaw chuck.

#### Notes:

- 1] The workshop instructors should prepare specimen job in each shop as demonstration practice before the student (as per the drawing given by subject teacher/ workshop superintendent).
- 2] Theory behind practical is to be covered by the concerned subject teacher/ workshop superintendent.
- 3] Workshop diary should be maintained by each student duly signed by respective shop instructors.
- 4] Assignments are to be assessed by the concerned subject teacher/ workshop superintendent.

# **Guidelines for conducting Practical Examination for MANUFACTURING PROCESSES**

- 1. The job drawing must be jointly decided by the External and Internal examiner prior to one day in advance from the commencement of practical examination. Every student should be supplied the copy of job drawing before examination.
- 2. Time for practical examination should be **THREE HOURS.**
- 3. Practical examination of the students shall consists of Turning job containing different operations like Facing, straight Turning, Taper turning, Chamfering, Knurling, Threading, Grooving. (Minimum 5 operations) Students will perform the job as per the drawing provided to them.
- 4. Raw material size Bar dia. 40 to 50 mm, length 80 to 100 mm.

# Learning Resources:

**Books:** 

| Sr.<br>No. | Author                              | Title                                            | Publisher                                 |
|------------|-------------------------------------|--------------------------------------------------|-------------------------------------------|
| 01         | S. K. Hajra Chaudhary,<br>Bose, Roy | Elements of workshop<br>Technology-Volume I & II | Media Promoters and<br>Publishers Limited |
| 02         | O. P. Khanna & Lal                  | Production Technology<br>Volume- I & II          | Production Technology<br>Volume- I & II   |

#### w.e.f Academic Year 2012-13

# 'G' Scheme

|    |                                   |                                         | Dhanpat Rai Publications |
|----|-----------------------------------|-----------------------------------------|--------------------------|
| 03 | W. A. J. Chapman, S. J.<br>Martin | W. A. J. Chapman, S. J.<br>Volume –I,II | Viva Books (p) Ltd.      |
| 04 | O.P. Khanna                       | A text book of Foundry Tech.            | Dhanpat Rai Publications |
| 05 | H.S. Bawa                         | Workshop Technology<br>Volume- I & II   | Tata McGraw-Hill         |
| 06 | P.C. Sharma                       | Production Engineering                  | S. Chand Publications    |

Course Name : Mechanical Engineering Group Course code : ME/MH/MI/PG/PT Semester : Fourth Subject Title : Electrical Engineering Subject Code : 17404

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |               | Examinati | on Scheme |    |     |       |
|-----------------|----|----|---------------|-----------|-----------|----|-----|-------|
| TH              | TU | PR | PAPER<br>HRS. | TH        | PR        | OR | TW  | TOTAL |
| 03              |    | 02 | 03            | 100       |           |    | 25@ | 125   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

This subject is introduced with intention to teach students of mechanical branch facts, concepts, principles and procedure of operating electrical machines, circuits and systems and their applications. This subject is most important in regards to selection of electrical drives for various applications and will provide sufficient knowledge about electrical machines, equipments used in industry/field. This subjects deals with measurements of electrical quantities to judge the performance of electrical machines

#### **General Objectives:**

Student will be able to:

- 1. Differentiate between a.c. and d.c. supply.
- 2. Identify different type's motors, transformers and drives.
- 3. Select suitable drive as per the requirements.
- 4. Understand various types of electric heating and welding operations in manufacturing processes.
- 5. Supervise routine maintenance of electrical machines and supply systems.
- 6. Use the tariff system.
- 7. Calculate energy requirements and cost of energy.



# Theory:

| Topic and Content                                                                                 | Hours | Marks |
|---------------------------------------------------------------------------------------------------|-------|-------|
| 1. Introduction to Electric Power System and A. C. Supply 20 Marks                                |       |       |
| Specific Objectives:                                                                              |       |       |
| Student will be able to :                                                                         |       |       |
| State various components of power system.                                                         |       |       |
| Distinguish between a.c. and d.c. supply.                                                         |       |       |
| Calculate electrical quantities of a.c. supply and circuit parameters of R-L                      |       |       |
| <ul> <li>Calculate line and phase quantities and various powers in three phase circuit</li> </ul> |       |       |
| Contents: Introduction 04 Marks                                                                   |       |       |
| 1.1 Electrical power supply system generation, transmission, distribution. AC supply & DC Supply  | 10    | 20    |
| AC Fundamentals: 08 Marks                                                                         |       |       |
| 1.2 Definitions: cycle frequency phase period maximum value average value                         |       |       |
| r m s value (Simple Numericals)                                                                   |       |       |
| 1.3 Concept of current voltage power & energy in series R-L and R-C circuits                      |       |       |
| (Simple Numericals)                                                                               |       |       |
| Three phase supply:08 Marks                                                                       |       |       |
| 1.4 Star and Delta circuit,                                                                       |       |       |
| 1.5 Line and Phase relationship, power equation.(No Derivation, Simple                            |       |       |
| Numericals)                                                                                       |       |       |
| 2.Measuring Instruments: 06 Marks                                                                 |       |       |
| Specific Objectives:                                                                              |       |       |
| Student will be able to :                                                                         |       |       |
| Differentiate between ac and dc meters.                                                           |       |       |
| > Use multimeter for measurements of current, voltage and passive                                 |       |       |
| parameter.                                                                                        | 04    | 06    |
| Contents:                                                                                         |       |       |
| 2.1 Introduction to construction, operation and use of AC and DC ammeter,                         |       |       |
| voltmeter (PMMC and MI meters only).                                                              |       |       |
| 2.2 Electro-dynamic wattmeter, energy meter and digital multimeter, Clip on                       |       |       |
| meter.                                                                                            |       |       |
| 3. DC Motor 04 Marks                                                                              |       |       |
| Specific Objectives:                                                                              |       |       |
| Student will be able to :                                                                         |       |       |
| State working principle of d.c. motor.                                                            |       |       |
| Select type of d.c. motor as per requirement.                                                     | 02    | 04    |
| Contents:                                                                                         |       |       |
| 3.1 Construction and principle of operation.                                                      |       |       |
| 3.2 Speed-torque characteristics. D.C. shunt, series and compound motors. Their                   |       |       |
| specifications and applications.                                                                  |       |       |
| 4. Transformer: 14 Marks                                                                          |       |       |
| Specific Objectives:                                                                              |       |       |
| Student will be able to :                                                                         |       |       |
| <ul> <li>State the working principle of transformer.</li> </ul>                                   | 06    | 14    |
| <ul> <li>Calculate transformation ratio, efficiency and regulation from direct load</li> </ul>    | -     |       |
| test.                                                                                             |       |       |
| Contents:                                                                                         |       |       |

| 4.1 Construction and principle of operation.                                    |        |    |
|---------------------------------------------------------------------------------|--------|----|
| 4.2 EMF equation and transformation ratio.                                      |        |    |
| 4.3 Load test for efficiency and regulation. Specifications and rating.         |        |    |
| 4.4 Auto transformer & 3 phase transformer concept only.                        |        |    |
| 4.5 Applications of transformers.                                               |        |    |
| 5. AC Motor: 24 Marks                                                           |        |    |
| Specific Objectives:                                                            |        |    |
| Student will be able to :                                                       |        |    |
| Describe working principle of three phase induction motor.                      |        |    |
| Calculate slip and rotor frequency and draw speed-torque curves.                |        |    |
| ➢ Use starter for three phase induction motor.                                  |        |    |
| > State the working principle of single phase induction motor and its types.    |        |    |
| Select proper type of single phase induction motor.                             |        |    |
| Contents:                                                                       |        |    |
| 5.1 Three Phase Induction Motor: 10 Marks                                       |        |    |
| Construction and principle of operation of 3 phase induction motor.             |        |    |
| Speed torque characteristics, slip, speed control of Induction Motor by         |        |    |
| variable frequency drive(VFD)-working principle and block diagram               |        |    |
| only. Reversal of rotation (Simple Numerical on speed and slip                  | 10     | 24 |
| calculations)                                                                   |        |    |
| Starters-Direct ON Line Starters and Star-Delta Starters-Working                |        |    |
| principle, circuit diagram and applications.                                    |        |    |
| 5.2 Single Phase Induction Motors 04 Marks                                      |        |    |
| a) Capacitor start b) Capacitor start and run c) Shaded pole                    |        |    |
| 5.3 Other Motors: 06 Marks                                                      |        |    |
| Study the following motors with respect to specifications and rating            |        |    |
| construction and applications                                                   |        |    |
| <ul> <li>Universal motor</li> </ul>                                             |        |    |
| <ul> <li>Servo motor</li> </ul>                                                 |        |    |
| <ul> <li>Stepper motor</li> </ul>                                               |        |    |
| 5.4 Alternator: 04 Marks                                                        |        |    |
| Construction principle of operation & applications Self and separate excitation |        |    |
| 6 Utilization of Electrical Energy:                                             |        |    |
| Specific Objectives                                                             |        |    |
| Student will be able to ·                                                       |        |    |
| Classify and select electric drives on the basis of speed-torque                |        |    |
| characteristics and enclosures                                                  |        |    |
| State the working principle of electric heating welding and electroplating      |        |    |
| <ul> <li>Use electric motor for electro-agro system</li> </ul>                  |        |    |
| Contents                                                                        |        |    |
| 6.1 Industrial Applications: 04 Marks                                           | 08     | 18 |
| Classification of drives                                                        | 00     | 10 |
| <ul> <li>Eactors for selection of motor for different drives</li> </ul>         |        |    |
| <ul> <li>Types of enclosures</li> </ul>                                         |        |    |
| 6.2 Flectric Heating & Welding: 10 Marks                                        |        |    |
| Working principle & types of heating and welding and their applications         |        |    |
| 6.3 Flectrometallurgical & Flectro Agro Systems:                                |        |    |
| Concept and principle used in electronlating                                    |        |    |
| <ul> <li>Flectrical machines used in electro-agro systems</li> </ul>            |        |    |
| 7 Electric Wiring Illumination Flactric Safety Taviff & Dowar                   | ┨────┦ |    |
| Conservation · 14 Marks                                                         | 08     | 14 |
| Specific Objectives:                                                            | 00     | 14 |
| specific Objectives:                                                            |        |    |

| Student will be able to :                                                 |        |     |
|---------------------------------------------------------------------------|--------|-----|
| Do wiring of switchboards.                                                |        |     |
| Select type of lamp as per requirement.                                   |        |     |
| State the importance of MCB and ELCB and electric safety.                 |        |     |
| Explain the need of earthing and importance of pf. improvement.           |        |     |
| Contents:                                                                 |        |     |
| 7.1 Introduction to switches used in mechanical machines. Simple Electric |        |     |
| Installations with 2 sockets, 2 fans, 2 lamps, with switches and fuses    |        |     |
| 7.2 Introduction to different accessories like MCB, ELCB, wires & cables. |        |     |
| 7.3 Fluorescent, CFL and LED lamps with their ratings and applications.   |        |     |
| 7.4 Concept of energy conservation and energy audit                       |        |     |
| 7.5 Necessity of earthing, type, safety tools, first aid.                 |        |     |
| 7.6 Types of tariff, pf improvement only methods.                         |        |     |
| 7.7 Fire extinguishing methods adopted in electrical engineering          |        |     |
| 7.8 Trouble shooting electrical installations and machines.               |        |     |
| Το                                                                        | tal 48 | 100 |

## Skills to be developed for practical:

#### **Intellectual skills**

#### Student will be able to:

- 1. Identify and give specifications of electrical motors and transformers.
- 2. Interpret wiring diagrams for various applications.
- 3. Identify safety equipments required.
- 4. Decide the procedure for setting experiments.

#### Motor skills:

#### Student will be able to:

- 1. Draw wiring diagram
- 2. Make wiring connections to connect electrical equipments and instruments.
- 3. Measure electrical power, earthing resistance and other electrical quantities.
- 4. Calibrate electrical instruments.
- 5. Use of safety devices while working.
- 6. Prepare energy consumption bill with present tariff structure.

#### **List of Practical:**

- 1. Know your electrical laboratory.
- 2. Find the performance of R-L series circuit with single phase A.C. supply and determine the current, power and power factor.
- 3. Find the performance of R-C series circuit with single phase A.C. supply and determine the current, power and power factor.
- 4. Verify the relationship between line and phase values of voltages and currents in three phase balanced star and delta connected load.

- 5. Determine efficiency and single phase transformer at no load, half load and full load by conducting load test.
- 6. Determination of slip of three phase induction motor by use of tachometer at no load and full load.
- 7. Observe the change in direction of rotation of three phase induction motor by changing the phase sequence R-Y-B
- 8. Prepare switch board for two lamps, one fan, one fan regulator and one 5 ampere socket.
- 9. Connect single phase energy meter in simple lamp circuit for measurement of energy consumption for one hour.
- 10. Search fault in faulty machines or installation.
- 11. Demonstration of servo motor and stepper motor.

# [Note: Practicals 1 to 9 shall be performed by 2 students and practical 10 in a group of 4 students]

# Assignment:

- 1. **Industrial visit:** Visit to show various motors, electrical devices, accessories used in mechanical industrial applications like dairy, crushers, dall mill, oil mill or small scale unit. [The group size is as suggested by industry]
- 2. Detail study of electrical motors manufacture's catalogues to study mounting installation, frame work, coupling, rotor inertia etc. [To be performed individually]

# NOTE: All Practicals and assignment are compulsory and should be considered in assessment formats A1, A2 And So On.

| I. Books | •                                                            |                                          |                                                       |                                        |  |
|----------|--------------------------------------------------------------|------------------------------------------|-------------------------------------------------------|----------------------------------------|--|
| Sr.No.   | Author                                                       | Title Of Book                            | Edition                                               | Publisher                              |  |
| 01       | B.L. Theraja                                                 | Electrical Technology<br>(Vol. I and IV) | Multicolour Edition<br>2005 And<br>Subsequent Reprint | S.Chand & Co.<br>Ramnagar New<br>Delhi |  |
| 02       | E. Hughes                                                    | Electrical Technology                    | Second Edition                                        | ELBS/Pearson                           |  |
| 03       | R.S. Ananda<br>Murthy                                        | Basic Electrical<br>Engineering          | Second Edition                                        | Pearson                                |  |
| 04       | Theodore Electrical Machines,<br>Drives and Power<br>Systems |                                          | Sixth Edition                                         | Pearson                                |  |
| 05       | Sunil T. Gaikwad                                             | Basic Electrical<br>Engineering          | First Edition                                         | WILEY India                            |  |

# Learning Resources:

#### 2. Websites:

www.wikipedia.com www.youtube.com www.narosa.com www.dreamtechpress.com

# List of Equipments

| Sr<br>No. | List of Equipments                                                          | Qty. |
|-----------|-----------------------------------------------------------------------------|------|
| 1         | Portable MI type A.C. ammeter range (0-5A)                                  | 05   |
| 2         | Portable MI type A.C. voltmeter range (0-150/300V)                          | 05   |
| 3         | Portable MI type A.C. voltmeter range (0-15/30/75 V)                        | 05   |
| 4         | Portable electro-dynamometer type wattmeter (10/20 A and 250/500V)          | 05   |
| 5         | Portable electro-dynamometer type power factor meter (10/20 A and 250/500V) | 05   |
| 6         | Rheostat (0-250 Ohm,2A)                                                     | 05   |
| 7         | Rheostat (0-90 Ohm,5A)                                                      | 05   |
| 8         | 3 phase load bank of 10A capacity/phase suitable for 415V                   | 02   |
| 9         | Single phase 230/115V,50Hz,1kVA natural air cooled transformer              | 02   |
| 10        | Analog type (0-5000 r.p.m.) tachometer                                      | 02   |
| 11        | A three phase 415 V, 50Hz, 4h.p. squirrel cage induction motor              | 02   |
| 12        | A simple model of servometer for demo                                       | 01   |
| 13        | A small model of stepper motor for demo                                     | 01   |
| 14        | A single Phase 230 V, 5A electrical/electronic energy meter                 | 02   |

# **Course Name : Diploma in Mechanical Engineering**

Course Code : ME/MH/MI Semester : Fourth Subject Title : Thermal Engineering Subject Code : 17410

## **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              | Examinati | on Scheme |     |     |       |
|-----------------|----|----|--------------|-----------|-----------|-----|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH        | PR        | OR  | TW  | TOTAL |
| 04              |    | 02 | 03           | 100       |           | 25# | 25@ | 150   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Mechanical Engineers have to work with various power producing & power absorbing devices like Boilers, Turbines, Compressor, I.C. Engines, and Pumps etc. In order to understand the principles, construction and working of the devices, it is essential to understand the concept of energy, work, heat and conversion between them.

The subject is a related to Power Engineering and other related subjects in which the application of fundamental concepts of Thermal Engineering are included.

#### **General Objectives:**

The Student will be able to:

- 1. Define fundamental concepts of thermodynamics to thermodynamic systems.
- 2. Use various laws of thermodynamics.
- 3. Apply various gas laws and ideal gas processes to various thermodynamic systems.
- 4. Draw the construction and explain working of boilers, turbines & condensers.
- 5. Find properties of two phase system from steam table / mollier charts
- 6. State the various modes of heat transfer.


# **Theory Content:**

| Topic and Contents                                                                                                                                                                                                                                               | Hours | Marks |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
| 1. Fundamentals of Thermodynamics20 Marks                                                                                                                                                                                                                        |       |       |
| Specific objectives:                                                                                                                                                                                                                                             |       |       |
|                                                                                                                                                                                                                                                                  |       |       |
| Define fundamental concepts of Thermodynamics                                                                                                                                                                                                                    |       |       |
| > Apply first law of thermodynamics to various thermodynamic devices.                                                                                                                                                                                            |       |       |
| Apply second law of thermodynamic.                                                                                                                                                                                                                               |       |       |
| Contents                                                                                                                                                                                                                                                         |       |       |
| 1.1 Concepts of pure substance, types of systems, properties of systems-<br>Extensive and Intensive properties, processes and cycles, Quasi-static<br>process, flow and non flow process, Thermodynamic equilibrium, Point<br>and path function. <b>04 Marks</b> |       |       |
| <ul> <li>1.2 Work, Heat Transfer and Energy. Thermodynamic definition of work &amp; heat, Difference between heat and work. Energy –Potential Energy, Kinetic Energy, Internal Energy, Flow Work, concepts of enthalpy &amp;</li> </ul>                          | 12    | 20    |
| entropy. <b>04 Marks</b><br>1.3 Laws of Thermodynamics- Zeroth Law, principle of law of conservation                                                                                                                                                             |       |       |
| Thermodynamics- Kelvin Planks, Clausius statements and their<br>equivalence, Clausius inequality, Concept of perpetual motion machine<br>of first and second kind <b>06 Marks</b>                                                                                |       |       |
| 1.4 Application of Laws of Thermodynamic:- Steady Flow Energy equation                                                                                                                                                                                           |       |       |
| and its application to boilers engine nozzle turbine compressor &                                                                                                                                                                                                |       |       |
| condenser Application of Second law of Thermodynamics to Heat                                                                                                                                                                                                    |       |       |
| Engine Heat Pump and Refrigerator <b>06 Marks</b>                                                                                                                                                                                                                |       |       |
| 2. Ideal Gases12 Marks                                                                                                                                                                                                                                           |       |       |
| Specific objectives:                                                                                                                                                                                                                                             |       |       |
| State ideal gas laws                                                                                                                                                                                                                                             |       |       |
| <ul> <li>Represent various ideal gas processes on P-V and T-S diagrams</li> </ul>                                                                                                                                                                                |       |       |
| Contents                                                                                                                                                                                                                                                         |       |       |
| 2.1 Concept of Ideal gas- Charle's law, Boyle's law, Avogadro's law,                                                                                                                                                                                             |       |       |
| equation of state, characteristic gas constant and universal gas constant.                                                                                                                                                                                       | 08    | 12    |
| 04 Marks                                                                                                                                                                                                                                                         |       |       |
| 2.2 Ideal gas processes: -                                                                                                                                                                                                                                       |       |       |
| Isobaric, Isochoric, Isothermal, Isentropic, Polytropic, and their                                                                                                                                                                                               |       |       |
| representation on P-V and T-S diagram (only simple numerical based                                                                                                                                                                                               |       |       |
| on above) 08 Marks                                                                                                                                                                                                                                               |       |       |
| 3. Steam and Steam Boiler20 Marks                                                                                                                                                                                                                                |       |       |
| Specific objectives:                                                                                                                                                                                                                                             |       |       |
| State the concept of Steam generation.                                                                                                                                                                                                                           |       |       |
| Use of steam tables and Mollier chart.                                                                                                                                                                                                                           |       |       |
| Explain construction and working of different types of boilers and                                                                                                                                                                                               | 12    | 20    |
| function of mountings & accessories                                                                                                                                                                                                                              | 12    | 20    |
| Contents                                                                                                                                                                                                                                                         |       |       |
| 3.1 Generation of steam at constant pressure with representation on various charts such as T-S, H-S. Properties of steam and use of steam table,                                                                                                                 |       |       |
| Dryness fraction, Degree of superheat 04 Marks                                                                                                                                                                                                                   |       |       |

| 3.2     | Vapour processes :- Constant pressure, constant volume, constant                                                              |    |     |
|---------|-------------------------------------------------------------------------------------------------------------------------------|----|-----|
|         | enthalpy, constant entropy process (numerical using Mollier chart),                                                           |    |     |
|         | Rankine Cycle. 06 Marks                                                                                                       |    |     |
| 3.3     | Steam Boilers: - Classification, Construction and working of - Cochran,                                                       |    |     |
|         | Babcock and Wilcox, La-mont and Loeffler boiler. Boiler draught.                                                              |    |     |
|         | Indian Boiler Regulation (IBR) 06 Marks                                                                                       |    |     |
| 3.4     | Boiler mountings and accessories (to be covered in practical periods).                                                        |    |     |
|         | 04 Marks                                                                                                                      |    |     |
| 4. Stea | am Nozzles and Turbines16 Marks                                                                                               |    |     |
| Specif  | ic objectives:                                                                                                                |    |     |
| $\succ$ | Define Mach number & critical pressure.                                                                                       |    |     |
| $\succ$ | State the application of steam nozzles.                                                                                       |    |     |
| $\succ$ | Explain the principle of working of steam turbine                                                                             |    |     |
| Conter  | nts                                                                                                                           |    |     |
| 4.1     | Steam nozzle: -                                                                                                               |    |     |
|         | Continuity equation, types of nozzles, concept of Mach number, critical pressure application of steam nozzles <b>04 Marks</b> | 10 | 16  |
| 12      | Steam turbino:                                                                                                                |    |     |
| 4.2     | Classification of turbings. Construction and working of Impulse and                                                           |    |     |
|         | Reaction turbines. <b>06 Marks</b>                                                                                            |    |     |
| 4.3     | Compounding of turbines and its types. Regenerative feed heating.                                                             |    |     |
|         | bleeding of steam, governing & its types, losses in steam turbines                                                            |    |     |
|         | (no velocity diagrams and numerical). <b>06 Marks</b>                                                                         |    |     |
| 5. Stea | om Condensers and Cooling Towers16 Marks                                                                                      |    |     |
| Specif  | ic objectives:                                                                                                                |    |     |
| < <     | Apply Dalton's law to condenser.                                                                                              |    |     |
| $\succ$ | Explain construction and working of condensers and cooling towers.                                                            |    |     |
| $\succ$ | State the effect of air leakages in condenser                                                                                 |    |     |
| Conter  | nts                                                                                                                           | 10 | 1.6 |
| 5.1     | Dalton's law of partial pressure, function and classification of                                                              | 12 | 16  |
|         | condensers, construction and working of surface condensers. 04 Marks                                                          |    |     |
| 5.2     | Sources of air leakage and its effect, concept of condenser efficiency,                                                       |    |     |
|         | vacuum efficiency (Simple numerical). <b>06 Marks</b>                                                                         |    |     |
| 5.3     | Cooling TowersConstruction and working of forced, natural and                                                                 |    |     |
|         | induced draught cooling tower. 06 Marks                                                                                       |    |     |
| 6. Hea  | t Transfer16 Marks                                                                                                            |    |     |
| Specif  | fic objectives:                                                                                                               |    |     |
| >       | Describe various modes of heat transfer.                                                                                      |    |     |
| $\succ$ | Describe construction and working of different types of Heat                                                                  |    |     |
|         | exchangers.                                                                                                                   |    |     |
| Conter  | nts                                                                                                                           |    |     |
| 6.1     | Modes of heat transfer: - Conduction, convection and radiation.                                                               |    |     |
|         | Conduction :- 08 Marks                                                                                                        | 10 | 16  |
|         | Fourier's law, thermal conductivity, conduction through cylinder,                                                             | 10 | 10  |
|         | thermal resistance, composite walls (Simple numerical) 04 Marks                                                               |    |     |
| 6.2     | Radiation:- Thermal Radiation, Absorptivity, Transmissivity,                                                                  |    |     |
|         | Reflectivity, Emissivity, black and gray bodies, Stefan-Boltzman law.                                                         |    |     |
|         | 04 Marks                                                                                                                      |    |     |
| 6.3     | Heat Exchangers: - Classification, Construction and working of Shell                                                          |    |     |
|         | and tube, shell and coil and pipe in pipe type, plate type heat exchanger                                                     |    |     |
|         | and its applications.                                                                                                         |    |     |
|         | Total                                                                                                                         | 64 | 100 |

#### **Practical:** Skills to be developed: **Intellectual Skills:**

- 1. Explain various concepts and fundamentals of thermodynamics.
- 2. **Explain** vapour processes, principle of working of steam boilers and function of different mountings and accessories.
- 3. Draw construction and explain working of steam turbines and condensers.
- 4. **State the various** modes of heat transfer and concept of heat exchanges.
- 5. Interpret steam tables, Mollier chart and relationship between different thermodynamic properties.
- 6. List different sources of energy and their applications

# Motor Skills:

- 1. Trace path of flue gases and water steam circuit in a boiler.
- 2. Collect information and write report on boiler and its mounting and accessories.
- 3. Conduct trial on the setup for calculation of thermal conductivity of metal rod
- 4. Collect information and write technical specifications of photovoltaic cells and identify different components on panels of photovoltaic cells.
- 5. Report writing on presentation given on Renewable sources of energy.

# List of Practicals:

- 1. Trace and draw the path of Flue Gases and water Steam circuit with the help of models of 'Babcock & Wilcox' and 'La-Mont' Boiler or any other similar model available in the laboratory.
- 2. Draw and understand working of various types of Boiler Mountings and Accessories.
- 3. Prepare a report on visit to Sugar Factory/ Steam Power Plant/ Dairy industry with specification of boiler and list of mountings and accessories along with their functions.
- 4. Draw the sketches of impulse and reaction turbines; describe their working and differences through a cut section model or a working model. Focus should be on the use for electrical power generation.
- 5. Draw a Neat sketch and understand working of Jet Condenser. Component must be labeled. State function of components and material used.
- 6. Calculate the thermal conductivity for a given sample of solid metallic rod.
- 7. Classify heat exchangers and write their descriptions. Observe the various heat exchangers available in laboratory with their specifications.
- 8. Mini project: Student will prepare individually a report on Renewable sources of energy and make power point presentation on the following.
  - a) Solar water heating system
  - b) Photo voltaic cells
  - c) Bio gas, Bio mass and Bio Diesel as a fuel
  - d) Wind, Tidal and Geothermal Energy

[Assignments to be completed in a group of (max.) four students. The topics should be distributed in the groups.]

# Learning resources: Books:

| Sr.<br>No. | Author           | Title                               | Publisher                       |
|------------|------------------|-------------------------------------|---------------------------------|
| 1          | Domkundwar V. M. | A Course in Thermal Engineering     | Dhanpat Rai & Co.               |
| 2          | R. S. Khurmi     | A text book of Thermal Engineering. | S. Chand & co. Ltd.             |
| 3          | P. Chattopadhyay | Engineering Thermodynamics          | Oxford university press         |
| 4          | P. K. Nag        | Engineering Thermodynamics          | Tata McGraw –Hill, New<br>Delhi |
| 5          | B. K. Sarkar     | Thermal Engineering                 | Tata McGraw –Hill, New<br>Delhi |
| 6          | P. L. Ballaney   | A Course in Thermal Engineering     | Khanna Publishers               |
| 7          | R. K. Rajput     | A Course in Thermal Engineering     | Laxmi Publication, Delhi        |

Course Name : Mechanical Engineering Group Course Code : ME/MH/MI/PG/PT/FE/FG Semester : Fourth Subject Title : Fluid Mechanics and Machinery Subject Code : 17411

# **Teaching and Examination Scheme:**

| Teac | Teaching Scheme |    |              |     | Examinati | on Scheme |     |       |
|------|-----------------|----|--------------|-----|-----------|-----------|-----|-------|
| TH   | TU              | PR | PAPER<br>HRS | TH  | PR        | OR        | TW  | TOTAL |
| 04   |                 | 02 | 03           | 100 | 25#       |           | 25@ | 150   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Knowledge of fluid properties, fluid flow & fluid machinery is essential in all fields of engineering. Hydraulic machines have important role in water supply, irrigation, power generation and also in most of the engineering segments. This subject requires knowledge of basic engineering sciences, applied mechanics, mathematics etc. The fundamentals of this subject are essential for the subject "Industrial Fluid Power" in sixth semester.

#### General Objectives: The student will be able to

- 1) Define various properties of fluids
- 2) Measure pressure, velocity and flow rate using various instruments.
- 3) State continuity equation, Bernoulli's equation and its applications.
- 4) Estimate various losses in flow through pipes.
- 5) Explain concept of impact of jet on various types of vanes.
- 6) Draw the construction, working of hydraulic pumps and turbines.
- 7) Evaluate performance of turbines and pumps.

### **Learning Structure:**



# Theory:

| need.                                                                                                                                                                   | 12  | 18  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|
| <ul> <li>need.</li> <li>Classification of hydraulic turbines and their applications.</li> <li>Construction and working principle of Palton wheel Energie and</li> </ul> | 12  | 18  |
| • Construction and working principle of Petton wheel, Francis and Kaplan turbine.                                                                                       |     |     |
| • Draft tubes – types and construction, Concept of cavitation in turbines,                                                                                              |     |     |
| Calculation of Work done, Power, efficiency of turbine                                                                                                                  |     |     |
| 6. Pumps<br>Specific Objectives:                                                                                                                                        |     |     |
| <ul> <li>Explain working of centrifugal, reciprocating and multistage pumps.</li> </ul>                                                                                 |     |     |
| <ul> <li>Explain the concept of cavitation in pumps.</li> </ul>                                                                                                         |     |     |
| Calculate manometric head, work done and various efficiencies related to                                                                                                |     |     |
| the pumps.                                                                                                                                                              |     |     |
| <ul> <li>Select the pump for a given application.</li> </ul>                                                                                                            |     |     |
| 6.1 Centrifugal Pumps 14 Marks                                                                                                                                          |     |     |
| Contents:                                                                                                                                                               |     |     |
| Construction, principle of working, priming methods and Cavitation                                                                                                      |     |     |
| • Types of casings and impellers.                                                                                                                                       |     |     |
| Manometric head, Work done, Manometric efficiency, Overall                                                                                                              | 1.4 | 24  |
| efficiency, NPSH.                                                                                                                                                       | 14  | 24  |
| Performance Characteristics of Centrifugal pumps.                                                                                                                       |     |     |
| • Trouble Shooting.                                                                                                                                                     |     |     |
| Construction, working and applications multistage pumps                                                                                                                 |     |     |
| Submersible pumps and jet pump                                                                                                                                          |     |     |
| 6.2 Reciprocating Pump 10 Marks                                                                                                                                         |     |     |
| • Construction, working principle and applications of single and                                                                                                        |     |     |
| double acting reciprocating pumps.                                                                                                                                      |     |     |
| • Slip, Negative slip, Cavitation and separation.                                                                                                                       |     |     |
| • Use of Air Vessels.                                                                                                                                                   |     |     |
| • Indicator diagram with effect of acceleration head & frictional head.                                                                                                 |     |     |
| (No numerical on reciprocating pumps)                                                                                                                                   |     | 100 |
| Total                                                                                                                                                                   | 64  | 100 |

# Practical: Skills to be developed: Intellectual Skills:

1) Select appropriate flow and pressure measuring devices for a given situation.

2) Analyze the performance of pumps and turbines.

# **Motor Skills:**

- 1) Use flow and pressure measuring devices.
- 2) Operate pumps and turbines.

# **List of Practicals:**

- 1. Measure water pressure by using Bourdon's pressure gauge and U-tube Manometer. Also measure discharge of water by using measuring tank and stop watch.
- 2. Calibrate Bourdon's pressure gauge with the help of Dead weight pressure gauge.
- 3. Verify Bernoulli's theorem.
- 4. Determine Coefficient of Discharge of Venturimeter.
- 5. Determine coefficient of Discharge, Coefficient of Contraction and Coefficient of Velocity of Sharp edged circular orifice.
- 6. Determine Darcy's friction factor 'f' in pipes of three different diameters for four different discharges.
- 7. Determine minor frictional losses in pipe fittings.
- 8. Determine overall efficiency of Pelton wheel by using Pelton wheel test rig.
- 9. Determine overall efficiency of Centrifugal Pump & plot its operating characteristics by using Centrifugal pump test rig.
- 10. Determine overall efficiency of Reciprocating pump by using Reciprocating Pump test rig.

# Assignments

1. Information collection of Centrifugal, reciprocating, multistage pumps and submersible pumps from local market and from internet. Comparison of various models manufactured by different manufacturers. [The market survey is to be completed in a group of (max.) three to four students and the report of the same is to be included as part of term work.]

# Learning Resources:

# 1. Books:

| Sr.<br>No | Author                                           | Title                                                                         | Publication                      |  |  |
|-----------|--------------------------------------------------|-------------------------------------------------------------------------------|----------------------------------|--|--|
| 01        | Ojha, Berndtsson,<br>Chnadramouli                | Fluid Mechanics and Machinery                                                 | Oxford University Press          |  |  |
| 02        | Som S K , Biswas G.                              | Introduction to Fluid Mechanics<br>and Fluid Machines 3 <sup>rd</sup> Edition | Tata McGraw-Hill Co.<br>Ltd.     |  |  |
| 03        | Modi P.N. Seth<br>S M                            | Hydraulics and Fluid Mechanics<br>including Hydraulic Machines                | Standard Book House<br>New Delhi |  |  |
| 04        | Subramanya K.                                    | Fluid Mechanics and Hydraulic<br>Machines: problems and solution              | Tata McGraw-Hill Co.<br>Ltd.     |  |  |
| 05        | Product catalogues of various pump manufacturers |                                                                               |                                  |  |  |

Course Name : Mechanical Engineering GroupCourse Code : AE/ME/MH/MI/PG/PTSemester : FourthSubject Title : Theory of MachinesSubject Code : 17412

# **Teaching and Examination Scheme:**

| Teac | Teaching Scheme |    |               |     | Examinati | on Scheme |     |       |
|------|-----------------|----|---------------|-----|-----------|-----------|-----|-------|
| TH   | TU              | PR | PAPER<br>HRS. | TH  | PR        | OR        | TW  | TOTAL |
| 03   |                 | 02 | 03            | 100 |           |           | 25@ | 125   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

It is a core technology subject in Mechanical Engineering Discipline. Mechanical Engineers often come across various machines in practice. They should be able to identify and interpret various elements of machines in day to day life. In maintaining various machines, a diploma engineer should have sound knowledge of fundamentals of machine and mechanism. It will be helpful for them to understand the mechanisms from operational point of view in a better way. This subject imparts the kinematics involved in different machine elements and mechanisms like gear, cam-follower, follower, belt-pulley, flywheel, brake, dynamometer, clutch, etc.

Detailed knowledge of these aspects with deep insight into the practical applications develops a professional confidence in them to become successful Engineer.

This subject serves as a prerequisite for subjects like Machine Design to be learned in higher semester.

#### **General Objectives:**

#### The student will be able to:

- 1. Understand different machine elements and mechanisms.
- 2. Understand Kinematics and Dynamics of different machines and mechanisms.
- 3. Draw cam profile suitable to various displacement diagram.
- 4. Select Suitable Drives and Mechanisms for a particular application
- 5. Understand the function, operation and application of flywheel and governor.
- 6. Understand the function, operation and application of brake, dynamometer, clutch and bearing
- 7. Find magnitude and plane of unbalanced forces.

#### MSBTE - Final Copy Dt. 30/08/2013

# Theory:

| Topic and Content                                                                                                                            | Hours      | Marks |
|----------------------------------------------------------------------------------------------------------------------------------------------|------------|-------|
| 1. Fundamentals and type of Mechanisms                                                                                                       |            |       |
| Specific objectives:                                                                                                                         |            |       |
| Define various terms related to mechanisms.                                                                                                  |            |       |
| Explain construction and working of various mechanisms                                                                                       |            |       |
| 1.1 Kinematics of Machines:- Definition of Kinematics, Dynamics, statics,                                                                    |            |       |
| Kinetics, Kinematic link, Kinematic pair and its types, constrained motion                                                                   |            |       |
| and its types, Kinematic chain and its types, Mechanism, inversion, machine                                                                  |            |       |
| and structure 8 Marks                                                                                                                        | <b>.</b> – |       |
| 1.2 Inversion of Kinematic Chain                                                                                                             | 07         | 16    |
| • Inversion of four bar chain, coupled wheels of Locomotive, Beam engine,                                                                    |            |       |
| Pantograph.                                                                                                                                  |            |       |
| • Inversion of single slider Crank chain –Pendulum pump, Rotary I.C.                                                                         |            |       |
| Engine mechanism, Oscillating cylinder engine, Whitworth quick return                                                                        |            |       |
| mechanism. Quick return mechanism of shaper.                                                                                                 |            |       |
| • Inversion of Double Slider Crank Chain- Scotch Yoke Mechanism.                                                                             |            |       |
| Elliptical trammel. Oldham's Coupling8 Marks                                                                                                 |            |       |
| 2. Velocity and Acceleration in Mechanisms                                                                                                   |            |       |
| Specific objectives                                                                                                                          |            |       |
| Draw velocity and acceleration diagram for given mechanism                                                                                   |            |       |
| 2.1 Concept of relative velocity and relative acceleration of a point on a link                                                              |            |       |
| angular acceleration inter-relation between linear and angular velocity and                                                                  |            |       |
| acceleration                                                                                                                                 |            |       |
| 2.2 Analytical method (No derivation) and Klein's construction to determine                                                                  | 08         | 16    |
| velocity and acceleration of different links in single slider crank mechanism                                                                | 00         | 10    |
| 8 Marks                                                                                                                                      |            |       |
| 2.3 Drawing of velocity and acceleration diagram of a given configuration                                                                    |            |       |
| diagrams of simple Mechanism Determination of velocity and acceleration                                                                      |            |       |
| of point on link by relative velocity method (Excluding Coriollis component                                                                  |            |       |
| of acceleration) 8 Mark                                                                                                                      |            |       |
| 3. Cams and Followers                                                                                                                        |            |       |
| Specific objectives                                                                                                                          |            |       |
| Define the terms related to Cam                                                                                                              |            |       |
| <ul> <li>Classify Cams and Followers</li> </ul>                                                                                              |            |       |
| <ul> <li>Draw cam profile as per the given applications</li> </ul>                                                                           |            |       |
| 3.1 Concept definition and applications of Cams and Followers Cam                                                                            |            |       |
| terminology                                                                                                                                  |            |       |
| 3.2 Classification of Cams and Followers                                                                                                     | 06         | 12    |
| 3.3 Different follower motions and their displacement diagrams - Uniform                                                                     |            |       |
| velocity Simple harmonic motion uniform acceleration and Retardation                                                                         |            |       |
| 4 Marks                                                                                                                                      |            |       |
| 3.4 Drawing of profile of radial cam with knife-edge and roller follower with and                                                            |            |       |
| without offset with reciprocating motion (graphical method)                                                                                  |            |       |
| 8 Marks                                                                                                                                      |            |       |
| 4 Power Transmission                                                                                                                         |            |       |
| Specific objectives                                                                                                                          |            |       |
| Give State broad classification of Drives                                                                                                    | 10         | 20    |
| <ul> <li>Stree State of our classification of Direcs.</li> <li>Select Suitable Drives and Mechanisms for a particular application</li> </ul> | 10         | 20    |
| <ul> <li>Calculate various quantities like velocity ratio, belt tensions, slip, angle of</li> </ul>                                          |            |       |

|                                                                                              | 1  |    |
|----------------------------------------------------------------------------------------------|----|----|
| contact, power transmitted in belt drives                                                    |    |    |
| 4.1 Belt Drives- flat belt, V-belt & its applications, material for flat and V-belt.         |    |    |
| Selection of belts, angle of lap, length of belt, Slip and creep. Determination              |    |    |
| of velocity ratio of tight side and slack side tension, centrifugal tension and              |    |    |
| initial tension, condition for maximum power transmission (Simple                            |    |    |
| numericals) 8 Marks                                                                          |    |    |
| 4.2 Chain Drives- Types of chains and sprockets, velocity ratio. Advantages &                |    |    |
| Disadvantages of chain drive over other drives, Selection of Chain &                         |    |    |
| Sprocket wheels, methods of lubrication 4 Marks                                              |    |    |
| 4.3 Gear Drives – Classification of gears, Law of gearing, gear terminology.                 |    |    |
| Types of gear trains, their selection for different applications. Train value &              |    |    |
| velocity ratio for simple, compound, reverted and epicyclic gear trains.                     |    |    |
|                                                                                              |    |    |
| 5. Flywheel and Governors 8 Marks                                                            |    |    |
| Specific objectives                                                                          |    |    |
| <ul> <li>Differentiate between flywheel and governor</li> </ul>                              |    |    |
| $\triangleright$ Explain with neat sketch the construction and working of various            |    |    |
| governors                                                                                    |    |    |
| 5.1 Flywheel –Concept, function and application of flywheel with the help of                 |    |    |
| turning moment diagram for single cylinder 4-Stroke IC Engine (no                            | 04 | 08 |
| Numericals)                                                                                  | 0. | 00 |
| Coefficient of fluctuation of energy coefficient of fluctuation of speed and its             |    |    |
| significance                                                                                 |    |    |
| 5.2 Governors- Types concept function and application & Terminology of                       |    |    |
| Governors                                                                                    |    |    |
| 5.3 Comparison between Flywheel and Governor                                                 |    |    |
| 6. Brakes and Dynamometers 10Marks                                                           |    |    |
| Specific objectives                                                                          |    |    |
| List the differences between brakes and dynamometers                                         |    |    |
| <ul> <li>Explain with neat sketch the construction and working of various brakes</li> </ul>  |    |    |
| and dynamometers                                                                             |    |    |
| <ul> <li>Calculate braking force braking force and power lost in friction in shoe</li> </ul> |    |    |
| and band brake                                                                               |    |    |
| 6 1 Function of brakes and Dynamometers. Type of brakes & Dynamometers                       | 05 | 10 |
| comparison between brakes & Dynamometer                                                      | 05 | 10 |
| 6.2 Construction and working i) shoe brake ii)Band brake iii) Internal expending             |    |    |
| shoe brake iv) Disc Brake                                                                    |    |    |
| 6.3 Numerical problems to find braking force and braking torque and power for                |    |    |
| shoe and hand brake                                                                          |    |    |
| 6.4 Construction and working of i) Rope brake Dynamometer ii) Hydraulic                      |    |    |
| Dynamometer iii) Eddy current Dynamometer                                                    |    |    |
| 7. Clutches and Bearings.                                                                    | -  |    |
| Specific objectives                                                                          |    |    |
| $\rightarrow$ Explain the difference between uniform pressure and uniform wear               |    |    |
| theories                                                                                     |    |    |
| Explain with neat sketch, the construction and working of various clutches                   |    |    |
| Calculate torque required to over come friction and power lost in friction                   | 06 | 12 |
| in clutches and footstep bearings                                                            |    |    |
|                                                                                              |    |    |
| 7.1 Clutches- Uniform pressure and Uniform Wear theories. Function of Clutch                 |    |    |
| rr                                                                                           |    |    |
| and its application, Construction and working of i) Single plate clutch. ii)                 |    |    |

| <ul><li>clutch, (Simple numericals on single and Multiplate clutches).</li><li>7.2 Bearings- i) Simple Pivot, ii) Collar Bearing iii) conical pivot. Torque and power lost in friction. (Simple numericals)</li></ul>                                                                                                                                 |    |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
| <ul> <li>8. Balancing</li> <li>Specific objectives</li> <li>Explain the concept of balancing</li> <li>Find balancing mass and position of plane, analytically and graphically.</li> <li>8.1 Concept of balancing. Balancing of single rotating mass. Analytical/Graphical methods for balancing of several masses revolving in same plane.</li> </ul> | 02 | 06  |
| Total                                                                                                                                                                                                                                                                                                                                                 | 48 | 100 |

#### Practicals: Skills to be developed:

# Intellectual Skills:

- 1. Determine velocity and acceleration of links in a given mechanism.
- 2. Analyze balancing of rotating masses in a single plane.
- 3. Interpret interrelationship between components of various braking mechanisms.
- 4. Compare various power transmission devices.

# Motor Skills:

- 1. Drawing of velocity and acceleration diagrams.
- 2. Dismantle and assemble given brakes and clutches.
- 3. Draw cam profiles for a given application
- 4. Draw velocity and acceleration diagram of the given mechanisms
- 5. Draw force polygon for unbalanced masses revolving in same plane

**Note -** The Term work shall consist of Journal / lab manual and A-3 size sketch book.

# List of Practical:-

- 1. Sketch and describe working of quick return mechanism for a shaper. Find the ratio of time of cutting stroke to the return stroke to understand quick return motion in shaping operation.
- 2. Sketch and describe the working of the following mechanisms with its application,
  - a) Bicycle free wheel sprocket mechanism
  - b) Geneva mechanism
  - c) Ackerman's steering gear mechanism
  - d) Foot operated air pump mechanism
- 3. Determine velocity and acceleration of various links of the given two mechanism, by relative velocity method for analysis of motion of links.
- 4. Determine velocity and acceleration in an I. C. engine's slider crank mechanism by Kleins's construction.
- 5. Draw the profile of a radial cam for the given follower type to obtain the desired follower motion.
- 6. Determine slip, length of belt, angle of contact in an open belt drive to understand its performance.
- 7. Draw a schematic diagram of centrifugal governor and describe its working. Draw a graph between radius of rotation versus speed of governor to understand its function.

- 8. Dismantle and assemble mechanically operated braking mechanism of two wheelers. Sketch the two wheeler braking system and identify the functions of various components.
- 9. Dismantle and assemble multi-plate clutch of two wheeler. Draw neat sketch and state the functions of various components.
- 10. Determine graphically counterbalance mass and its direction for complete balancing of a system of several masses rotating in a single plane.

| Book       | S:                 |                |         |                                                 |
|------------|--------------------|----------------|---------|-------------------------------------------------|
| Sr.<br>No. | Title              | Author         | Edition | Publication                                     |
| 01         | Theory of Machines | Khurmi Gupta   |         | Eurasia publishing House Pvt. Ltd. 2006 edition |
| 02         | Theory of Machines | S.S. Rattan    | Third   | McGraw Hill companies, II Edition               |
| 03         | Theory of Machines | P.L. Ballaney  |         | Khanna Publication                              |
| 04         | Theory of Machines | Jagdishlal     |         | Bombay metro-politan book limited               |
| 05         | Theory of Machines | Sadhu Singh    | Second  | Pearson                                         |
| 06         | Theory of Machines | Ghosh – Mallik |         | Affiliated East west press                      |
| 07         | Theory of Machines | Thomas Bevan   | Third   | Pearson                                         |
| 08         | Theory of Machines | J.E. Shigley   | Third   | Oxford                                          |

#### **Learning Resources:**

Course Name : Mechanical Engineering Group Course Code : AE/ME/PG/PT/MH/MI Semester : Fourth Subject Title : Professional Practices-II

Subject Code : 17035

# **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              | Examinati | on Scheme |    |     |       |
|-----------------|----|----|--------------|-----------|-----------|----|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH        | PR        | OR | TW  | TOTAL |
|                 |    | 02 |              |           |           |    | 50@ | 50    |

# **Rational:**

The purpose of introducing Professional practices is to fulfill the need of students to stand in today's global market with knowledge and confidence. This can be achieved by arranging industrial visits, expert lectures attitude to present them-selves, get alternative solutions and validation of the selected alternatives, socially relevant activities, and modular courses. Professional Practices is helpful in broadening technology base of students beyond curriculum. Model making exercises allow students to think more creatively and innovatively and inculcating habit of working with their own hands. Modular courses are introduced with a view of learning and acquiring higher technology skills through industry experts and consultants from the respective fields.

#### **Objectives:**

The student will be able to:

- 1) Acquire information from different sources.
- 2) Prepare notes for given topics.
- 3) Present seminar using power projection system.
- 4) Interact with peers to share thoughts.
- 5) Work in a team and develop team spirit.

#### **Intellectual Skill:**

Student will be able to:

- 1) Search information from various resources.
- 2) Prepare notes on selected topics.
- 3) Participate in group discussions.

#### **Motor Skills:**

- 1) Observe industrial practices during visits.
- 2) Prepare slides / charts for presentation in seminar.
- 3) Develop a model

#### **Learning Structure:**



#### **Content:**

| Topic & Content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |    |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|--|
| 1: Information Search –                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |    |  |
| Specific objectives: at the end of this chapter student will able to;<br>1] List various sources for information collection.<br>2] Collect information and arrange it and produce in the useful form of report                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |    |  |
| <ul> <li>Information search be made through manufacturers catalogue, Hand books, magazines journal and websites, and submit a report on any Two Topics in a group of 3 to 4 students, report size shall not be more than 10 pages.</li> <li>Following topics are suggested, any other equivalent topics may be selected. <ul> <li>i) Present scenario of electric power generation in Maharashtra state /India.</li> <li>ii) Composite materials – Types, properties &amp; application</li> <li>iii) Material handling equipments commonly used in industries.</li> <li>iv) Advances in Automobile engines.</li> <li>v) Hydraulic steering systems of Automobile.</li> <li>vi) Mechanisms used to produce straight-line motion.</li> <li>vii) Advanced surface coating techniques like chemical vapor deposition, ion implantation, physical vapor deposition.</li> <li>ix) Types of cutting tools- specification, materials and applications.</li> <li>x) Booking of E-Tickets for Railways/Buses/Air travel.</li> <li>xi) Profiles of 2 multinational companies.</li> <li>xii) Engine lubricants, coolants and additives</li> <li>xiii) Power steering, power windows</li> <li>xiv) ABS(anti lock braking systems)</li> <li>xv) MPFI(multi point fuel injection) system</li> <li>xvi) Role of MIDC, MSSIDC, DIC, Financial institutions in development of industrial sector.</li> <li>xvii) Design data book - Study and use of types of data.</li> </ul> </li> </ul> | 06 |  |
| <ul> <li>2. Lectures by professionals/Industry Experts-<br/>Specific objectives: at the end of this chapter student will able to;</li> <li>1] Identify and arrange the lectures of professionals/Industry Experts.</li> <li>2] Interact with the expert to gather specific information needed by him.</li> <li>3] Solve the problems through assistance of expert.</li> <li>Two lectures of two hour duration be arranged on any two topics suggested below or any other suitable topics to acquire practical information beyond scope of curriculum.</li> <li>Students shall prepare a brief report of each lecture as a part of their term work. <ul> <li>i) Components of project Report.</li> <li>ii) Various loan schemes of banks, LIC and other agencies for education and other purposes.</li> <li>iii) Use of plastics &amp; rubbers in Automobiles industries.</li> <li>iv) Type of processes used to protect material surfaces from environmental effect.</li> <li>v) Product life cycle.</li> <li>vi) Industrial application of mechatronics.</li> <li>vii) Special features of CNC machines</li> <li>viii) Gear manufacturing &amp; gear teeth finishing processes.</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                 | 04 |  |

| x)              | Super-finishing operation & their industrial applications.                             |    |  |  |
|-----------------|----------------------------------------------------------------------------------------|----|--|--|
| xi              | Processing methods for plastic components.                                             |    |  |  |
| xii             | Features of modern boilers                                                             |    |  |  |
| xii             | ) Strainers and filters –Types, functions and applications                             |    |  |  |
| xiv             | y) Industrial drives-Types, components, comparison and applications.                   |    |  |  |
| XV              | ) Introduction to Apprenticeship Training Scheme                                       |    |  |  |
| 3. Semi         | nars:                                                                                  |    |  |  |
| Specific        | objectives: at the end of this chapter student will able to;                           |    |  |  |
| 1] Colle        | ct and present information thorough seminar method.                                    |    |  |  |
| <b>2]</b> Use A | /V aids effectively for delivering seminars.                                           |    |  |  |
| 3] Inter        | act with speaker for solving his difficulties in a conducing atmosphere.               |    |  |  |
|                 |                                                                                        |    |  |  |
| One sen         | inar be arranged on the subjects related to 4 <sup>th</sup> semester. Or topics beyond |    |  |  |
| curricul        | ım.                                                                                    |    |  |  |
| Each stu        | dent shall submit a report up to 10 pages and deliver the seminar.                     |    |  |  |
| batch size      | 2e - 2-3 students.                                                                     |    |  |  |
| Source of       | of information – books, magazine, Journals, Website, surveys,                          | 04 |  |  |
| Topics s        | uggested for guidance-                                                                 | 04 |  |  |
|                 |                                                                                        |    |  |  |
| i)              | Clutches- Types, Principles, working, & applications.                                  |    |  |  |
| ii)             | High pressure boilers.                                                                 |    |  |  |
| iii             | Heat exchangers-Types, working, applications.                                          |    |  |  |
| iv              | Hydraulic turbines-Types, working, & applications.                                     |    |  |  |
| v)              | Hydraulic pumps -Types, working, & applications.                                       |    |  |  |
| vi              | Sensors -Types, principle, & applications.                                             |    |  |  |
| vii             | ) Super conductor technology - Types, principle, & applications.                       |    |  |  |
| vii             | i) Semi conductors Types, materials, & applications.                                   |    |  |  |
| ix              | Industrial breaks- Types, construction, working, & applications.                       |    |  |  |

| 4. Industrial Visits                                                                       |    |  |  |  |
|--------------------------------------------------------------------------------------------|----|--|--|--|
| Specific objectives: at the end of this chapter student will able to;                      |    |  |  |  |
| 1] Identify and select proper industry for observing new machines and                      |    |  |  |  |
| Technologies                                                                               |    |  |  |  |
| 2] To collect information about various aspects of industry like Plant layout,             |    |  |  |  |
| Production processes, Quality control, Inventory control etc.                              |    |  |  |  |
| 3] Observe the human resource, managers and workers their style of working,                |    |  |  |  |
| Discipline, work culture etc and reproduce in the form of report.                          |    |  |  |  |
| Structured industrial visits be arranged and report of the same shall be submitted by each |    |  |  |  |
| student to form a part of the term work                                                    |    |  |  |  |
| No of visits- At least one                                                                 |    |  |  |  |
| Scale of industry- medium scale unit large scale unit                                      |    |  |  |  |
| Group size- practical batch                                                                |    |  |  |  |
| Report-not exceeding 7 to 10 pages.                                                        |    |  |  |  |
| Purpose :                                                                                  |    |  |  |  |
| $\succ$ To study the profile of industry                                                   |    |  |  |  |
| > To see the advanced manufacturing processes & machinery.                                 |    |  |  |  |
| > To observe working of CNC machines, work centre's ,flexible manufacturing                |    |  |  |  |
| systems                                                                                    | 04 |  |  |  |
| ➢ To observe working in foundry, forging shop, press shop, heat treatment shop etc.        |    |  |  |  |
| To observe chip less manufacturing machines & processes.                                   |    |  |  |  |
| > To study process sheets , quality control charts & production drawings, metallurgical    |    |  |  |  |
| testing laboratory                                                                         |    |  |  |  |
| To observe Tool room, standards room etc.                                                  |    |  |  |  |
|                                                                                            |    |  |  |  |
| Following types of industries may be visited in & around the institute.                    |    |  |  |  |
| 1) Foundry                                                                                 |    |  |  |  |
| 11) Forging units                                                                          |    |  |  |  |
| iii) Sheet metal processing unit                                                           |    |  |  |  |
| iv) Machine/ Automobile component manufacturing unit                                       |    |  |  |  |
| v) Factication unit powder metanurgy component manufacturing unit.                         |    |  |  |  |
| vi) Machine tool manufacturing unit.                                                       |    |  |  |  |
| industries                                                                                 |    |  |  |  |
| viji) Auto workshon / four wheeler garage                                                  |    |  |  |  |
| ix) City water supply pumping station                                                      |    |  |  |  |
| x) Hydro electric power plant.                                                             |    |  |  |  |
| xi) Wind mills, Solar Park                                                                 |    |  |  |  |

| 5. Socially Relevant Activities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <ul> <li>Specific objectives: at the end of this chapter student will able to;</li> <li>1] Develop awareness about recent trends in general industries</li> <li>2] Appreciate and value the activities for development of positive attitude in the area of Environmental protection, Sustainable Development and critical social issues.</li> <li>3] Gain knowledge through training or by completing modular courses of recent technology.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |
| Conduct any one activity through active participation of students and write the report.<br>Group of students- maximum 4<br>Report- Not more than 6 pages<br>List of suggested activities- ( activities may be thought in terms of campus improvement)<br>i) Awareness about carbon credit<br>ii) Anticorruption movement<br>iii) Awareness about cyber crimes.<br>iv) Developing good citizens.<br>v) Management of E- WASTE<br>vi) Recycling of waste materials.<br>vii) Accident prevention & enforcement of safely rules.<br>viii) Awareness about pollution and pollution control.<br>ix) Any other relevant activity may be performed)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 04 |
| <ul> <li>6. Mini Projects</li> <li>Students, in a group of 4, shall perform any one activity listed below.</li> <li>i) Model making out of card board paper ,wood ,thermocol, plastics, metal, clay etc <ul> <li>a) Any new idea/principle converted into model</li> <li>b) Mechanisms</li> <li>c) Jigs/fixtures</li> <li>d) Material handling device,etc.</li> </ul> </li> <li>ii) Toy making with simple operating mechanisms</li> <li>iii Layout of workshop/department/college</li> <li>iv) Experimental set up/testing of a parameter</li> <li>v) Display board indicating different type of machine components like bearing, fasteners, couplings, pipe fitting, valves, cams &amp; followers, exploded views of assemblies, type of welding equipment ,welding rods (drawings, photo graphs )</li> <li>vi) Any relevant project which will make students to collect information &amp; work with their own hands.</li> <li>Students shall arrange exhibition of all mini projects in the class/hall and present the task to the audience/ experts/examiners. The student shall submit a brief report (Max. 5 pages) of the mini project.</li> <li>OR</li> </ul> Modular courses: <ul> <li>Modular courses on any one of the suggested or equivalent topic be undertaken by a group of 15 to 20 students.</li> <li>i) Advance features in CAD</li> <li>ii) Meshing of solid model using any suitable software</li> <li>iii) Developing Unfold Sheet or Hyperblank by using Blanking Software</li> <li>v) CAM Software</li> <li>v) Basics of PLC programming</li> <li>vi) Applications of mechatronics</li> </ul> | 10 |

| <ul> <li>viii) Modern packaging technology</li> <li>ix) Enterprise Resource Planning</li> <li>x) Bio-pneumatic Robots</li> <li>xi) Bio-mimicry</li> </ul> |    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Total                                                                                                                                                     | 32 |

Note:

The students who wish to undergo in plant training shall go through details regarding it in the syllabus of Professional Practices – III for fifth semester and complete the training in summer vacation at the end of fourth semester examination.

All such students will be assessed out of ten marks as per guidelines mentioned in the curriculum of professional practice III in the fifth semester

**Learning Resources:** 

1. Books:

| Sr.<br>No. | Author                                                                        | Title                   | Publisher                     |  |  |
|------------|-------------------------------------------------------------------------------|-------------------------|-------------------------------|--|--|
| 01         | NRDC, Publication Bi                                                          | Invention Intelligence  | National Research Development |  |  |
| 01         | Monthly Journal                                                               | Journal                 | Corporation, GOI.             |  |  |
| 02         | DK Publishing                                                                 | How things works        | DK Publishing                 |  |  |
|            | DK Fuolisining                                                                | encyclopedia            | DK Fublishing                 |  |  |
| 03         | Trott                                                                         | Innovation mgmt.& new   | Pearson Education             |  |  |
| 05         | 1100                                                                          | product development     | Tearson Education             |  |  |
| 04         | EH McGrath SI                                                                 | Basic Managerial Skills | рні                           |  |  |
| 04         | E.II. MCOlaul, S.J.                                                           | for All – Ninth Edition | 1111                          |  |  |
| 05         | Apprenticeship Training Scheme:- Compiled By – BOAT (Western Region), Mumbai, |                         |                               |  |  |
| 05         | Available on MSBTE Web Site.                                                  |                         |                               |  |  |

#### 2. Web sites

www.engineeringforchange.org www.wikipedia.com www.slideshare.com www.teachertube.com

#### **Course Name : All Branches of Diploma in Engineering & Technology**

# Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/

# ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG

Industrial Training (Optional) after 4<sup>th</sup> semester examination. Note:- Examination in Professional Practices of 5<sup>th</sup> Semester.

#### **INDUSTRIAL TRAINING (OPTIONAL)**

#### **Rational:-**

There was a common suggestion from the industry as well as other stakeholders that curriculum of Engineering and Technology courses should have Industrial training as part of the curriculum. When this issue of industrial training was discussed it was found that it will be difficult to make industrial training compulsory for all students of all courses as it will be difficult to find placement for all the students. It is therefore now proposed that this training can be included in the curriculum as optional training for student who is willing to undertake such training on their own. The institutes will help them in getting placement or also providing them requisite documents which the student may need to get the placement.

Details:- Student can undergo training in related industries as guided by subject teachers / HOD.

- The training will be for four weeks duration in the summer vacation after the fourth semester examination is over.
- The student undergoing such training will have to submit a report of the training duly certified by the competent authority from the industry clearly indicating the achievements of the student during training. This submission is to be made after joining the institute for Fifth semester.
- The student completing this training will have to deliver a seminar on the training activities based on the report in the subject Professional Practices at Fifth Semester.
- The student undergoing this training will be exempted from attending activities under Professional Practices at Fifth semester except the seminar.
- The students who will not undergo such training will have to attend Professional Practices Classes/activities of fifth semester and will have to complete the tasks given during the semester under this head.
- There work will be evaluated on their submissions as per requirement and will be given marks out of 50. Or student may have to give seminar on training in Industry he attended.
- Institute shall encourage and guide students for Industry training.
- Evaluation:- Report of Training attended and delivery of seminar and actual experience in Industry will be evaluated in fifth semester under Profession Practices-III and marks will be given accordingly out of 50.

'G' Scheme

#### MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI UJ TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES **COURSE NAME : DIPLOMA IN MEDICAL ELECTRONICS COURSE CODE : MU DURATION OF COURSE : 6 SEMESTERS** WITH EFFECT FROM 2012-13 **SEMESTER : FOURTH DURATION: 16 WEEKS** FULL TIME / PART TIME : FULL TIME **SCHEME : G EXAMINATION SCHEME** TEACHING SUBJECT TITLE SUB SR. SW Abbrevi **SCHEME TH** (1) **PR** (4) TW (9) **OR** (8) PAPER CODE NO. ation (17400)HRS. Max Min ΤН TU PR Max Min Min Max Max Min 1 **Environmental Studies** \$ EST 17401 01 02 01 50#\* 20 25@ 10 --\_\_\_ ----17436 04 10 2 Human Biology HBI --02 03 100 40 25# 10 25@ ----3 **Communication Techniques** 17438 03 02 03 25@ 10 CTE 100 40 --------17442 10 50 4 Biosensor BIO 03 02 03 100 40 25# 10 25@ ---------5 Linear Integrated Circuits ß LIC 17445 04 02 03 40 50# 20 ---25@ 10 100 --Visual Basic 10 6 ß VBA 17043 01 02 25@ --------------**Professional Practices-II** 03 20 7 ß PPS 17044 --50@ ----------------TOTAL 16 15 75 --450 --25 200 50 ---------Examination in 5<sup>th</sup> Semester Professional Practices-III \*\* **Industrial Training (Optional)** Student Contact Hours Per Week: 31 Hrs. THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH. Total Marks : 800 No Theory Examination, \$ - Common to all branches, #\*- Online Theory Examination, @- Internal Assessment, # - External Assessment, β - Common to ET / EJ / EN / EX / IE / IS / IC / DE / EV / IU / ED / EI Abbreviations: TH-Theory, TU-Tutorial, PR-Practical, OR-Oral, TW-Term Work, SW-Sessional Work. \*\* Industrial Training (Optional) - Student can undergo Industrial Training of four weeks after fourth semester examination during summer vacation.

Assessment will be done in Fifth semester under Professional Practices-III. They will be exempted from activities of Professional Practices-III of 5<sup>th</sup> Semester.

- Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subjects is to be converted out of 50 marks as sessional work (SW).
- > Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.
- > Code number for TH, PR, OR and TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.

# Course Name : All Branches of Diploma in Engineering & Technology Course Code : AE/CE/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG

Semester : Fourth

Subject Title : Environmental Studies

Subject Code : 17401

**Teaching and Examination Scheme:** 

| Teaching Scheme |    |    |              | Examinati | on Scheme |    |     |       |
|-----------------|----|----|--------------|-----------|-----------|----|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH        | PR        | OR | TW  | TOTAL |
| 01              |    | 02 | 01           | 50#*      |           |    | 25@ | 75    |

#### **#\* Online Theory Examination**

NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Environment essentially comprises of our living ambience, which gives us the zest and verve in all our activities. The turn of the twentieth century saw the gradual onset of its degradation by our callous deeds without any concern for the well being of our surrounding we are today facing a grave environmental crisis. The unceasing industrial growth and economic development of the last 300 years or so have resulted in huge ecological problems such as overexploitation of natural resources, degraded land, disappearing forests, endangered species, dangerous toxins, global warming etc.

It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

The curriculum covers the aspects about environment such as Environment and Ecology, Environmental impacts on human activities, Water resources and water quality, Mineral resources and mining, Forests, etc.

General Objectives: The student will be able to,

- 1. Understand importance of environment.
- 2. Know key issues about environment.
- 3. Understands the reasons for environment degradation.
- 4. Know aspects about improvement methods.
- 5. Know initiatives taken by the world bodies to restrict and reduce degradation.

# **Learning Structure:**



# Theory:

| Topic and Contents                                                                                                   | Hours | Marks |
|----------------------------------------------------------------------------------------------------------------------|-------|-------|
| Topic 1: Nature of Environmental Studies                                                                             |       |       |
| Specific Objectives:                                                                                                 |       |       |
| Define the terms related to Environmental Studies                                                                    |       |       |
| State importance of awareness about environment in general public                                                    | 01    | 04    |
| Contents:                                                                                                            | 01    | 04    |
| • Definition, Scope and Importance of the environmental studies                                                      |       |       |
| Importance of the studies irrespective of course                                                                     |       |       |
| Need for creating public awareness about environmental issues                                                        |       |       |
| <b>Topic 2: Natural Resources and Associated Problems</b>                                                            |       |       |
| Specific Objectives:                                                                                                 |       |       |
| Define natural resources and identify problems associated with                                                       |       |       |
| them                                                                                                                 |       |       |
| Identify uses and their overexploitation                                                                             |       |       |
| Identify alternate resources and their importance for environment                                                    |       |       |
| Contents:                                                                                                            |       |       |
| 2.1 Renewable and Non renewable resources                                                                            |       |       |
| • Definition                                                                                                         |       |       |
| • Associated problems                                                                                                |       |       |
| 2.2 Forest Resources                                                                                                 |       |       |
| • General description of forest resources                                                                            |       |       |
| • Functions and benefits of forest resources                                                                         |       |       |
| • Effects on environment due to deforestation, l'imber                                                               |       |       |
| extraction, Building of dams, waterways etc.                                                                         | 04    | 10    |
| 2.5 Water Resources<br>Hydrosphere: Different sources of water                                                       |       |       |
| Hydrosphere. Different sources of water                                                                              |       |       |
| Ose and overexploitation of surface and ground water     Effect of floods, drought, doms ato, on water resources and |       |       |
| • Effect of floods, draught, dams etc. on water resources and                                                        |       |       |
| 2.4 Mineral Resources:                                                                                               |       |       |
|                                                                                                                      |       |       |
| Categories of mineral resources                                                                                      |       |       |
| Basics of mining activities                                                                                          |       |       |
| • Mine safety                                                                                                        |       |       |
| • Effect of mining on environment                                                                                    |       |       |
| 2.5 Food Resources:                                                                                                  |       |       |
| • Food for all                                                                                                       |       |       |
| • Effects of modern agriculture                                                                                      |       |       |
| World food problem                                                                                                   |       |       |
| Topic 3. Ecosystems                                                                                                  |       |       |
| Concept of Ecosystem                                                                                                 |       |       |
| Structure and functions of ecosystem                                                                                 | 01    | 04    |
| • Energy flow in ecosystem                                                                                           |       |       |
| <ul> <li>Major ecosystems in the world</li> </ul>                                                                    |       |       |
| Topic 4. Biodiversity and Its Conservation                                                                           |       |       |
| Definition of Biodiversity                                                                                           | 02    | 06    |
| • Levels of biodiversity                                                                                             |       | ~~    |

| Total                                                                                                                                         | 16 | 50 |
|-----------------------------------------------------------------------------------------------------------------------------------------------|----|----|
| Human Health and Human Rights                                                                                                                 |    |    |
| environment                                                                                                                                   |    |    |
| Population Growth: Aspects, importance and effect on                                                                                          |    |    |
| Forest Conservation Act                                                                                                                       |    |    |
| Wildlife Protection Act                                                                                                                       | 02 | 00 |
| • Water (Prevention and Control of Pollution) Act                                                                                             | 02 | 08 |
| • Air (Prevention and Control of Pollution) Act                                                                                               |    |    |
| Environmental Protection Act                                                                                                                  |    |    |
| Brief description of the following acts and their provisions:                                                                                 |    |    |
| Topic 7. Environmental Protection                                                                                                             |    |    |
| <ul> <li>Concept of Carbon Credits and its advantages</li> </ul>                                                                              |    |    |
| and their effect on climate                                                                                                                   |    |    |
| Depletion, Nuclear Accidents and Holocaust: Basic concepts                                                                                    |    |    |
| Climate Change Global warming Acid rain Ozone Laver                                                                                           | 03 | 10 |
| harvesting: Definition Methods and Benefits                                                                                                   |    |    |
| Water conservation Watershed management Pain water                                                                                            |    |    |
| Concept of development systemable development                                                                                                 |    |    |
| Noise Politition: Definition, sources, effects, prevention     Tonic 6. Social Issues and Environment                                         |    |    |
| <ul> <li>Son Ponution: Definition, sources, effects, prevention</li> <li>Noise Pollution: Definition, sources, effects, prevention</li> </ul> |    |    |
| <ul> <li>Soil Pollution: Definition sources offacts provention</li> </ul>                                                                     |    |    |
| • water Pollution: Definition, Classification, sources, effects,                                                                              |    |    |
| prevention                                                                                                                                    | 03 | 08 |
| • Air pollution: Definition, Classification, sources, effects,                                                                                |    |    |
| • Definition                                                                                                                                  |    |    |
| Topic 5. Environmental Pollution                                                                                                              |    |    |
| Conservation of biodiversity                                                                                                                  |    |    |
| Threats to biodiversity                                                                                                                       |    |    |
| Value of biodiversity                                                                                                                         |    |    |

#### Practical: Skills to be developed:

# Intellectual Skills:

- 1. Collection of information, data
- 2. Analysis of data
- 3. Report writing

# Motor Skills:

- 1. Presentation Skills
- 2. Use of multi media

# List of Projects:

Note: Any one project of the following:

- 1. Visit to a local area to document environmental assets such as river / forest / grassland / hill / mountain
- 2. Visit to a local polluted site: Urban/Rural/Industrial/Agricultural
- 3. Study of common plants, insects, birds

4. Study of simple ecosystems of ponds, river, hill slopes etc.

Prepare a project report on the findings of the visit illustrating environment related facts, analysis and conclusion. Also suggest remedies to improve environment.

Learning Resources: Books:

| Sr.<br>No. | Author                                                | Title                                        | Publisher               |
|------------|-------------------------------------------------------|----------------------------------------------|-------------------------|
| 01         | Anindita Basak                                        | Environmental Studies                        | Pearson Education       |
| 02         | R. Rajgopalan                                         | Environmental Studies<br>from Crises to Cure | Oxford University Press |
| 03         | Dr. R. J. Ranjit Daniels, Dr.<br>Jagdish Krishnaswamy | Environmental Studies                        | Wiley India             |

| Course Name   | : Diploma in Medical Electronics |
|---------------|----------------------------------|
| Course Code   | : <b>M</b> U                     |
| Semester      | : Fourth                         |
| Subject Title | : Human Biology                  |
| Subject Code  | : 17436                          |

### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              | Examinati | on Scheme |     |     |       |
|-----------------|----|----|--------------|-----------|-----------|-----|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH        | PR        | OR  | TW  | TOTAL |
| 04              |    | 02 | 03           | 100       |           | 25# | 25@ | 150   |

# NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

### **Rationale:**

Human biology is a core subject to understand the anatomy & physiology of human body. Each system of the human body is explained step by step, in different chapters. Human Biology is a prerequisite for all subjects of Medical Electronics.

# **General Objectives:**

Students will be able to:

- 1) Understand structure and functions of cell and tissues.
- 2) Understand the origin of bioelectric signals.
- 3) Learn the compositions and structures of Human body organs.
- 4) Gain knowledge about the functioning of organs and system.

# **Learning Structure:**



# **Theory Contents:**

| Topic<br>No | Theory                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Hrs. | Marks |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|
| 110         | Cell , Tissues, Blood and Skeleton System                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |       |
|             | <ul> <li>Specific Objectives</li> <li>Describe structure and function of cell organelles and different types of tissues.</li> <li>Discuss functions of blood and list its components.</li> <li>Classify blood group, bones, joints and muscles.</li> </ul>                                                                                                                                                                                                                                                                                                      |      |       |
| 1           | <ul> <li>Contents:</li> <li>1.1 Cell, Tissues and Blood [12]</li> <li>Structure &amp; function of cell organelles, Cell electrophysiology-repolarization, depolarization, characteristics, resting membrane potential, action potential</li> <li>Different types of tissues &amp; their function</li> <li>Composition of blood, cellular contents, Blood function, Blood groups</li> <li>1.2 Skeletal System [08]</li> <li>Classification of bone, joints and muscles, Function of bone, joints and skeletal muscle</li> </ul>                                  | 11   | 20    |
| 2           | <ul> <li>Cardiovascular System</li> <li>Specific Objectives</li> <li>Describe anatomy and physiology of heart</li> <li>Outline the conduction system of heart</li> <li>Describe the main parameters of cardiac blood flow</li> <li>Contents: <ul> <li>Anatomy of heart, cardiac muscle &amp; its properties, Blood vessels &amp; circulation of blood, Conduction system</li> <li>Blood pressure, blood flow, cardiac output, heart rate and pulse rate, List of instruments related to heart</li> </ul> </li> </ul>                                            | 10   | 16    |
| 3           | <ul> <li>Respiratory System</li> <li>Specific Objectives</li> <li>Describe the location and gross anatomy of respiratory organ and functions of each.</li> <li>Describe the mechanism by which respiration is controlled</li> <li>Define the respiratory parameters</li> <li>Contents: <ul> <li>Anatomy of respiratory system, nose, pharynx, larynx, trachea, bronchi &amp; lungs,</li> <li>Mechanism of respiration, gases exchange, Respiratory parameters: lung volumes &amp; capacities, List of instruments related to respiration</li> </ul> </li> </ul> | 10   | 12    |
| 4           | Digestive and Urinary System<br>Specific Objectives                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 14   | 20    |

|   | <ul> <li>Describe and outline structure of digestive organs</li> <li>Describe the functions of various organs of digestive system<br/>and their respective secretion</li> <li>Outline the structure of urinary system and describe its function</li> <li>Describe the processes involved in formation of urine and<br/>function of kidney</li> <li>Contents:         <ul> <li><b>110</b></li> <li>Organs of digestive system, Juices secreted by various digestive<br/>organs &amp; their functions,</li> <li>List of instruments related to digestive system</li> <li><b>4.2 Urinary System</b></li> <li><b>110</b></li> <li>Anatomy of urinary system –kidney, ureter, urinary bladder,<br/>urethra, Formation of urine &amp; function of kidney,</li> <li>Structure and function of skin,</li> <li>List of instruments related to urinary system</li> </ul> </li> </ul> |          |     |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-----|
|   | Reproductive System                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |          |     |
| 5 | <ul> <li>Specific Objectives</li> <li>Outline the structure of male and female reproductive system</li> <li>Describe the actions of androgens, oestrogens and progesterone</li> <li>Contents:         <ul> <li>Male reproductive system, Hormones secreted &amp; their functions, Female reproductive systems, Hormones secreted &amp; their functions</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 04       | 08  |
|   | Nervous System and Special Senses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |          |     |
| 6 | <ul> <li>Specific Objectives</li> <li>Classify nervous system</li> <li>Describe the position and function of all parts of nervous system</li> <li>Sketch the structure of eye and ear and describe its physiology</li> <li>Contents:</li> <li>6.1 Nervous System [12]</li> <li>Neurons, Central Nervous System (CNS), Brain, Spinal cord, Peripheral Nervous System, Autonomic Nervous System (ANS)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 12       | 20  |
|   | Instruments related to nervous system.         6.2 Special Senses       [08]         • Anatomy of Ear & its function (hearing mechanism)         • Anatomy of ear on dite function (impact formation)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |          |     |
|   | Anatomy of eye and its function (image formation)     Endocrine system                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |     |
| 7 | <ul> <li>Specific Objectives</li> <li>List and explain structure and functions of various endocrine glands</li> <li>Contents:         <ul> <li>Structure and position of endocrine glands. Functions of each</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 03       | 04  |
|   | gland                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <i>.</i> | 100 |
|   | 64                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 100      |     |

# **Practical:**

# Intellectual Skills:-

- 1. Know the function of various organs
- 2. Know the function of various equipment

# **Motor Skills:**

- 1. Set up blood testing instruments
- 2. Handle the microscope.

# **List of Practicals:**

- 1. Observation of cell structure using microscope.
- 2. Counting of RBC using microscope.
- 3. Counting of WBC using microscope
- 4. Determination of Blood group
- 5. Measurement of Hemoglobin using Sahalie's Technique.
- 6. Measurement of Blood pressure using sphygmomanometer.
- 7. Measurement of bleeding time.
- 8. Measurement of clotting time.

# List of Assignments:

Teachers should assign questions for following topics. For that demonstrate various live/modelled organ/videos/charts and visit medical college/hospital.

- 1. Cardiovascular
- 2. Respiratory
- 3. Digestive
- 4. Urinary
- 5. Nervous

# **Learning Resources:**

| Sr.<br>No. | Title                                                        | Author                       | Publisher                                                  |
|------------|--------------------------------------------------------------|------------------------------|------------------------------------------------------------|
| 01         | Ross & Wilson Anatomy &<br>Physiology In Health &<br>Illness | Anne Waugh,<br>Allison Grant | Elsevier Churchill<br>Livingstone<br>International Edition |
| 02         | Human Physiology an<br>Integrated Approach                   | Dee Unglaub Silverthron      | EEE (PHI)                                                  |
| 03         | Human Biology for A2                                         | Mary Jones, Geoff Jones      | Cambridge                                                  |
| 04         | Medical Instrumentation-<br>Application & Design             | John G. Webster, Editor      | John Wiley And Sons (Asia)<br>Pvt. Ltd.                    |

#### w.e.f Academic Year 2012-13

# Websites:-

www.innerbody.com

www.getbodysmart.com

www.visiblebody.com

www.argosymedical.com

### List of Equipments:

- 1. Sphygmomanometer
- 2. Sahalie's haemoglobinometer
- 3. Microscope

(Some practicals can be performed in pathology laboratories or science college laboratory)

| : Diploma in Medical Electronics |
|----------------------------------|
| : <b>M</b> U                     |
| : Fourth                         |
| : Communication Techniques       |
| : 17438                          |
|                                  |

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |     | Examination | on Scheme |     |       |
|-----------------|----|----|--------------|-----|-------------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH  | PR          | OR        | TW  | TOTAL |
| 03              |    | 02 | 03           | 100 |             |           | 25@ | 125   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

The Concept of global village has become reality only due to advancement in communication technology. In India communication has developed by leaps and bounds in last two decades. We are witness to the mobile and television revolution. In this Scenario, diploma passed out students should be aware about the principles, procedure and application of communication techniques, so that they can face the technological changes happening due to globalization & competition. The upcoming field of telemedicine and telemetry in biomedical sector, communication plays a vital role. The knowledge of this subject will help students to handle and operate different communication system.

#### **General Objectives**

After Studying this subject the students will be able to

- 1. Describe various communication systems.
- 2. Compare various types of modulation techniques.
- 3. Understand concept about the digital communication, multiplexing techniques and encoding techniques.
- 4. Understand basic fundamentals in satellite, mobile and data communication.
- 5. Understand applications of communication in telemetry and telemedicine.

#### MSBTE - Final Copy Dt. 30/08/2013

# **Learning Structure:**


#### **Theory:**

| Topic<br>No | Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Hours        | Marks              |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------------|
| 110         | Fundamentals of Electronic Communication                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |              |                    |
| Topic<br>No | Contents         Fundamentals of Electronic Communication         Specific objectives:       > State basic terminology concepts regarding Electronic Communication.         > Know different techniques of analog communication.       > Know different techniques of analog communication.         Contents:         1.1 Basics of Communication System       [12]         • Block diagram of communication system.       [12]         • Electromagnetic spectrum       [12]         • Concept of decibel bandwidth, information capacity in communication.       Terminology related to noise         • Sources of noise       Effects of noise.         • Signal to noise ratio(SNR)       Noise voltage         • Noise figure       Noise temperature.         Modulation-Demodulation       Classification of communication system.         • Need for modulation       Understanding of AM, FM & PM on the basis of definition, waveform bandwidth Modulation index numerical based on | <b>Hours</b> | <b>Marks</b><br>20 |
|             | <ul> <li>waveform, bandwidth. Modulation index, numerical based on modulation index.</li> <li>Amplitude modulation circuits- emitter modulator, base modulator, collector modulator.</li> <li>Fm modulation circuit using varactor diode.</li> <li>Concept of demodulation- amplitude demodulation by diode</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |              |                    |
|             | detector.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |              |                    |
|             | Sampling theorem Nyquist rate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |              |                    |
|             | <ul><li>Natural sampling.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |              |                    |
|             | • Flat top sampling.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |              |                    |
|             | Pulse Analog Modulation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |              |                    |
|             | <ul> <li>Block diagram for generation. Waveforms, working, principle,<br/>advantages, disadvantages &amp; applications of PAM, PWM&amp; PPM.<br/>(no numerical to be taught)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |              |                    |
|             | • Advantages of pulse modulation over AM.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |              |                    |
|             | Digital Communication                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |              |                    |
|             | Specific objectives:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |              |                    |
| 2           | <ul> <li>State the fundamentals of digital communication.</li> <li>Describe PCM</li> <li>Know digital modulation tashniswas &amp; multiplaying tashniswas</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 12           | 24                 |
| 1           | • Know urgital modulation techniques & multiplexing techniques                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |                    |

|   | Contents:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |    |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|
|   | <ul> <li>2.1 Fundamental of Digital Communication [16]</li> <li>Block diagram for generation, working principle, waveforms, advantages, disadvantage &amp; application of ask, FSK, BPSK, QPSK, DPSK.</li> <li>Block diagram, working principle, waveforms, advantages, disadvantages &amp; application of PCM, delta modulation, adaptive delta modulation.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                        |    |    |
|   | <ul> <li>2.2 Multiplexing &amp; Data Encoding Techniques. [08]</li> <li>Multiplexing technique:<br/>Definitions, schematic diagram, principle, application, advantages<br/>&amp; disadvantage of TDM, FDM AND WDM</li> <li>Data encoding techniques<br/>Unipolar –NRZ,<br/>Polar –NRZ,RZ,<br/>Biphase (manchester and differential manchester)<br/>Bipolar – AMI<br/>Pseudoternary.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                 |    |    |
| 3 | <ul> <li>Satellite Communication</li> <li>Specific objectives:</li> <li>State basic concept regarding satellite communication.</li> <li>Know terms related to satellite communication</li> <li>State the concept of earth (ground) state.</li> <li>Contents: <ul> <li>History of satellite.</li> <li>Terminology related to satellite communication: satellite orbits, elevation angle, azimuth angle, foot print, station keeping, altitude, geostationary satellite.</li> <li>Block diagram of satellite communication. Frequency bands used in satellite communication.</li> <li>Diagram, working, principle of uplink model, transponder, down link model.</li> <li>Diagram ,working, principle, advantages &amp; disadvantages of TDMA, FDMA, CDMA</li> </ul> </li> </ul> | 06 | 14 |
| 4 | <ul> <li>Mobile Communication</li> <li>Specific objectives: <ul> <li>Know brief history of mobile telephone service.</li> <li>State the terminology related to cellular phone</li> <li>State the different concepts related to cell, interference, base station etc.</li> </ul> </li> <li>Contents: <ul> <li>Evolution of cellular telephone</li> <li>Concept of cell pattern, frequency reuse, interference - co channel &amp; adjacent channel, cell splitting, sectoring, segmentation &amp; dualization, roaming &amp; handoffs.</li> <li>Block diagram and working of mobile communication</li> </ul> </li> </ul>                                                                                                                                                         | 06 | 12 |

|   | <ul> <li>Know basics of telemetry system.</li> <li>State the concept of telemedicine.</li> <li>Contents: <ul> <li>Block diagram of biotelemetry system.</li> <li>Block diagram and working of single channel biotelemetry system for ECG</li> <li>Block diagram of working of multi channel biotelemetry system.</li> <li>Telemedicine in India</li> <li>Tele radiology (block diagram and working)</li> <li>Tele cardiology( block diagram and working)</li> <li>Concept of tele psychiatry, tele dermatology, tele surgery.</li> <li>Advantages and disadvantages of telemedicine.</li> <li>Ethical and legal aspect of internet medical services.</li> </ul> </li> </ul>                                                                                            | 06 | 10 |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|
| 6 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |    |    |
| ] | <ul> <li>Network security         <ul> <li>Network security</li> <li>Concept of message confidentiality, message integrity, message authentication, digital signature, entity authentication</li> </ul> </li> <li>Bio telemetry</li> <li>Specific objectives:</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |    |    |
| 5 | <ul> <li>State the concepts of network topologies, types of network and the network models.</li> <li>Know about connecting devices &amp; network security.</li> </ul> Contents: 5.1 Modes of Transmission, Topologies, Categories and Models of Network. [14] <ul> <li>Modes of data transmission serial, parallel, synchronous, asynchronous</li> <li>Network topologies Diagram, working, advantage, disadvantages and application of mesh, star, bus, ring <ul> <li>Network categories Fundamentals of LAN,WAN,MAN</li> <li>Network models Architecture of OSI model, TCP/IP model</li> </ul> 5.2 Connecting Devices and Network Security [06] <ul> <li>Connecting devices Concept and operation of hubs, repeaters, bridges, routers, gateway</li> </ul></li></ul> | 08 | 20 |
|   | <ul> <li>Data Communication &amp; Networking</li> <li>Specific objectives:</li> <li>Know modes of data transmission</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |    |    |
|   | <ul> <li>Cellular telephone call processing</li> <li>Mobile (cellular) to wire line (PSTN) call procedure</li> <li>Mobile (cellular) to mobile (cellular) call procedure.</li> <li>Wire line (PSTN) to mobile (cellular) call procedure.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |    |    |

#### Practical's:

Skills to be developed:

### **Intellectual Skills**

- 1. Interpretation of result.
- 2. Selection of communication techniques based on application.

### **Motor Skills**

- 1. Make connections/arrange experimental set up carryout the tests.
- 2. Ability to observe and record out puts.
- 3. Draw waveform /graphs.
- 4. Locate Faults.

#### List of Experiments:

- 1. Measurement of modulation index of amplitude modulated wave and observe the effect of modulating signal voltage on it by Emitter / Base / Collector Modulation.(any one circuit)
- 2. Measurement of modulation index of the frequency modulated wave and observe the effect of modulating and Carrier signal voltage on Frequency Modulation.(construct the circuit by using IC8038)
- 3. Generate PAM and draw input / output waveform and measure amplitude of each pulse.
- 4. Generate PWM and draw input / output waveform and measure Width of each pulse.
- 5. Generate ASK Signal and draw input/output waveforms.
- 6. Generate FSK Signal and draw input/output waveforms.
- 7. Generate PSK Signal and draw input/output waveforms.
- 8. Generate PCM Signal and draw input/output waveforms.
- 9. Generate PPM Signal and draw input/output waveforms.
- 10. Study the single channel telemetry system.

#### List of Assignments

#### Teacher should assign two or three questions on each of the following topic.

- 1. Digital Image communication in hospitals(DICOM)
- 2. Satellite communication- India's progress.
- 3. Mobile communication.
- 4. Graphical Representation of digital data by using the different encoding Techniques.

### Learning Resources

### 1. Books

| Sr.<br>No. | Title                                                        | Author                         | Publisher               |
|------------|--------------------------------------------------------------|--------------------------------|-------------------------|
| 1          | Electronic Communication System (V <sup>th</sup> Edition)    | Wayne Tomasi                   | Prentice Hall of India. |
| 2          | Electronic Communication                                     | Roddy Collen                   | Prentice Hall of India. |
| 3          | Electronic Communication System                              | Kennedy                        | Tata McGraw Hill        |
| 4          | Data Communication &<br>Networking                           | Forouzan                       | Tata McGraw Hill        |
| 5          | Mobile Cellular Telecommunication                            | William Lee                    | McGraw Hill             |
| 6          | Communication Electronic                                     | Frenzel                        | Tata MCgraw hills       |
| 7          | Introduction to Biomedical<br>Instrumentation                | Mandeep Singh                  | Prentice Hall of India. |
| 8          | Hand book of Biomedical<br>Instrumentation                   | R.S.Khandpur                   | Tata MCgraw hills       |
| 9          | Biomedical Instrument &<br>Measurement                       | Cromwell, Weibell,<br>Pfeiffer | Pearson                 |
| 10         | Principle of Medical electronics &<br>Biomedical Instruments | Raja Rao & Guha                | Universities Press.     |

#### 2. Websites

- http://en.wikipedia.org/wiki/
- > www.youtube.com/
- www.google.com(as a search engine)
- ➢ www.tech-faq.com
- ➤ www.howstuffworks.com
- ➢ www.williamson-labs.com

Course Name: Diploma in Medical ElectronicsCourse Code: MUSemester: FourthSubject Title: BiosensorsSubject Code: 17442

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    | Examination Scheme |     |     |    |     |       |
|-----------------|----|----|--------------------|-----|-----|----|-----|-------|
| TH              | TU | PR | PAPER<br>HRS       | TH  | PR  | OR | TW  | TOTAL |
| 03              |    | 02 | 03                 | 100 | 25# |    | 25@ | 150   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)

#### Rationale

Human body generates different physiological signals which are further electronically processed for diagnosis, monitoring, or therapeutic patient management.

This subject deals with the acquisition of bio signals from human body using various transducers/ sensors and processing of these signals.

This subject, Biosensors is the pre-requisite for all the subjects related to patient's management in the respect of diagnosis monitoring and therapy.

#### **General Objectives**

Students will be able to

- 1. Understand the design principle of physiological electrodes & transducer.
- 2. Understand working principle of these electrodes & transducers.
- 3. Understand different electrodes & transducers for various applications.

### **Learning Structure**



### **Theory Contents:**

| Topic<br>No | Theory                                                                                                                                                                                      | Hrs. | Marks |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|
| 110         | Introduction to Medical Instrumentation System & Physiological                                                                                                                              |      |       |
|             | Specific Objectives:                                                                                                                                                                        |      |       |
|             |                                                                                                                                                                                             |      |       |
|             | <ul> <li>Identify physiological sources of biomedical signals</li> <li>Describe working principle of Medical Instrumentation system</li> <li>Classify the physiology transducers</li> </ul> |      |       |
|             | Contents:                                                                                                                                                                                   |      |       |
|             | 1.1 Introduction to Medical Instrumentation System: [12]                                                                                                                                    |      |       |
|             | Definition of Biometrics                                                                                                                                                                    |      |       |
| 1           | Sources of biomedical signals                                                                                                                                                               | 10   | 20    |
|             | • Basic medical instrumentation (Man instrumentation)system                                                                                                                                 |      |       |
|             | Specification of medical instrumentation system                                                                                                                                             |      |       |
|             | Objectives of medical instrumentation system                                                                                                                                                |      |       |
|             | • General constraints in design of MIS                                                                                                                                                      |      |       |
|             | 1.2 Introduction to Physiological transducers: [08]                                                                                                                                         |      |       |
|             | • Classification of transducer based on: Process used, Physical                                                                                                                             |      |       |
|             | or chemical principle used, Applications                                                                                                                                                    |      |       |
|             | Performance characteristics of transducers:                                                                                                                                                 |      |       |
|             | Static characteristics, Dynamic characteristics                                                                                                                                             |      |       |
|             | Displacement & Pressure Transducers                                                                                                                                                         |      |       |
|             | Specific Objectives:                                                                                                                                                                        |      |       |
|             | > Draw constructional sketches of displacement & pressure                                                                                                                                   |      |       |
|             | transducers.                                                                                                                                                                                |      |       |
|             | rescribe working principle of displacement & pressure                                                                                                                                       |      |       |
|             | Contents:                                                                                                                                                                                   |      |       |
| 2           | • Resistive - Linear & angular notentiometers bonded &                                                                                                                                      | 00   | 16    |
| Z           | unbounded strain gauge                                                                                                                                                                      | 08   | 10    |
|             | • Inductive - Variable inductance, LVDT                                                                                                                                                     |      |       |
|             | • Capacitive                                                                                                                                                                                |      |       |
|             | • Piezoelectric                                                                                                                                                                             |      |       |
|             | • Diaphragm - Flat, corrugated, capsule                                                                                                                                                     |      |       |
|             | • Bellows                                                                                                                                                                                   |      |       |
|             | • Bourdon tube - C shape, spiral, helical, twisted                                                                                                                                          |      |       |
|             | Temperature, Optical and, Radiation Transducers                                                                                                                                             |      |       |
|             | Specific Objectives:                                                                                                                                                                        |      |       |
|             | > Draw constructional sketches of temperature, optical and                                                                                                                                  |      |       |
|             | radiation transducers                                                                                                                                                                       |      | • •   |
| 3           | > Describe working of these transducers.                                                                                                                                                    | 08   | 20    |
|             | • Tomporatura transducar Thermistor Thermosounds DTD                                                                                                                                        |      |       |
|             | Optical transducers Eibra optic songers Diotomyltinlier type                                                                                                                                |      |       |
|             | Provide transducers-rible optic sensors, riblomulupiler tube     Radiation Thermometry                                                                                                      |      |       |
| 4           | Kaulation Inclinetry     Flow & Fleetro Chemical Transducers                                                                                                                                | 10   | 24    |
| 4           |                                                                                                                                                                                             | 12   | 4     |

|   | Total                                                                                         | 48 | 100 |
|---|-----------------------------------------------------------------------------------------------|----|-----|
|   | Phase sensitive amplifier                                                                     |    |     |
|   | • Bridge amplifier                                                                            |    |     |
|   | Instrumentation amplifier                                                                     |    |     |
|   | Differential amplifier                                                                        |    |     |
| 6 | Basic requirements of biomedical amplifier                                                    | 04 | 08  |
| 6 | Contents:                                                                                     | 04 | 00  |
|   | amplifiers.                                                                                   |    |     |
|   | > Draw circuit diagram & explain working of the bio signal                                    |    |     |
|   | Specific Objectives:                                                                          |    |     |
|   | Signal Conditioners                                                                           |    |     |
|   | microelectrodes. Micro pipette microelectrodes                                                |    |     |
|   | <ul> <li>Micro electrodes - Metal microelectrodes Supported</li> </ul>                        |    |     |
|   | Internal electrode Needle electrodes. Wire electrodes                                         |    |     |
|   | • Surface electrode- Metal plate electrode, Metal disc disposable,                            |    |     |
|   | • Electrode skin interface & motion artifact                                                  |    |     |
| 5 | Polarizable & nonpolarizable electrodes                                                       | 06 | 12  |
|   | Electrode electrolyte interference     Delevizeble & generalerizeble electrolyte interference |    |     |
|   | Contents                                                                                      |    |     |
|   | Draw constructional details & explain working of Electrodes.                                  |    |     |
|   | Specific Objectives:                                                                          |    |     |
|   | Bio Potential Electrode                                                                       |    |     |
|   | Blood glucose sensor                                                                          |    |     |
|   | • Ion-Sensitive Field Effect Transistor (ISFET)                                               |    |     |
|   | PCO2electrode                                                                                 |    |     |
|   | • PO2 electrode                                                                               |    |     |
|   | • pH electrode                                                                                |    |     |
|   | Reference electrode                                                                           |    |     |
|   | 4.2 Chemical transducers: [12]                                                                |    |     |
|   | • Flow measurement by thermal convection                                                      |    |     |
|   | • Flow measurement by indicator dilution                                                      |    |     |
|   | Electromagnetic transducers                                                                   |    |     |
|   | Ultrasonic flow transducers                                                                   |    |     |
|   | • Plethysmography                                                                             |    |     |
|   | 4.1 Flow transducers: [12]                                                                    |    |     |
|   | Contents:                                                                                     |    |     |
|   | > Describe working of these transducers.                                                      |    |     |
|   | > Draw construction of Flow & electrochemical transducers.                                    |    |     |
|   | Specific Objectives:                                                                          |    |     |

### **Practicals:**

Skills to be developed:

#### **Intellectual skills**

- 1. Select transducer for particular application.
- 2. Interpret the characteristics of transducer.

#### **Motor Skills**

- 1. Measure the parameters accurately.
- 2. Plot the characteristics of transducer.

#### List of Experiments:

- 1) Characteristics of Potentiometer Linear & Angular
- 2) Characteristics of LVDT
- 3) Characteristics of Strain Gauge/determination of pressure using strain gauge.
- 4) Characteristics of Thermistor
- 5) Characteristics of RTD
- 6) Characteristics of Thermocouple
- 7) Determination of pH level of the given solutions
- 8) Amplification of bio signals (simulated) using an Instrumentation Amplifier/ Differential Amplifier
- 9) Determine the blood flow using ultrasonic flow transducer
- 10) Determination of pressure using Piezoelectric/Capacitive transducer

#### List of Assignments:

Information search (manufacturers, technical specifications, applications, costing etc.) on

- Different types of electrodes
- Fibre optic transducer
- Diaphragms, ,Bellows, Bourdon tube

#### Learning Resources

#### **Books:**

| Sr.<br>No. | Title                                                             | Author                                                 | Publisher                            |
|------------|-------------------------------------------------------------------|--------------------------------------------------------|--------------------------------------|
| 1          | Biomedical Instrumentation & Measurements                         | Leslie Cromwell,<br>Fred J. Weibell,<br>Erich Pfeiffer | Prentice Hall of India               |
| 2          | Medical Instrumentation-<br>Application & Design                  | John G. Webster                                        | John Wiley & Sons<br>(Asia) Pvt. Ltd |
| 3          | Principles of medical electronics<br>& Biomedical Instrumentation | C. Raja Rao,<br>S. K. Guha                             | Universities Press                   |
| 4          | Handbook of Biomedical<br>Instrumentation                         | R. S. Khandpur                                         | Tata Mc Graw hills                   |
| 5          | Biomedical Instrumentation & Measurements                         | R. Ananadnatarajan                                     | PHI learning Pvt. Ltd.               |
| 6          | Electronics in medicine &<br>Biomedical instrumentation           | Nandini Jog                                            | PHI learning Pvt. Ltd.               |

#### List of Equipments:

- 1) Potentiometer linear & angular Set up
- 2) LVDT Set up
- 3) Strain gauge Set up

#### MSBTE - Final Copy Dt. 30/08/2013

- 4) Thermistor Set up
- 5) RTD Set up
- 6) Thermocouple Set up
- 7) pH meter Set up
- 8) Biosignals simulator & an instrumentation amplifier/differential amplifier
- 9) Ultrasonic flow transducer Set up
- 10) Piezoelectric/capacitive transducer Set up

| Course Name   | : Electronics Engineering Group          |
|---------------|------------------------------------------|
| Course Code   | : ET/EN/EX/EJ/IE/IS/IC/DE/EV/MU/IU/ED/EI |
| Semester      | : Fourth                                 |
| Subject Title | : Linear Integrated Circuits             |
| Subject Code  | : 17445                                  |

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    | Examination Scheme |     |     |    |     |       |
|-----------------|----|----|--------------------|-----|-----|----|-----|-------|
| TH              | TU | PR | PAPER<br>HRS       | TH  | PR  | OR | TW  | TOTAL |
| 04              |    | 02 | 03                 | 100 | 50# |    | 25@ | 175   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Modern age technology has developed on high density and high speed electronics circuits. Integrated circuits are basis of these high density circuits enabled to reduce size, weight and cost of equipments. They have intrinsic features such as low power consumption, low noise and ease of design.

Today the growth of any industry depends upon electronics to great extent. Contents of this subject are the basic building blocks of different analog circuits.

Basic operating and designing principle of such a large collection of circuits establishes a foundation for understanding new development in the electronics field, instrumentation and power control. This subject acquaints student with general analog principles and design methodologies using integrated circuit for system design.

Prerequisites various devices and circuits studied in elements of electronics and electronic devices and circuits. Prospects - LSI, MSI, VLSI.

#### **General Objectives:**

Students will be able to:

- Understand working principle of Op-Amp and IC555
- Develop electronics circuits using timer IC555 and Op-Amp

• Analyze the response of frequency selective circuits such as PLL with respect to the incoming signal.

### **Learning Structure:**

#### **Application:**



### **Contents: Theory**

| Topic | Content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Hours | Marks |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
|       | <b>Operational Amplifier (Op-Amp):</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |       |
|       | Specific Objectives :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |       |
|       | Draw labeled block diagram of Op-Amp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |
|       | Specify and define Different parameters of Op-Amp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |       |
|       | Interpret ideal transfer characteristics of Op-Amp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |       |
|       | Contents:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |       |
|       | • Importance of Op-Amp:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |       |
|       | Block diagram of Op-Amp and function of each block with the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |       |
|       | circuit such as balanced, Unbalanced, differential amplifiers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |       |
|       | with simple current source, level shifter and complementary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |       |
| 1     | push-pull amplifier. Equivalent Circuit, Circuit Symbols And                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 12    | 10    |
|       | Terminals. Op-Amp IC-741 pin diagram and function.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |       |
|       | • Parameters of Op-Amp:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |       |
|       | Input offset voltage, Input offset current, Input bias current,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |       |
|       | differential input resistance, Input capacitance, Input voltage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |       |
|       | range, offset voltage adjustment range, Common Mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |       |
|       | Rejection Ratio (CMRR), Supply Voltage Rejection Ratio                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |       |
|       | (SVRR), large signal voltage gain and transfer characteristics,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |       |
|       | supply voltages, supply current, output voltage swing, output                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |       |
|       | resistance, slew rate, gain bandwidth product, output short                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |       |
|       | circuit current.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |       |
|       | <b>Op-Amp Configuration:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |       |
|       | Specific Objectives: Students will be able to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |       |
|       | Differentiate open and close loop configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |       |
|       | Identify inverting and non-inverting configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |       |
|       | Construct integrator and differentiator.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |       |
|       | <b>1</b> One of the state of the sta |       |       |
|       | 2.1 Open loop and closed loop configuration of Op-Amp, [08]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |       |
|       | its comparison. Virtual ground, virtual snort concept.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |       |
|       | Open loop configuration – inverting, Non-inverting                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |       |
| 2     | differential emplifier unity gain emplifier (voltage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 10    | 10    |
| 2     | follower) inverter(sign changer)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 12    | 10    |
|       | Tonower), inverter(sign changer)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |       |
|       | <b>2.2</b> Inverting and non-inverting configuration of [10]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |       |
|       | Adders (summing amplifier scaling Amplifier averaging                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |       |
|       | amplifier) Subtractor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |       |
|       | Basic Integrator                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |       |
|       | Basic Differentiator                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |
|       | Basic concept of frequency compensation of On-Amp and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |       |
|       | Offset nulling                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       |       |
|       | Numerical based on designing of above circuit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |       |
|       | Applications of Op-Amp:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |       |
|       | Specific Objectives:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |
|       | <ul> <li>Compute component values for instrumentation amplifier.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |       |
| 3     | Explain IC LM-324                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 12    | 22    |
|       | Explain different applications of Op-Amp.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |       |
|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |       |
|       | <b>3.1</b> Need for signal conditioning and signal processing. [08]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |       |

|   | Circuit diagram, operation, derivation of output voltage<br>Equation. advantages and applications of Instrumentation<br>amplifier.<br>Pin diagram pin functions and specifications of IC LM 324<br>Voltage to current converter (with floating load, with grounded<br>load) Current to voltage converter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |    |    |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|
|   | <b>3.2</b> Sample and hold circuit. [16]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |    |    |
|   | Logarithmic and antilogarithmic amplifiers (using Diodes)<br>Analog divider and analog multiplier<br>Comparator: Circuit diagrams and operation of<br>Zero crossing detector,<br>Schmitt trigger,<br>Window detector,<br>Phase detector,<br>Active peak detector,<br>Peak to peak detector                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |    |    |
| 4 | <ul> <li>Filters:</li> <li>Specific Objectives:</li> <li>Distinguish the types of filter</li> <li>Explain active and passive filter</li> <li>Explain different parameters of filter.</li> <li>Contents: <ul> <li>Introduction to filters ,Classification of filters,</li> <li>Concept of passive and active filters</li> <li>Merits and demerits of active filters over passive filters</li> <li>Ideal and actual characteristics, terms: - cut off frequency, Pass band, Stop band, center frequency, roll off rate, BW, Q-factor, first order and second order Butterworth filters, order of filter, Low pass filter, high pass filter, band pass filter ( wide band pass , narrow band pass filter) Band reject filter(wide band reject, narrow band reject filter), all pass filter. Numerical based on design of different filters.</li> </ul> </li> </ul> | 10 | 16 |
| 5 | <ul> <li>Timers</li> <li>Specific Objectives:</li> <li>Draw block diagram of IC 555</li> <li>Understand industrial applications of IC 555,565</li> <li>5.1 Introduction to timer IC 555 [10]</li> <li>Block diagram of IC 555 and its pin diagram and function of each pin.</li> <li>Concepts of different timer circuits used in industries: water level controller, Touch plate switch, frequency divider.</li> <li>Numericals based on timers.</li> <li>5.2 Phase Lock Loop</li> <li>Principle of operation, block diagram of PLL. [08]</li> <li>Applications of PLL as multiplier, FM demodulator.</li> <li>Pin diagram and pin functions of IC 565(PLL)</li> </ul>                                                                                                                                                                                         | 10 | 18 |

|   | Oscillators:                                                                                                                                        |    |     |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
|   | Specific Objectives:                                                                                                                                |    |     |
|   | Explain concept of oscillators                                                                                                                      |    |     |
|   | Explain different types of oscillators                                                                                                              |    |     |
|   | Develop multivibrators and oscillators for given values.                                                                                            |    |     |
| 6 | Contents:                                                                                                                                           | 00 | 10  |
| 0 | Concept of oscillators,                                                                                                                             | 08 | 10  |
|   | • Types of oscillators: Phase shift oscillators, Wien bridge oscillators using IC-741                                                               |    |     |
|   | • Types of Multivibrators: Monostable, Astable, Bistable using IC-555 and IC-741. Schmitt trigger, voltage controlled oscillator (VCO) using IC 555 |    |     |
|   | Total                                                                                                                                               | 64 | 100 |

### Practical:

#### **Intellectual Skills:**

- 1. Interpret the waveforms.
- 2. Find faults in circuits.

#### Motor Skill:

1. Testing and Measurement.

### **List of Practicals:**

| Sr. No. | Title of the Experiment                                                                 |
|---------|-----------------------------------------------------------------------------------------|
|         | Determine the op-amp parameters:                                                        |
| 01      | • Input Offset Voltage (V <sub>io</sub> )                                               |
| 01      | • Output Offset Voltage (V <sub>oo</sub> )                                              |
|         | Common mode rejection ratio (CMRR)                                                      |
| 02      | Determine the gain of Inverting and Non-inverting amplifier using op-amp and            |
| 02      | compare it with theoretical gain.                                                       |
| 03      | Verify the operation of Adder and Subtractor circuit using op-amp IC 741.               |
|         | Verify the working of active integrator and differentiator circuits using op-amp IC 741 |
|         | for following inputs:                                                                   |
| 04      | • Sine waveform                                                                         |
|         | • Square waveform                                                                       |
|         | Rectangular waveform                                                                    |
| 05      | Assemble V to I converter and I to V converter using IC 741 and measure the             |
| 05      | respective output.                                                                      |
|         | Verify the working of following comparator circuits using op-amp IC 741 and draw the    |
| 06      | input-output waveforms                                                                  |
| 00      | • Zero crossing detector                                                                |
|         | Active peak detector                                                                    |
| 07      | Assemble first order low pass Butterworth filter using op-amp and plot the frequency    |
| 07      | response and determine its cutoff frequency.                                            |
| 08      | Assemble Astable multivibrator circuit using IC 741. Plot the output waveform and       |
| 00      | determine the frequency of oscillations and duty cycle.                                 |
| 09      | Assemble Monostable multivibrator circuit using IC 555. Plot the output waveform        |
| 07      | and determine the on-time.                                                              |
| 10      | Assemble Schmitt trigger circuit using IC 555. Plot the output waveform and             |

#### w.e.f Academic Year 2012-13

|    | determine UTP and LTP                                                             |
|----|-----------------------------------------------------------------------------------|
| 11 | Assemble Instrumentation amplifier circuit using IC 324 and determine the overall |
|    | gain.                                                                             |
| 12 | Verify the operation of frequency Multiplier using PLL IC 565 and determine the   |
|    | output frequency.                                                                 |

# Learning Resources:

Books:

| Sr.<br>No. | Author            | Author Title                                                       |                  |
|------------|-------------------|--------------------------------------------------------------------|------------------|
| 01         | K.R. Botkar       | Integrated Circuit                                                 | Khanna           |
| 02         | Ramakant Gayakwad | Op-Amps and Linear Integrated Circuit                              | РНІ              |
| 03         | Serigo Franco     | Design with Operational Amplifier and<br>Analog Integrated Circuit | Tata-McGraw Hill |
| 04         | Willam D. Stanley | Operation Amplifier with Linear<br>Integrated Circuit              | Person           |

**Course Name : Electronics Engineering and Video Engineering Group** 

Course Code : ET/EJ/IE/IS/EN/EX/IC/MU/EV/DE/IU/ED/EI

Semester : Fourth

Subject Title : Visual Basic

Subject Code : 17043

#### **Teaching and Examination Scheme**:

| Teac | Teaching Scheme Examination Scheme |    |              |    |    |    |     |       |
|------|------------------------------------|----|--------------|----|----|----|-----|-------|
| TH   | TU                                 | PR | PAPER<br>HRS | TH | PR | OR | TW  | TOTAL |
| 01   |                                    | 02 |              |    |    |    | 25@ | 25    |

#### **Rationale:**

Today's most of the electronically operated devices, integrated circuits, controllers, equipments, gadgets are run by specific drivers/software. To understand design, develop and write drivers programming knowledge is required. To run the devices software has to be user friendly. New approach is to use graphical user interface. Graphical user interface can be implemented using visual software's.

Traditionally visual basic is the most popular, versatile, suitable, simple and commonly used visual programming language to write efficient, compact and portable interfaces, drivers/ software's.

The subject will enable the students to inculcate visual programming concepts and methodology used to write, debug, compile and execute simple visual basic programs using different powerful data types, built in visual controls and integrated visual basic environment (IDE) provided by Microsoft visual studio. Students will be exposed to event driven programming and bottom up approached used in objects oriented programming.

Students will understand how a complex interface can be easily implemented in visual basic with almost no programming expertise.

This course will lay the basic foundation of visual programming which will enable students to develop simple to complex programmable systems interfaces in the real world of work

#### **General Objectives**

Students will able to.

- 1. Learn visual programming development environment, concepts and methodology.
- 2. Use essential components (visual tools ) of Visual software's
- 3. Develop the skill of visual basic programming to build custom standalone applications
- 4. Develop applications with Multiple documents interface (MDI) using common dialog, menus and graphics
- 5. Use ADO for database connectivity with different databases.
- 6. Create simple reports using data report, Seagate crystal reports and integrating it with visual basic
- 7. Develop applications using class modules

### **Learning Structure:**



### Theory

| Name of Topics                                                                            | Hours |
|-------------------------------------------------------------------------------------------|-------|
| Topic 1] Introduction to Visual Environment                                               |       |
| Specific Objectives:                                                                      |       |
| Familiar with IDE of Visual basic                                                         |       |
| Use concepts of object based language                                                     |       |
| > Use basic elements of visual interface                                                  |       |
| > Use properties, events and methods at design time and runtime                           | 00    |
| > Create objects, place them on forms                                                     | 02    |
| Contents:                                                                                 |       |
| 1.1 Concepts of visual programming, object, features, properties, methods, events.        |       |
| 1.2 Environment of VB – Menu bar, toolbar, project explorer, toolbox, properties          |       |
| window, form designer, form layout, immediate window.                                     |       |
| 1.3 Concept of project, elements of projects, form, their properties, methods and events. |       |
| Topic 2] Introduction to Visual Basic                                                     |       |
| Specific Objectives:                                                                      |       |
| > Use different data types                                                                |       |
| Use powerful features of arrays and collections                                           |       |
| > Write procedures and functions                                                          |       |
| > Call procedures and functions                                                           |       |
| > Differentiate between procedure and functions                                           |       |
| > Use library functions for math and string operations                                    | 02    |
| Use Inputbox and Msgbox functions                                                         |       |
| Contents:                                                                                 |       |
| 2.1 Data types, variables, constants, arrays, collections                                 |       |
| 2.2 procedures, Arguments, function, return values, control flow statements, loop         |       |
| statements, Nested control structures, exit statement                                     |       |
| 2.3 Math operators & formulas, logical operators, string functions, special functions     |       |
| available in VB like Input Box (), Message Box (), Format ().                             |       |
| Topic 3] Controls and Events                                                              |       |
| Specific Objectives:                                                                      |       |
| Use basic controls                                                                        |       |
| Select appropriate controls for given data                                                |       |
| > Set properties of different basic controls                                              |       |
| Call methods and events of basic controls                                                 |       |
| > Demonstrate the use of each control with simple examples                                | 02    |
| Contents:                                                                                 |       |
| 3.1 Basic controls: Text box, list Box, Combo Box, Scroll Bar, frame, Option button,      |       |
| checkbox, command button, OLE controls                                                    |       |
| 3.2 File, Drive, directory, Picture box, Image and timer controls .Designing a form using |       |
| controls, concepts of event & properties, changing properties (runtime & design           |       |
| time) Important events of each control & creating applications using controls.            |       |
| Topic 4] Advance Controls & Events                                                        |       |
| Specific Objectives:                                                                      |       |
| Add extrinsic controls in an application                                                  |       |
| Use common dialog box control and its properties such open, save as, font,                |       |
| color, print and help                                                                     | 03    |
| Use rich text box to design simple ms-word like application                               |       |
| Use and create explorer like utilities using tree view and list controls                  |       |
| Familiar with windows common controls                                                     |       |
| Contents:                                                                                 |       |

| Total                                                                                   | 16 |
|-----------------------------------------------------------------------------------------|----|
| 6.5 Report generation using data report and crystal report                              |    |
| Using delete, save, search, update exit, new, add, methods.                             |    |
| 6.4 Using ADO Objects at run time, attaching visual controls to record set at run time, |    |
| executing a command,                                                                    |    |
| connection, command, record set, parameter, Creating & closing a connection;            |    |
| 6.3 Programming with ADO ( Active data objects ), using ADO Objects at design time-     |    |
| 6.2 validating data, entering data, visual data manager.                                |    |
| 6.1 Concept of database, Record, Record set, Data control & its important properties    | 04 |
| Contents:                                                                               |    |
| <ul> <li>Generate report using Data Report and Crystal Report</li> </ul>                |    |
| <ul> <li>Make database connectivity with different databases</li> </ul>                 |    |
| <ul> <li>Select appropriate concepts such as back-end and front-end</li> </ul>          |    |
| <ul> <li>Use ADO and its properties methods and events</li> </ul>                       |    |
| Specific Objectives:                                                                    |    |
| 1 opic of Database and Report                                                           |    |
| method, RGB () Functions, Paint picture () method, Load picture () function.            |    |
| 5.3 Graphics: Basic controls – Line & shape control, line method, circle method, Pset   |    |
| 5.3 Menu: Creating own menu using menu editor, popup menu.                              |    |
| 5.2 MDI- MDI form and child form, Creation and use in                                   |    |
| procedures, variables and accessing them using objects                                  |    |
| 5.1 Concept of module, class module, using class module to define functions,            |    |
| Contents:                                                                               |    |
| > Work with graphic functions and methods                                               | 03 |
| Design menu based applications such as notepad editor                                   |    |
| <ul> <li>Use multiple document interface</li> </ul>                                     |    |
| <ul> <li>Access functions and procedures from class module</li> </ul>                   |    |
| <ul> <li>Define functions and procedures in class module</li> </ul>                     |    |
| Specific Objectives:                                                                    |    |
| Topic 5] Module, Class Module, Mdi, Menu Graphics                                       |    |
| properties, changing properties at design or run time, event handling.                  |    |
| 4.2 Windows common controls – status Bar, Tab control, image list control, Important    |    |
| textbox controls                                                                        |    |
| 4.1 Common Dialog Box controls, The Tree view and List, View controls, the rich         |    |
|                                                                                         |    |

### **TERM WORK:-**

| Sr<br>No. | Name of the Experiments                                                                    |
|-----------|--------------------------------------------------------------------------------------------|
|           | a) Study and Understand Visual                                                             |
|           | Basic Environment                                                                          |
| 1         | b) Develop VB Project which                                                                |
| 1         | accepts User Name & Password                                                               |
|           | using three forms Login Form1                                                              |
|           | and Form2 to accept data, and                                                              |
|           | Form3 to display data.                                                                     |
| 2         | Design simple calculator to perform mathematical function using Control array like Windows |
| Z         | Calculator.                                                                                |
| 3         | Design GUI to Find Resistor Value from it's color code.                                    |
| 4         | Display student data using structure in loop. Implement it using Class module & Procedures |

| 5  | Demonstrate list boxes features with sorted list and selected item transfer facility.                                                                                                                                                                          |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6  | <ul><li>a) Design Color box using RGB function to observe color change using H- scroll bar.</li><li>b) Design project to demonstrate file, folder &amp; drive controls to explore drive &amp; folders.</li></ul>                                               |
| 7  | Design GUI for Testing AC series Circuit                                                                                                                                                                                                                       |
|    | Practice Experiment / Exercise                                                                                                                                                                                                                                 |
| 8  | <ul> <li>a) Design project to implement Common Dialog box controls such as open, save, Color, Font,<br/>Printer &amp; Help</li> <li>b) Design a menu structure like notepad, using menu editor.</li> </ul>                                                     |
| 9  | Design MDI application with 4 child forms & arrange forms with cascade, Tile Horizontal,<br>Tile Vertical arrangements                                                                                                                                         |
| 10 | Design student database project using ADO connectivity in design time and runtime and MS access as backend database engine, with basic features such as add, edit, update, save, cancel, delete feature and generate Report using Data Report / Crystal Report |
| 11 | Develop mini VB Project                                                                                                                                                                                                                                        |

### **Reference Books**:

| Sr.<br>No. | Author                            | Title                             | Publisher                   |
|------------|-----------------------------------|-----------------------------------|-----------------------------|
| 01         | MSDN library on Line<br>Reference |                                   | From Microsoft MSDN Library |
| 02         | Evangelos Petroustus              | Mastering VB6                     | WILEY India                 |
| 03         | Steven Holzner                    | Visual basic 6                    | Dream Tech. Press           |
| 04         | Content Development<br>Group      | Visual Basic 6.0<br>Programming   | Tata McGraw Hill            |
| 05         | Mohammed Azam                     | Programming with visual basic 6.0 | Vikas Publishers            |
| 06         | Nel Jerka                         | The complete referenceVB6         | Tata McGraw Hill Publishing |

Course Name : Electronics Engineering Group Course Code : ET/EJ/EN/EX/IE/IS/IC/DE/EV/MU/IU/ED/EI Semester : Fourth Subject Title : Professional Practices-II

Subject Code : 17044

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |    | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH | PR        | OR        | TW  | TOTAL |
|                 |    | 03 |              |    |           |           | 50@ | 50    |

#### **Rationale:**

Most of the diploma holders join industries. Due to globalization and competition in the industrial and service sectors the selection for the job is based on campus interviews or competitive tests.

While selecting candidates a normal practice adopted is to see general confidence, ability to communicate and attitude, in addition to basic technological concepts.

The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

### **Objectives:**

To develop the following skills:

#### Intellectual skills:

- 1) Analyze information from different sources.
- 2) Prepare reports.

### Motor skills:

- 1) Present given topic in a seminar.
- 2) Interact with peers to share thoughts.
- 3) Prepare a report on industrial visit, expert lecture.

### **Learning Structure:**



### **Contents:**

| Activity | Content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Hours |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 1        | <ul> <li>Industrial Visits</li> <li>Structured industrial visits be arranged and report of the same should be submitted by the individual student to form a part of the term work.</li> <li>Minimum two industrial visits may be arranged in the following areas/ industries : <ul> <li>i) Electronic equipment manufacturing unit</li> <li>ii) Resistance Welding unit</li> <li>iii) Industrial automation unit</li> <li>iv) Sugar mill, Paper mill, Cement Industry.</li> <li>v) Railway station control room.</li> <li>vi) Telephone Exchange.</li> <li>vii) Any other suitable Industry.</li> </ul> </li> </ul> | 16    |
| 2        | Lectures by Professional / Industrial Expert to be organized from any of<br>the following areas (Any three)<br>i) Cyber laws.<br>ii) Fiber optics communication system<br>iii) Disaster management<br>iv) Atomic energy<br>v) Industrial Safety<br>vi) Computer security systems/Ethical hacking.<br>vii) Any other suitable topic<br>viii) Introduction to Apprenticeship Training Scheme                                                                                                                                                                                                                          | 08    |
| 3        | <ul> <li>Information Search :</li> <li>Information search can be done through manufacturers, catalogue, internet, magazines; books etc. and submit a report on one of the following topics: <ul> <li>i) GPS</li> <li>ii) Market survey for motors used in electronic application</li> <li>iii) Electronic billing system.</li> <li>iv) Elevators installation and maintenance</li> <li>v) Any other suitable areas</li> </ul> </li> </ul>                                                                                                                                                                           | 06    |
| 4        | Seminar :<br>Seminar topic should be related to the subjects of fourth semester. Each<br>student shall submit a report of at least 10 pages and deliver a seminar<br>(Presentation time – 10 Minutes)                                                                                                                                                                                                                                                                                                                                                                                                               | 10    |
| 5        | <b>Group Discussion</b> :<br>The students should discuss in group of six to eight students and write a brief report on the same as a part of term work. The topic of group discussion may be selected by the faculty members.                                                                                                                                                                                                                                                                                                                                                                                       | 08    |
|          | Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 48    |

# Learning Resources:

# 1. Books:

| Sr.<br>No. | Author               | Title                  | Publisher                     |
|------------|----------------------|------------------------|-------------------------------|
| 01         | NRDC, Publication Bi | Invention Intelligence | National Research Development |

|    | Monthly Journal                                     | Journal                                            | Corporation, GOI.            |
|----|-----------------------------------------------------|----------------------------------------------------|------------------------------|
|    |                                                     |                                                    |                              |
| 02 | DK Publishing                                       | How things works encyclopedia                      | DK Publishing                |
| 03 | Trott                                               | Innovation mgmt.& new product development          | Pearson Education            |
| 04 | E.H. McGrath, S.J.                                  | Basic Managerial Skills<br>for All – Ninth Edition | PHI                          |
| 05 | Apprenticeship Training S<br>Available on MSBTE Web | cheme:- Compiled By – BO.<br>9 Site.               | AT (Western Region), Mumbai, |

## 2. Web sites

www.engineeringforchange.org www.wikipedia.com www.slideshare.com www.teachertube.com

# Course Name : All Branches of Diploma in Engineering & Technology Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG Industrial Training (Optional) after 4<sup>th</sup> semester examination.

Note:- Examination in Professional Practices of 5<sup>th</sup> Semester.

### INDUSTRIAL TRAINING (OPTIONAL)

### Rational:-

There was a common suggestion from the industry as well as other stakeholders that curriculum of Engineering and Technology courses should have Industrial training as part of the curriculum. When this issue of industrial training was discussed it was found that it will be difficult to make industrial training compulsory for all students of all courses as it will be difficult to find placement for all the students. It is therefore now proposed that this training can be included in the curriculum as optional training for student who is willing to undertake such training on their own. The institutes will help them in getting placement or also providing them requisite documents which the student may need to get the placement.

Details:- Student can undergo training in related industries as guided by subject teachers / HOD.

- The training will be for four weeks duration in the summer vacation after the fourth semester examination is over.
- The student undergoing such training will have to submit a report of the training duly certified by the competent authority from the industry clearly indicating the achievements of the student during training. This submission is to be made after joining the institute for Fifth semester.
- The student completing this training will have to deliver a seminar on the training activities based on the report in the subject Professional Practices at Fifth Semester.
- The student undergoing this training will be exempted from attending activities under Professional Practices at Fifth semester except the seminar.
- The students who will not undergo such training will have to attend Professional Practices Classes/activities of fifth semester and will have to complete the tasks given during the semester under this head.
- There work will be evaluated on their submissions as per requirement and will be given marks out of 50. Or student may have to give seminar on training in Industry he attended.
- Institute shall encourage and guide students for Industry training.
- Evaluation:- Report of Training attended and delivery of seminar and actual experience in Industry will be evaluated in fifth semester under Profession Practices-III and marks will be given accordingly out of 50.

w.e.f Academic Year 2012-13

'G' Scheme

|                                       | MAHA                                                    | RASHTR             | A STATE      | E BOA   | ARD (   | OF TI   | ECHNIC                | AL ED     | UCAT    | 'ION, N       | AUMB      | AI           |         |                    |                      |               |
|---------------------------------------|---------------------------------------------------------|--------------------|--------------|---------|---------|---------|-----------------------|-----------|---------|---------------|-----------|--------------|---------|--------------------|----------------------|---------------|
|                                       |                                                         | G AND EX           | XAMINA       | TION    | SCH     | EME     | FOR PO                | OST S.S   | .C. DI  | PLOM          | A COU     | JRSES        |         |                    |                      |               |
| CO                                    | <b>JRSE NAME : DIPLOMA IN PRO</b>                       | DUCTIC             | N ENGIN      | IEER    | ING     | / DIPI  | LOMA II               | N PROI    | DUCT    | ION T         | ECHN      | OLOG         | Y       |                    |                      |               |
| CO                                    | <b>JRSE CODE : PG / PT</b>                              |                    |              |         |         |         |                       |           |         |               |           |              |         |                    |                      |               |
| DUI                                   | RATION OF COURSE : 6 SEMEST                             | rers               |              |         |         |         |                       | W         | ITH I   | EFFEC         | T FRO     | <b>M 201</b> | 2-13    |                    |                      |               |
| SEMESTER : FOURTH DURATION : 16 WEEKS |                                                         |                    |              |         |         |         |                       |           |         |               |           |              |         |                    |                      |               |
| PAT                                   | TERN : FULL TIME - SEMESTE                              | R                  |              |         |         |         |                       | S         | CHEN    | <b>/E : G</b> |           |              |         |                    |                      |               |
| ~~                                    |                                                         |                    |              | ТЕ      | ACHI    | NG      |                       |           | EX.     | AMINA         | TION SO   | CHEME        |         |                    |                      |               |
| SR.<br>NO                             | SUBJECT TITLE                                           | Abbrev<br>iation   | SUB<br>CODE  | S       | CHEM    | E       | PAPER                 | ТН        | (1)     | PR            | (4)       | OR           | (8)     | TW                 | (9)                  | SW<br>(17400) |
| 110                                   |                                                         | lation             | CODE         | ТН      | TU      | PR      | HRS.                  | Max       | Min     | Max           | Min       | Max          | Min     | Max                | Min                  | (17400)       |
| 1                                     | Environmental Studies \$                                | EST                | 17401        | 01      |         | 02      | 01                    | 50#*      | 20      |               |           |              |         | 25@                | 10                   |               |
| 2                                     | Manufacturing Processes β                               | MPR                | 17402        | 03      |         | 04      | 03                    | 100       | 40      | 25#           | 10        |              |         | 50@                | 20                   |               |
| 3                                     | Electrical Engineering β                                | EEN                | 17404        | 03      |         | 02      | 03                    | 100       | 40      |               |           |              |         | 25@                | 10                   |               |
| 4                                     | Heat Engineering                                        | HEN                | 17406        | 04      |         | 02      | 03                    | 100       | 40      |               |           | 25#          | 10      | 25@                | 10                   | 50            |
| 5                                     | Fluid Mechanics & Machinery β                           | FMM                | 17411        | 04      |         | 02      | 03                    | 100       | 40      | 25#           | 10        |              |         | 25@                | 10                   |               |
| 6                                     | Theory of Machines β                                    | TOM                | 17412        | 03      |         | 02      | 03                    | 100       | 40      |               |           |              |         | 25@                | 10                   |               |
| 7                                     | Professional Practices-II β                             | PPT                | 17035        |         |         | 02      |                       |           |         |               |           |              |         | 50@                | 20                   |               |
|                                       |                                                         |                    | TOTAL        | 18      |         | 16      |                       | 550       |         | 50            |           | 25           |         | 225                |                      | 50            |
| **                                    | Industrial Training (Optional)                          |                    |              | E       | xamir   | nation  | in 5 <sup>th</sup> Se | mester    | Profes  | sional        | Practic   | es-III       |         |                    |                      |               |
| Stud                                  | ent Contact Hours Per Week: <b>34 Hrs</b> .             |                    |              |         | CII     |         |                       |           |         |               |           |              |         |                    |                      |               |
| THI                                   | CORY AND PRACTICAL PERIOR                               | <b>DS OF 60</b>    | MINUTE       | S EA    | CH.     |         |                       |           |         |               |           |              |         |                    |                      |               |
| 1 ota                                 | I Marks: 900<br>Internal Assessment # External Ass      | assmant            |              |         | Theory  | , Evor  | nination              | ¢ Com     | mont    | o all bro     | nahaa     | #* Or        | lino E  | vomino             | tion                 |               |
| β-C                                   | ommon to ME_MH_MI                                       |                    |              |         | neory   |         | iiiiatioii,           | φ - Coll  | inton u |               | inches,   | # · - OI     |         | ханнна             | uon,                 |               |
| Abbi                                  | eviations: TH-Theory, TU- Tutorial, PR-                 | Practical,         | OR-Oral, T   | W- Te   | rm Wo   | ork, SV | V- Session            | al Work   |         |               |           |              |         |                    |                      |               |
| ** Iı                                 | dustrial Training (Optional) - Student                  | can unde           | rgo Indust   | rial T  | rainin  | g of fo | ur weeks              | after fou | urth se | mester        | examina   | ation du     | ring su | ımmer <sup>•</sup> | vacatio              | n.            |
| Asse                                  | ssment will be done in Fifth semester u                 | inder Prof         | essional Pr  | ractice | es-III. | They v  | will be exe           | empted f  | from a  | ctivities     | of Prof   | essional     | Pract   | ices-III           | of 5 <sup>th</sup> S | emester.      |
| 2                                     | Conduct two class tests each of 25 sessional work (SW). | marks fo           | or each the  | ory su  | bject.  | Sum     | of the tota           | al test m | narks o | f all su      | bjects is | s to be o    | conver  | ted out            | of 50                | marks as      |
|                                       | Progressive evaluation is to be dor                     | ne by subj         | ect teacher  | as pe   | r the p | orevai  | ling currio           | culum in  | mplem   | entatio       | n and as  | ssessme      | nt nor  | ms.                |                      |               |
|                                       | Code number for TH, PR, OR, TW                          | <u>/ are to</u> be | e given as s | suffix  | 1, 4, 8 | 8, 9 re | spectively            | to the    | subject | t code.       |           |              |         |                    |                      |               |
|                                       |                                                         |                    |              |         |         |         |                       |           |         |               |           |              |         |                    |                      |               |

#### Course Name : All Branches of Diploma in Engineering & Technology

# Course Code : AE/CE/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG/AU

Semester : Fourth

Subject Title : Environmental Studies

Subject Code : 17401

**Teaching and Examination Scheme:** 

| Teac | hing Scl | heme |              |      | Examinati | on Scheme |     |       |
|------|----------|------|--------------|------|-----------|-----------|-----|-------|
| TH   | TU       | PR   | PAPER<br>HRS | TH   | PR        | OR        | TW  | TOTAL |
| 01   |          | 02   | 01           | 50#* |           |           | 25@ | 75    |

#### **#\* Online Theory Examination**

NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sh eet under the head Sessional Work (SW).

#### **Rationale:**

Environment essentially comprises of our living ambience, which gives us the zest and verve in all our activities. The turn of the twentieth century saw the gradual onset of its degradation by our callous deeds without any concern for the well being of our surrounding we are today facing a grave environmental crisis. The unceasing industrial growth and economic development of the last 300 years or so have resulted in huge ecological problems such as overexploitation of natural resources, degraded land, disappearing forests, endangered species, dangerous toxins, global warming etc.

It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

The curriculum covers the aspects about environment such as Environment and Ecology, Environmental impacts on human activities, Water resources and water quality, Mineral resources and mining, Forests, etc.

General Objectives: The student will be able to,

- 1. Understand importance of environment.
- 2. Know key issues about environment.
- 3. Understands the reasons for environment degradation.
- 4. Know aspects about improvement methods.
- 5. Know initiatives taken by the world bodies to restrict and reduce degradation.

### **Learning Structure:**



# Theory:

| Topic and Contents                                                                                          | Hours | Marks |
|-------------------------------------------------------------------------------------------------------------|-------|-------|
| Topic 1: Nature of Environmental Studies                                                                    |       |       |
| Specific Objectives:                                                                                        |       |       |
| Define the terms related to Environmental Studies                                                           |       |       |
| State importance of awareness about environment in general public                                           | 01    | 04    |
| Contents:                                                                                                   | 01    | 04    |
| • Definition, Scope and Importance of the environmental studies                                             |       |       |
| Importance of the studies irrespective of course                                                            |       |       |
| Need for creating public awareness about environmental issues                                               |       |       |
| <b>Topic 2: Natural Resources and Associated Problems</b>                                                   |       |       |
| Specific Objectives:                                                                                        |       |       |
| Define natural resources and identify problems associated with                                              |       |       |
|                                                                                                             |       |       |
| Identify uses and their overexploitation Identify alternate recourses and their importance for environment. |       |       |
| Contents:                                                                                                   |       |       |
| 2.1 Renewable and Non renewable resources                                                                   |       |       |
| 2.1 Kenewable and Non Tenewable resources                                                                   |       |       |
| Associated problems                                                                                         |       |       |
| 2.2 Forest Resources                                                                                        |       |       |
| General description of forest resources                                                                     |       |       |
| Eulerian description of forest resources                                                                    |       |       |
| <ul> <li>Effects on environment due to deforestation. Timber</li> </ul>                                     |       |       |
| extraction. Building of dams, waterways etc.                                                                |       |       |
| 2.3 Water Resources                                                                                         | 04    | 10    |
| • Hydrosphere: Different sources of water                                                                   |       |       |
| • Use and overexploitation of surface and ground water                                                      |       |       |
| • Effect of floods, draught, dams etc. on water resources and                                               |       |       |
| community                                                                                                   |       |       |
| 2.4 Mineral Resources:                                                                                      |       |       |
| Categories of mineral resources                                                                             |       |       |
| Basics of mining activities                                                                                 |       |       |
| • Mine safety                                                                                               |       |       |
| • Effect of mining on environment                                                                           |       |       |
| 2.5 Food Resources:                                                                                         |       |       |
| • Food for all                                                                                              |       |       |
| • Effects of modern agriculture                                                                             |       |       |
| World food problem                                                                                          |       |       |
| Topic 3. Ecosystems                                                                                         |       |       |
| Concept of Ecosystem                                                                                        |       |       |
| • Structure and functions of ecosystem                                                                      | 01    | 04    |
| • Energy flow in ecosystem                                                                                  |       |       |
| Major ecosystems in the world                                                                               |       |       |
| Topic 4. Biodiversity and Its Conservation                                                                  |       |       |
| Definition of Biodiversity                                                                                  | 02    | 06    |
| • Levels of biodiversity                                                                                    |       |       |

| Truman realth and riuman Rights     Total                                                                                                     | 16 | 50 |
|-----------------------------------------------------------------------------------------------------------------------------------------------|----|----|
| Human Health and Human Rights                                                                                                                 |    |    |
| Population Growth: Aspects, importance and effect on                                                                                          |    |    |
| • Forest Conservation Act                                                                                                                     |    |    |
| • Wildlife Protection Act                                                                                                                     |    |    |
| • Water (Prevention and Control of Pollution) Act                                                                                             | 02 | 08 |
| • Air (Prevention and Control of Pollution) Act                                                                                               |    |    |
| Environmental Protection Act                                                                                                                  |    |    |
| Brief description of the following acts and their provisions:                                                                                 |    |    |
| Topic 7. Environmental Protection                                                                                                             |    |    |
| Concept of Carbon Credits and its advantages                                                                                                  |    |    |
| and their effect on climate                                                                                                                   |    |    |
| Depletion, Nuclear Accidents and Holocaust: Basic concepts                                                                                    |    |    |
| Climate Change, Global warming, Acid rain, Ozone Laver                                                                                        | 03 | 10 |
| harvesting: Definition. Methods and Benefits                                                                                                  |    | 10 |
| Water conservation Watershed management Rain water                                                                                            |    |    |
| Concept of development sustainable development                                                                                                |    |    |
| Topic 6 Social Issues and Environment                                                                                                         |    |    |
| <ul> <li>Son Fonution: Definition, sources, effects, prevention</li> <li>Noise Pollution: Definition, sources, effects, prevention</li> </ul> |    |    |
| <ul> <li>Soil Pollution: Definition sources offacts provention</li> </ul>                                                                     |    |    |
| • water Pollution: Definition, Classification, sources, effects,                                                                              |    |    |
| prevention<br>Weter Deflections Definition Cheerification commence officiate                                                                  | 03 | 08 |
| • Air pollution: Definition, Classification, sources, effects,                                                                                |    |    |
| • Definition                                                                                                                                  |    |    |
| Topic 5. Environmental Pollution                                                                                                              |    |    |
| Conservation of biodiversity                                                                                                                  |    |    |
| Threats to biodiversity                                                                                                                       |    |    |
| Value of biodiversity                                                                                                                         |    |    |

#### Practical: Skills to be developed:

#### **Intellectual Skills**:

- 1. Collection of information, data
- 2. Analysis of data
- 3. Report writing

### **Motor Skills:**

- 1. Presentation Skills
- 2. Use of multi media

### List of Projects:

Note: Any one project of the following:

- 1. Visit to a local area to document environmental assets such as river / forest / grassland / hill / mountain
- 2. Visit to a local polluted site: Urban/Rural/Industrial/Agricultural
- 3. Study of common plants, insects, birds

4. Study of simple ecosystems of ponds, river, hill slopes etc

Prepare a project report on the findings of the visit illustrating environment related facts, analysis and conclusion. Also suggest remedies to improve environment.

Learning Resources: Books:

| Sr.<br>No. | Author                                                | Title                                        | Publisher               |
|------------|-------------------------------------------------------|----------------------------------------------|-------------------------|
| 01         | Anindita Basak                                        | Environmental Studies                        | Pearson Education       |
| 02         | R. Rajgopalan                                         | Environmental Studies<br>from Crises to Cure | Oxford University Press |
| 03         | Dr. R. J. Ranjit Daniels, Dr.<br>Jagdish Krishnaswamy | Environmental Studies                        | Wiley India             |

Course Name : Mechanical Engineering Group Course Code : ME/PG/PT/MH/MI/FE/FG Semester : Fourth Subject Title : Manufacturing Processes Subject Code : 17402

#### **Teaching and Examination Scheme**

| Teac | hing Sch | neme |              |     | Examinati | on Scheme |     |       |
|------|----------|------|--------------|-----|-----------|-----------|-----|-------|
| TH   | TU       | PR   | PAPER<br>HRS | TH  | PR        | OR        | TW  | TOTAL |
| 03   |          | 04   | 03           | 100 | 25#       |           | 50@ | 175   |

#### **Rationale:**

Diploma technician often comes across various types of basic manufacturing processes. He / she is required to select, operate and control the appropriate processes for specific applications. He / she is also required to know about various cutting tools, latest improvements in manufacturing processes. This is a core technology subject. The diploma technician should know how the raw material gets processed through various processes and ultimately results into finished goods.

Hence it is essential that, he has understanding of basic manufacturing processes, machines, tools and equipments. With sound knowledge of this subject, the diploma technician will be able to handle and control practical situations more effectively and confidently.

#### **Objectives:**

The student will be able to:

- 1) Use the basic machine tools like lathe and drilling.
- 2) Produce and inspect the job as per specified dimensions.
- 3) Select the specific manufacturing processes for the desired output.
- 4) Adopt safety practices while working on various machines.
- 5) Explain the different types of plastic moulding processes.
- 6) Select the basic manufacturing process for different components to be machined.

### **Learning Structure:**



### Theory:

| 1:Forming Processes         Specific Objectives:         > To list basic manufacturing processes and write working principal of different manufacturing processes like Drop forging, Rolling and Extrusion         > To identify and select proper manufacturing process for a specific component         Content         1.1 Drop forging:       06 Marks         Upset forging press forging(die forging) open die & closed die forging |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Specific Objectives:       > To list basic manufacturing processes and write working principal of different manufacturing processes like Drop forging, Rolling and Extrusion       > To identify and select proper manufacturing process for a specific component         Content       1.1 Drop forging:       06 Marks         Upset forging press forging(die forging) open die & closed die forging       08       18                 |
| <ul> <li>To list basic manufacturing processes and write working principal of different manufacturing processes like Drop forging, Rolling and Extrusion</li> <li>To identify and select proper manufacturing process for a specific component</li> <li>Content</li> <li>1.1 Drop forging:</li> <li>06 Marks</li> <li>08 18</li> </ul>                                                                                                    |
| of different manufacturing processes like Drop forging, Rolling<br>and Extrusion       >         > To identify and select proper manufacturing process for a specific<br>component       08         Content       06 Marks         1.1 Drop forging:       06 Marks                                                                                                                                                                       |
| and Extrusion<br>> To identify and select proper manufacturing process for a specific<br>component<br>Content<br>1.1 Drop forging: 06 Marks<br>Unset forging press forging(die forging) open die & closed die forging                                                                                                                                                                                                                     |
| <ul> <li>To identify and select proper manufacturing process for a specific component</li> <li>Content         <ol> <li>1.1 Drop forging: 06 Marks</li> <li>Unset forging press forging(die forging) open die &amp; closed die forging</li> </ol> </li> </ul>                                                                                                                                                                             |
| component018Content06 Marks081.1 Drop forging:06 Marks                                                                                                                                                                                                                                                                                                                                                                                    |
| Content081.1 Drop forging:06 MarksUpset forging press forging(die forging) open die & closed die forging                                                                                                                                                                                                                                                                                                                                  |
| <b>1.1 Drop forging</b> : <b>06 Marks</b>                                                                                                                                                                                                                                                                                                                                                                                                 |
| Unset forging press forging(die forging) open die & closed die forging                                                                                                                                                                                                                                                                                                                                                                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| forging operations                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 1.2 Rolling: 06 Marks                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Principle of rolling, hot & cold rolling, Types of rolling mill, application of                                                                                                                                                                                                                                                                                                                                                           |
| rolling                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 1.3 Extrusion: 06 Marks                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Direct & indirect extrusion. Advantages, disadvantages and Applications.                                                                                                                                                                                                                                                                                                                                                                  |
| 2. Press working:                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Specific Objectives:                                                                                                                                                                                                                                                                                                                                                                                                                      |
| To define Press working machine principal                                                                                                                                                                                                                                                                                                                                                                                                 |
| <ul> <li>To state various classification of press machine.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                     |
| To state different operations performed on press machine and                                                                                                                                                                                                                                                                                                                                                                              |
| their p[practical applications 01 pross mathematical 08 16                                                                                                                                                                                                                                                                                                                                                                                |
| Content                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 2.1 Press classification, press operations like punching/piercing, blanking,                                                                                                                                                                                                                                                                                                                                                              |
| notching lancing 06 Marks                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 2.2 Die set components and types of dies <b>06 Marks</b>                                                                                                                                                                                                                                                                                                                                                                                  |
| 2.3 Forming Operations: Bending drawing 04 Marks                                                                                                                                                                                                                                                                                                                                                                                          |
| 3. Casting Processes:                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Specific Objectives:                                                                                                                                                                                                                                                                                                                                                                                                                      |
| To state different between pattern and model                                                                                                                                                                                                                                                                                                                                                                                              |
| > To list different types of pattern and their applications                                                                                                                                                                                                                                                                                                                                                                               |
| <ul> <li>To state various types of pattern allowances.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                         |
| <ul> <li>To state various types of casting processes.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                          |
| Content                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 3.1 Pattern making: 06 Marks                                                                                                                                                                                                                                                                                                                                                                                                              |
| Basic steps in making casting. Pattern : types, materials and allowances.                                                                                                                                                                                                                                                                                                                                                                 |
| tools, color coding of patterns                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>3.2 Moulding: 06 Marks</b> 10 22                                                                                                                                                                                                                                                                                                                                                                                                       |
| Types of moulding sands, properties of sand, moulding methods, cores                                                                                                                                                                                                                                                                                                                                                                      |
| and core prints, elements of gating system, bench moulding, floor                                                                                                                                                                                                                                                                                                                                                                         |
| moulding, pit moulding, machine moulding.                                                                                                                                                                                                                                                                                                                                                                                                 |
| 3.3 Casting: 06 Marks                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Furnaces: Construction and working of cupola furnace, electric arc                                                                                                                                                                                                                                                                                                                                                                        |
| furnace Methods & applications of - Centrifugal casting, shell                                                                                                                                                                                                                                                                                                                                                                            |
| moulding, investment casting, Casting defects - Causes & remedies.                                                                                                                                                                                                                                                                                                                                                                        |
| <b>3.4</b> Hot chamber and cold chamber die casting, Die casting defects - Causes &                                                                                                                                                                                                                                                                                                                                                       |
| remedies. 04 Marks                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 4. Welding                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Specific Objectives:                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <ul> <li>To define Arc welding and Gas welding Principal.</li> <li>To state difference between soldering and brazing processes</li> </ul> |           |     |
|-------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----|
| Content                                                                                                                                   |           |     |
| 4.1 Introduction & classification of welding processes -                                                                                  |           |     |
| Gas welding, carbon arc welding, shielded metal arc welding, TIG                                                                          |           |     |
| welding, MIG welding, plasma arc welding, resistance welding types-                                                                       |           |     |
| spot, seam projection, Electron beam welding, laser beam welding.                                                                         |           |     |
| welding defects. <b>10 Marks</b>                                                                                                          |           |     |
| 4.2 Introduction to soldering and brazing –                                                                                               |           |     |
| Process, fillers, heating methods & applications. 04 Marks                                                                                |           |     |
| 5. Machining Operations                                                                                                                   |           |     |
| Specific Objectives:                                                                                                                      |           |     |
| > To state the working principal of lathe and drilling machines.                                                                          |           |     |
| > To list out various operations performed on lathe and drilling                                                                          |           |     |
| machines                                                                                                                                  |           |     |
| Content                                                                                                                                   |           |     |
| 5.1 Lathe Machine: 12 Marks                                                                                                               |           | 20  |
| Introduction, classification and basic parts of center lathe & their                                                                      | 10        |     |
| functions, Lathe operations like facing, plain turning, taper turning, thread                                                             | 10        |     |
| cutting, chamfering, grooving, knurling. Cutting tool nomenclature & tool                                                                 |           |     |
| signature, cutting parameters.                                                                                                            |           |     |
| 5.2 Drilling Machine: 08 Marks                                                                                                            |           |     |
| Introduction, classification, basic parts of radial drilling machine and their                                                            |           |     |
| functions, twist drill nomenclature, drilling machine operations like                                                                     |           |     |
| drilling, reaming, boring, counter sinking, counter boring, spot facing.                                                                  |           |     |
| Cutting parameters.                                                                                                                       |           |     |
| 6. Plastic Moulding:                                                                                                                      |           |     |
| Specific Objectives:                                                                                                                      |           |     |
| To state different properties of plastics                                                                                                 |           |     |
| To explain various plastic mauling methods like Injection, blow,                                                                          |           |     |
| compression molding                                                                                                                       | 05        | 10  |
| Content                                                                                                                                   |           |     |
| Introduction, Properties of plastics, types of plastics, plastic moulding                                                                 |           |     |
| methods - compression moulding, injection moulding, blow moulding,                                                                        |           |     |
| extrusion, vacuum forming and calendaring.                                                                                                |           |     |
| Tota                                                                                                                                      | <b>48</b> | 100 |

# **Practical:**

Skills to be developed:

# Intellectual skills:

- 1) Identify basic manufacturing processes like forging, rolling and extrusion, for required component.
- 2) Specify need of pattern allowances.
- 3) Decide process parameters for different operations.
- 4) Decide tools required for a manufacturing process.
- 5) Identify a joining method for fabrication.

#### **Motor Skills:**

1) Operate lathe, drilling machine.

- 2) Set the tool and select the cutting parameters for machining operations.
- 3) Set the tools, job and decide cutting parameters.
- 4) Inspect various dimensions of jobs by using measuring instruments.
- 5) Make simple wooden / thermocole pattern.

## List of Practical:

- 1) One turning job on lathe containing the operations like plain turning, step turning, taper turning, grooving, knurling and chamfering.
- 2) One job using Spot welding machine. (Min. 4 spots on 0.5-1mm thick metal strip.)
- 3) One simple job on TIG / MIG welding setup or visit to TIG / MIG welding shop.
- 4) Moulding practice for any one pattern.
- 5) Industrial visit to observe plastic processing shop and report on the visit.
- 6) One composite job containing the operations like lathe with axial & across drilling (like Nut- Bolt assembly or any other equivalent job).
- 7) Demonstration of eccentric turning using four jaw chuck.

#### Notes:

- 1] The workshop instructors should prepare specimen job in each shop as demonstration practice before the student (as per the drawing given by subject teacher/ workshop superintendent).
- 2] Theory behind practical is to be covered by the concerned subject teacher/ workshop superintendent.
- 3] Workshop diary should be maintained by each student duly signed by respective shop instructors.
- 4] Assignments are to be assessed by the concerned subject teacher/ workshop superintendent.

# **Guidelines for conducting Practical Examination for MANUFACTURING PROCESSES**

- 1. The job drawing must be jointly decided by the External and Internal examiner prior to one day in advance from the commencement of practical examination. Every student should be supplied the copy of job drawing before examination.
- 2. Time for practical examination should be **THREE HOURS.**
- 3. Practical examination of the students shall consists of Turning job containing different operations like Facing, straight Turning, Taper turning, Chamfering, Knurling, Threading, Grooving. (Minimum 5 operations) Students will perform the job as per the drawing provided to them.
- 4. Raw material size Bar dia. 40 to 50 mm, length 80 to 100 mm.

# Learning Resources:

Books:

| Sr.<br>No. | Author                              | Title                                            | Publisher                                 |
|------------|-------------------------------------|--------------------------------------------------|-------------------------------------------|
| 01         | S. K. Hajra Chaudhary,<br>Bose, Roy | Elements of workshop<br>Technology-Volume I & II | Media Promoters and<br>Publishers Limited |
| 02         | O. P. Khanna & Lal                  | Production Technology<br>Volume- I & II          | Production Technology<br>Volume- I & II   |

#### w.e.f Academic Year 2012-13

#### 'G' Scheme

|    |                                   |                                         | Dhanpat Rai Publications |
|----|-----------------------------------|-----------------------------------------|--------------------------|
| 03 | W. A. J. Chapman, S. J.<br>Martin | W. A. J. Chapman, S. J.<br>Volume –I,II | Viva Books (p) Ltd.      |
| 04 | O.P. Khanna                       | A text book of Foundry Tech.            | Dhanpat Rai Publications |
| 05 | H.S. Bawa                         | Workshop Technology<br>Volume- I & II   | Tata McGraw-Hill         |
| 06 | P.C. Sharma                       | Production Engineering                  | S. Chand Publications    |

Course Name : Mechanical Engineering Group Course code : ME/MH/MI/PG/PT Semester : Fourth Subject Title : Electrical Engineering Subject Code : 17404

#### **Teaching and Examination Scheme:**

| Teac | ching Scł | neme | Examination Scheme |     |    |    |     |       |
|------|-----------|------|--------------------|-----|----|----|-----|-------|
| TH   | TU        | PR   | PAPER<br>HRS.      | TH  | PR | OR | TW  | TOTAL |
| 03   |           | 02   | 03                 | 100 |    |    | 25@ | 125   |

NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

This subject is introduced with intention to teach students of mechanical branch facts, concepts, principles and procedure of operating electrical machines, circuits and systems and their applications. This subject is most important in regards to selection of electrical drives for various applications and will provide sufficient knowledge about electrical machines, equipments used in industry/field. This subjects deals with measurements of electrical quantities to judge the performance of electrical machines

#### **General Objectives:**

Student will be able to:

- 1. Differentiate between a.c. and d.c. supply.
- 2. Identify different type's motors, transformers and drives.
- 3. Select suitable drive as per the requirements.
- 4. Understand various types of electric heating and welding operations in manufacturing processes.
- 5. Supervise routine maintenance of electrical machines and supply systems.
- 6. Use the tariff system.
- 7. Calculate energy requirements and cost of energy.

# **Learning Structure:**



#### Theory:

| Topic and Content                                                                                              | Hours | Marks |
|----------------------------------------------------------------------------------------------------------------|-------|-------|
| 1. Introduction to Electric Power System and A. C. Supply 20 Marks                                             |       |       |
| Specific Objectives:                                                                                           |       |       |
| Student will be able to :                                                                                      |       |       |
| > State various components of power system.                                                                    |       |       |
| Distinguish between a.c. and d.c. supply.                                                                      |       |       |
| <ul> <li>Calculate electrical quantities of a c supply and circuit parameters of R-L</li> </ul>                |       |       |
| and R-C circuits                                                                                               |       |       |
| <ul> <li>Calculate line and phase quantities and various powers in three phase circuit</li> </ul>              |       |       |
| Contents: Introduction 04 Marks                                                                                |       |       |
| 1.1 Electrical power supply system generation, transmission, distribution. AC supply & DC Supply.              | 10    | 20    |
| AC Fundamentals: 08 Marks                                                                                      |       |       |
| 1.2 Definitions: cycle frequency phase period maximum value average value                                      |       |       |
| r m s value (Simple Numericals)                                                                                |       |       |
| 1.3 Concept of current voltage power & energy in series R-L and R-C circuits                                   |       |       |
| (Simple Numericals)                                                                                            |       |       |
| (Simple Numericals)                                                                                            |       |       |
| 1 4 Star and Dolta circuit                                                                                     |       |       |
| 1.4 Star and Dena circuit,                                                                                     |       |       |
| Numericels)                                                                                                    |       |       |
| Numericals)                                                                                                    |       |       |
| 2. Measuring Instruments: 00 Marks                                                                             |       |       |
| Specific Objectives:                                                                                           |       |       |
| Student will be able to :                                                                                      |       |       |
| Differentiate between ac and dc meters.                                                                        |       |       |
| > Use multimeter for measurements of current, voltage and passive                                              | 0.4   | 0.6   |
| parameter.                                                                                                     | 04    | 06    |
| Contents:                                                                                                      |       |       |
| 2.1 Introduction to construction, operation and use of AC and DC ammeter, voltmeter (PMMC and MI meters only). |       |       |
| 2.2 Electro-dynamic wattmeter, energy meter and digital multimeter, Clip on                                    |       |       |
| meter.                                                                                                         |       |       |
| 3. DC Motor 04 Marks                                                                                           |       |       |
| Specific Objectives:                                                                                           |       |       |
| Student will be able to :                                                                                      |       |       |
| State working principle of d.c. motor.                                                                         |       |       |
| Select type of d.c. motor as per requirement.                                                                  | 02    | 04    |
| Contents:                                                                                                      |       |       |
| 3.1 Construction and principle of operation.                                                                   |       |       |
| 3.2 Speed-torque characteristics. D.C. shunt, series and compound motors. Their                                |       |       |
| specifications and applications.                                                                               |       |       |
| 4. Transformer: 14 Marks                                                                                       |       |       |
| Specific Objectives:                                                                                           |       |       |
| Student will be able to :                                                                                      |       |       |
| > State the working principle of transformer.                                                                  | 0.5   |       |
| Calculate transformation ratio, efficiency and regulation from direct load                                     | 06    | 14    |
| test.                                                                                                          |       |       |
| Contents:                                                                                                      |       |       |

| 4.1 Construction and principle of operation.                                                                                                                             |    |    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|
| 4.2 EMF equation and transformation ratio.                                                                                                                               |    |    |
| 4.3 Load test for efficiency and regulation. Specifications and rating.                                                                                                  |    |    |
| 4.4 Auto transformer & 3 phase transformer concept only.                                                                                                                 |    |    |
| 4.5 Applications of transformers.                                                                                                                                        |    |    |
| 5. AC Motor: 24 Marks                                                                                                                                                    |    |    |
| Specific Objectives:                                                                                                                                                     |    |    |
| Student will be able to :                                                                                                                                                |    |    |
| > Describe working principle of three phase induction motor                                                                                                              |    |    |
| <ul> <li>Calculate slip and rotor frequency and draw speed-torque curves</li> </ul>                                                                                      |    |    |
| <ul> <li>Use starter for three phase induction motor</li> </ul>                                                                                                          |    |    |
| <ul> <li>State the working principle of single phase induction motor and its types</li> </ul>                                                                            |    |    |
| <ul> <li>Select proper type of single phase induction motor</li> </ul>                                                                                                   |    |    |
| Contents                                                                                                                                                                 |    |    |
| 5.1 Three Phase Induction Motor 10 Marks                                                                                                                                 |    |    |
| Construction and principle of operation of 3 phase induction motor                                                                                                       |    |    |
| <ul> <li>Construction and principle of operation of 5 phase induction motor.</li> <li>Speed torque abaracteristics, slip, speed control of Induction Motor by</li> </ul> |    |    |
| Speed torque characteristics, slip, speed control of induction Motor by variable frequency drive (VED) working, principle and block diagram                              |    |    |
| variable frequency drive( vFD)-working principle and block diagram                                                                                                       | 10 | 24 |
| only, Reversal of rotation (Simple Numerical on speed and sip                                                                                                            | 10 | 24 |
| calculations)                                                                                                                                                            |    |    |
| Starters-Direct ON Line Starters and Star-Delta Starters-Working                                                                                                         |    |    |
| principle, circuit diagram and applications.                                                                                                                             |    |    |
| 5.2 Single Phase Induction Motors 04 Marks                                                                                                                               |    |    |
| a) Capacitor start, b) Capacitor start and run, c) Shaded pole                                                                                                           |    |    |
| 5.3 Other Motors: 06 Marks                                                                                                                                               |    |    |
| Study the following motors with respect to specifications and rating,                                                                                                    |    |    |
| construction and applications.                                                                                                                                           |    |    |
| > Universal motor                                                                                                                                                        |    |    |
| > Servo motor                                                                                                                                                            |    |    |
| > Stepper motor                                                                                                                                                          |    |    |
| 5.4 Alternator: 04 Marks                                                                                                                                                 |    |    |
| Construction, principle of operation & applications. Self and separate excitation.                                                                                       |    |    |
| 6.Utilization of Electrical Energy: 18 Marks                                                                                                                             |    |    |
| Specific Objectives:                                                                                                                                                     |    |    |
| Student will be able to :                                                                                                                                                |    |    |
| Classify and select electric drives on the basis of speed-torque                                                                                                         |    |    |
| characteristics and enclosures.                                                                                                                                          |    |    |
| State the working principle of electric heating, welding and electroplating.                                                                                             |    |    |
| ➢ Use electric motor for electro-agro system.                                                                                                                            |    |    |
| Contents:                                                                                                                                                                |    |    |
| 6.1 Industrial Applications: 04 Marks                                                                                                                                    | 08 | 18 |
| Classification of drives                                                                                                                                                 |    |    |
| Factors for selection of motor for different drives.                                                                                                                     |    |    |
| Types of enclosures.                                                                                                                                                     |    |    |
| 6.2 Electric Heating & Welding: 10 Marks                                                                                                                                 |    |    |
| Working principle & types of heating and welding and their applications.                                                                                                 |    |    |
| 6.3 Electrometallurgical & Electro Agro Systems: 04 Marks                                                                                                                |    |    |
| Concept and principle used in electroplating.                                                                                                                            |    |    |
| Electrical machines used in electro-agro systems.                                                                                                                        |    |    |
| 7.Electric Wiring, Illumination, Electric Safety, Tariff & Power                                                                                                         |    |    |
| Conservation : 14 Marks                                                                                                                                                  | 08 | 14 |
| Specific Objectives:                                                                                                                                                     |    |    |

| Student will be able to :                                                 |      |    |     |  |
|---------------------------------------------------------------------------|------|----|-----|--|
| Do wiring of switchboards.                                                |      |    |     |  |
| Select type of lamp as per requirement.                                   |      |    |     |  |
| State the importance of MCB and ELCB and electric safety.                 |      |    |     |  |
| Explain the need of earthing and importance of pf. improvement.           |      |    |     |  |
| Contents:                                                                 |      |    |     |  |
| 7.1 Introduction to switches used in mechanical machines. Simple Electric |      |    |     |  |
| Installations with 2 sockets, 2 fans, 2 lamps, with switches and fuses    |      |    |     |  |
| 7.2 Introduction to different accessories like MCB, ELCB, wires & cables. |      |    |     |  |
| 7.3 Fluorescent, CFL and LED lamps with their ratings and applications.   |      |    |     |  |
| 7.4 Concept of energy conservation and energy audit                       |      |    |     |  |
| 7.5 Necessity of earthing, type, safety tools, first aid.                 |      |    |     |  |
| 7.6 Types of tariff, pf improvement only methods.                         |      |    |     |  |
| 7.7 Fire extinguishing methods adopted in electrical engineering          |      |    |     |  |
| 7.8 Trouble shooting electrical installations and machines.               |      |    |     |  |
| Т                                                                         | otal | 48 | 100 |  |

## Skills to be developed for practical:

#### Intellectual skills

#### Student will be able to:

- 1. Identify and give specifications of electrical motors and transformers.
- 2. Interpret wiring diagrams for various applications.
- 3. Identify safety equipments required.
- 4. Decide the procedure for setting experiments.

# Motor skills:

#### Student will be able to:

- 1. Draw wiring diagram
- 2. Make wiring connections to connect electrical equipments and instruments.
- 3. Measure electrical power, earthing resistance and other electrical quantities.
- 4. Calibrate electrical instruments.
- 5. Use of safety devices while working.
- 6. Prepare energy consumption bill with present tariff structure.

# **List of Practical:**

- 1. Know your electrical laboratory.
- 2. Find the performance of R-L series circuit with single phase A.C. supply and determine the current, power and power factor.
- 3. Find the performance of R-C series circuit with single phase A.C. supply and determine the current, power and power factor.
- 4. Verify the relationship between line and phase values of voltages and currents in three phase balanced star and delta connected load.

- 5. Determine efficiency and single phase transformer at no load, half load and full load by conducting load test.
- 6. Determination of slip of three phase induction motor by use of tachometer at no load and full load.
- 7. Observe the change in direction of rotation of three phase induction motor by changing the phase sequence R-Y-B
- 8. Prepare switch board for two lamps, one fan, one fan regulator and one 5 ampere socket.
- 9. Connect single phase energy meter in simple lamp circuit for measurement of energy consumption for one hour.
- 10. Search fault in faulty machines or installation.
- 11. Demonstration of servo motor and stepper motor.

# [Note: Practicals 1 to 9 shall be performed by 2 students and practical 10 in a group of 4 students]

# Assignment:

- 1. **Industrial visit:** Visit to show various motors, electrical devices, accessories used in mechanical industrial applications like dairy, crushers, dall mill, oil mill or small scale unit. [The group size is as suggested by industry]
- 2. Detail study of electrical motors manufacture's catalogues to study mounting installation, frame work, coupling, rotor inertia etc. [To be performed individually]

# NOTE: All Practicals and assignment are compulsory and should be considered in assessment formats A1, A2 And So On.

| I. BOOKS |                       |                                                     |                     |               |
|----------|-----------------------|-----------------------------------------------------|---------------------|---------------|
| Sr.No.   | Author                | Title Of Book                                       | Edition             | Publisher     |
| 01       | D.I. Thoraia          | Electrical Technology                               | Multicolour Edition | S.Chand & Co. |
| 01       | B.L. Theraja          | (Vol. I and IV)                                     | Subsequent Reprint  | Delhi         |
| 02       | E. Hughes             | Electrical Technology                               | Second Edition      | ELBS/Pearson  |
| 03       | R.S. Ananda<br>Murthy | Basic Electrical<br>Engineering                     | Second Edition      | Pearson       |
| 04       | Theodore<br>Wildi     | Electrical Machines,<br>Drives and Power<br>Systems | Sixth Edition       | Pearson       |
| 05       | Sunil T. Gaikwad      | Basic Electrical<br>Engineering                     | First Edition       | WILEY India   |

#### Learning Resources:

#### 2. Websites:

www.wikipedia.com www.youtube.com www.narosa.com www.dreamtechpress.com Course Name : Diploma in Production Engineering Course Code : PG/PT Semester : Fourth Subject Title : Heat Engineering Subject Code : 17406

## **Teaching and Examination Scheme:**

| Teac | ching Scl | neme | Examination Scheme |     |    |     |     |       |
|------|-----------|------|--------------------|-----|----|-----|-----|-------|
| TH   | TU        | PR   | PAPER<br>HRS       | TH  | PR | OR  | TW  | TOTAL |
| 04   |           | 02   | 03                 | 100 |    | 25# | 25@ | 150   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)

#### **Rationale:**

Production Engineer is involved in manufacturing aspects of power producing and power absorbing devices. I.C. Engines are used on large scale in automobiles and power sector. Compressors find many applications due to automation. Use of refrigeration and air-conditioning systems is increasing in industrial and domestic fields. Knowledge of working of these devices can help him in improving the performance of these devices.

#### **Objectives:**

The Student will be able to:

- 1. Understand construction and working of Boilers and turbines.
- 2. Understand constructional features of air compressor.
- 3. Know the applications of refrigeration.
- 4. Classify air-conditioning systems

#### **Learning Structure:**



# **Theory Content:**

| Topic and Contents                                                                      | Hours | Marks |
|-----------------------------------------------------------------------------------------|-------|-------|
| 1. Sources of energy 10Marks                                                            |       |       |
| Specific objectives                                                                     |       |       |
| State the various types and sources of energy.                                          |       |       |
| Content:                                                                                |       |       |
| 1.1 Brief description of energy Sources.                                                |       |       |
| 1.2 Classification of energy sources                                                    |       |       |
| • Renewable-                                                                            | 08    | 10    |
| Solar- Flat plate and concentrating collectors and its application. Wind,               |       |       |
| Tidal, Geothermal, Biogas, Biomass, Bio-diesel, Hydraulic,                              |       |       |
| Photovoltaic Cell, Solar Water Heater, Solar Distillation.                              |       |       |
| • Non-Renewable-                                                                        |       |       |
| Fossil fuels, including CNG, LPG, Nuclear                                               |       |       |
| 1.3 Fuel cell – Types of fuel cells                                                     |       |       |
| 2.Fundamentals of Thermodynamics 20 Marks                                               |       |       |
| Specific objectives:                                                                    |       |       |
| State laws of thermodynamics.                                                           |       |       |
| Content:                                                                                |       |       |
| 2.1 Concepts of pure substance, types of system, properties of system,                  |       |       |
| Extensive and Intensive properties with units and their conversion.                     | 14    | 20    |
| 06 Marks                                                                                | 17    | 20    |
| 2.2 WORK and Energy - Thermodynamic definition of work, heat, difference                |       |       |
| onthalay                                                                                |       |       |
| <b>23 Laws of Thermodynamics -</b> Zeroth Law, First law - Principle of                 |       |       |
| conservation of energy irreversibility second law entropy <b>08 Marks</b>               |       |       |
| (Note: Simple numerical may be asked )                                                  |       |       |
| 3. Ideal Gases 16 Marks                                                                 |       |       |
| Specific objectives:                                                                    |       |       |
| Describe thermodynamic processes of the gases.                                          |       |       |
| Content:                                                                                |       |       |
| <b>3.1 Concept of Ideal gas -</b> Charle's law, Boyle's law, Avogadro's law,            |       |       |
| equation of state, characteristic gas constant and universal gas constant.              | 08    | 16    |
|                                                                                         |       |       |
| 08 Marks                                                                                |       |       |
| <b>3.2 Ideal gas processes</b> - Isobaric, Isochoric, Isothermal, Adiabatic, Polytropic |       |       |
| with representation of the processes on P-V and T-S diagrams <b>08 Marks</b>            |       |       |
| (Note: Simple numerical may be asked.)                                                  |       |       |
| 4.Boilers and Steam Turbines 12 Marks                                                   |       |       |
| Specific objectives:                                                                    |       |       |
| Contents                                                                                |       |       |
| Content:                                                                                | 08    | 12    |
| 4.1 Infroduction and classification of Doners.                                          |       |       |
| 4.2 Construction and working of impulse and reaction turbines                           |       |       |
| 4.4 Introduction to steam power plant                                                   |       |       |
| 5 I C Engines 14 Marks                                                                  |       |       |
| Specific objectives:                                                                    | 08    | 14    |
| > Describe working of I C engine.                                                       | 00    |       |

| Content:                                                                      |    |     |
|-------------------------------------------------------------------------------|----|-----|
| 5.1 Classification of I.C. Engines.                                           |    |     |
| 5.2 Construction, working and comparison of two stroke and four stroke petrol |    |     |
| and diesel engines.                                                           |    |     |
| 6. Air Compressors 14 Marks                                                   |    |     |
| Specific objectives:                                                          |    |     |
| State the types and working of compressors.                                   |    |     |
| Content:                                                                      |    |     |
| 6.1 Introduction and classification of air compressor.                        | 10 | 14  |
| 6.1 Uses of compressed air.                                                   | 10 |     |
| 6.2 Construction and working of single stage and two stage reciprocating      |    |     |
| compressor.                                                                   |    |     |
| 6.3 Screw compressor and centrifugal compressor- construction, working and    |    |     |
| applications.                                                                 |    |     |
| 7. Refrigeration and Air-conditioning 14 Marks                                |    |     |
| Specific objectives:                                                          |    |     |
| Explain refrigeration cycle.                                                  |    |     |
| Describe working of air conditioner.                                          |    |     |
| Content:                                                                      | 08 | 14  |
| 7.1 Vapour compression cycle.                                                 |    |     |
| 7.2 Components of vapour compression cycle and its application.               |    |     |
| 7.3 Classification of air conditioning systems.                               |    |     |
| 7.4 Window Air Conditioner.                                                   |    |     |
| Total                                                                         | 64 | 100 |

## Practical:

Skills to be developed:

#### **Intellectual Skills:**

- 1. Plan for trial test.
- 2. Calculate derived parameters.

#### Motor Skills:

- 1. Operate I.C. Engines.
- 2. Observe and sketch boiler mountings and accessories.
- 3. Test reciprocating air compressor and take measurements.

#### List of Practical:

- 1. Trial on domestic solar water heater and calculate its efficiency.
- 2. Trace and draw the flue gas path and water steam circuit with the help of boiler model.
- 3. Trial on single/multi cylinder petrol or diesel engine with heat balance sheet.
- 4. Measurement of I.C. Engine pollutants with the help of Exhaust gas Analyzer.
- 5. Trial on single / two-stage Reciprocating compressor and determine volumetric, isothermal efficiency.
- 6. Trial on Refrigeration Test Rig for calculation of C.O.P, power required, refrigerating effect.
- 7. Identification of the components and trace the flow of refrigerant in domestic refrigerator/window air conditioner.

8. Visit to sugar factory/biogas plant/solar system/wind mills and draw the block diagram of plant layout and system.

# Learning Resources: Books:

# Books:

| Sr.<br>No. | Author              | Title                    | Publisher                                      |
|------------|---------------------|--------------------------|------------------------------------------------|
| 01         | V.M. Domkundwar     | Thermal Engg.            | Dhanpat Rai and Co                             |
| 02         | P.L. Ballaney       | Thermal Engg.            | Khanna Publishers 24 <sup>th</sup> edition     |
| 03         | R. S. Khurmi        | Thermal Engg.            | S. Chand and Co. Ltd. 15 <sup>th</sup> edition |
| 04         | R. K. Rajput        | Thermal Engg.            | Laxmi Publication, Delhi                       |
| 05         | Patel, Karmchandani | Heat Engine Vol.I and II | Achrya publication                             |
| 06         | P.K. Nag            | Engg. Thermodynamics     | Tata McGraw Hill 23 <sup>rd</sup> edition      |

Course Name : Mechanical Engineering GroupCourse Code : ME/MH/MI/PG/PT/FE/FGSemester : FourthSubject Title : Fluid Mechanics and MachinerySubject Code : 17411

## **Teaching and Examination Scheme:**

| Teac | hing Scl | neme |              |     | Examinati | on Scheme |     |       |
|------|----------|------|--------------|-----|-----------|-----------|-----|-------|
| TH   | TU       | PR   | PAPER<br>HRS | TH  | PR        | OR        | TW  | TOTAL |
| 04   |          | 02   | 03           | 100 | 25#       |           | 25@ | 150   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Knowledge of fluid properties, fluid flow & fluid machinery is essential in all fields of engineering. Hydraulic machines have important role in water supply, irrigation, power generation and also in most of the engineering segments. This subject requires knowledge of basic engineering sciences, applied mechanics, mathematics etc. The fundamentals of this subject are essential for the subject "Industrial Fluid Power" in sixth semester.

General Objectives: The student will be able to

- 1) **Define** various properties of fluids
- 2) Measure pressure, velocity and flow rate using various instruments.
- 3) State continuity equation, Bernoulli's equation and its applications.
- 4) Estimate various losses in flow through pipes.
- 5) **Explain** concept of impact of jet on various types of vanes.
- 6) **Draw** the construction, working of hydraulic pumps and turbines.
- 7) Evaluate performance of turbines and pumps.

#### **Learning Structure:**



# Theory:

| Topics and Contents                                                                  | Hours | Marks |
|--------------------------------------------------------------------------------------|-------|-------|
| 1. Properties of fluid and Fluid Pressure                                            |       |       |
| Specific Objectives:                                                                 |       |       |
| Define fluid properties.                                                             |       |       |
| Differentiate between fluid pressure intensity and pressure head.                    |       |       |
| Solve numerical related to properties of fluid, fluid pressure and                   |       |       |
| manometers.                                                                          |       |       |
| Contents:                                                                            |       |       |
| 1.1 Properties of Fluid 06 Marks                                                     |       |       |
| Density, Specific gravity, Specific volume, Specific Weight, Dynamic                 |       |       |
| viscosity, Kinematic viscosity, Surface tension, Capillarity, Vapour                 | 12    | 20    |
| Pressure, Compressibility                                                            |       |       |
| 1.2: Fluid Pressure & Pressure Measurement 14 Marks                                  |       |       |
| • Fluid pressure, Pressure head, Pressure intensity                                  |       |       |
| • Conceptof absolute vacuum, gauge pressure, atmospheric pressure,                   |       |       |
| absolute pressure.                                                                   |       |       |
| • Simple and differential manometers, Bourden pressure gauge.                        |       |       |
| • Total pressure, center of pressure- regular surface forces on                      |       |       |
| immersed bodies in liquid in horizontal, vertical and inclined                       |       |       |
| position                                                                             |       |       |
| 2. Fluid Flow                                                                        |       |       |
| Specific Objectives:                                                                 |       |       |
| State Bernoulli's theorem and apply it to venturimeter, orifice and pitot            |       |       |
| tube.                                                                                |       |       |
| Contents:                                                                            |       |       |
| • Types of fluid flows-Laminar, turbulent, steady, unsteady, uniform,                |       |       |
| non uniform, rotational, irrotational.                                               | 10    |       |
| • Continuity equation. Bernoulli's theorem                                           | 10    | 14    |
| • Venturimeter – Construction, principle of working,                                 |       |       |
| coefficient of discharge, Derivation for discharge through                           |       |       |
| venturimeter.                                                                        |       |       |
| • Orifice meter – Construction, Principle of working, hydraulic                      |       |       |
| coefficients. Derivation for discharge through Orifice meter                         |       |       |
| • Pitot tube – Construction, Principle of Working                                    |       |       |
| 3. Flow Through Pipes                                                                |       |       |
| Specific Objectives:                                                                 |       |       |
| State laws of friction and list various losses in flow through pipes.                |       |       |
| Solve numerical on laws of friction and list various losses in flow through          |       |       |
| pipes.                                                                               |       |       |
| Contents:                                                                            | 10    | 14    |
| • Laws of fluid friction (Laminar and turbulent)                                     | 10    | 14    |
| • Darcy's equation and Chezy's equation for frictional losses                        |       |       |
| • Minor losses in fittings and valves                                                |       |       |
| • Hydraulic gradient line and total energy line                                      |       |       |
| Hydraulic power transmission through pipe                                            |       |       |
| Impact of lats                                                                       |       |       |
| Specific Objectives                                                                  | 06    | 10    |
| <ul> <li>Analyze explain the impact of jet on vanes in various conditions</li> </ul> |       | 10    |

| > Solve numerical on impact of jet on vanes in various conditions.                               |    |     |
|--------------------------------------------------------------------------------------------------|----|-----|
| Contents:                                                                                        |    |     |
| • Impact of jet on fixed vertical, moving vertical flat plates.                                  |    |     |
| • Impact of jet on curved vanes with special reference to turbines and                           |    |     |
| pumps                                                                                            |    |     |
| 5. Hydraulic Turbines                                                                            |    |     |
| Specific Objectives:                                                                             |    |     |
| Explain working principle of various hydraulic turbines.                                         |    |     |
| Calculate work done, power generated and various efficiencies of hydraulic                       |    |     |
| turbines.                                                                                        |    |     |
| Contents:                                                                                        |    |     |
| • Layout and features of hydroelectric power plant, surge tanks and its need.                    | 12 | 18  |
| • Classification of hydraulic turbines and their applications.                                   |    |     |
| • Construction and working principle of Pelton wheel, Francis and                                |    |     |
| Kaplan turbine.                                                                                  |    |     |
| <ul> <li>Draft tubes – types and construction, Concept of cavitation in turbines,</li> </ul>     |    |     |
| • Calculation of Work done, Power, efficiency of turbine                                         |    |     |
| 6. Pumps                                                                                         |    |     |
| Specific Objectives:                                                                             |    |     |
| Explain working of centrifugal, reciprocating and multistage pumps.                              |    |     |
| Explain the concept of cavitation in pumps.                                                      |    |     |
| Calculate manometric head, work done and various efficiencies related to                         |    |     |
| the pumps.                                                                                       |    |     |
| Select the pump for a given application.                                                         |    |     |
| 6.1 Centrifugal Pumps 14 Marks                                                                   |    |     |
| Contents:                                                                                        |    |     |
| • Construction, principle of working, priming methods and Cavitation                             |    |     |
| • Types of casings and impellers.                                                                |    |     |
| <ul> <li>Manometric head, Work done, Manometric efficiency, Overall efficiency, NPSH.</li> </ul> | 14 | 24  |
| • Performance Characteristics of Centrifugal pumps.                                              |    |     |
| • Trouble Shooting.                                                                              |    |     |
| <ul> <li>Construction, working and applications multistage pumps</li> </ul>                      |    |     |
| • Submersible pumps and jet pump                                                                 |    |     |
| 6.2 Reciprocating Pump 10 Marks                                                                  |    |     |
| • Construction, working principle and applications of single and                                 |    |     |
| double acting reciprocating pumps.                                                               |    |     |
| • Slip, Negative slip, Cavitation and separation.                                                |    |     |
| • Use of Air Vessels.                                                                            |    |     |
| • Indicator diagram with effect of acceleration head & frictional head.                          |    |     |
| (No numerical on reciprocating pumps)                                                            |    |     |
| Total                                                                                            | 64 | 100 |

#### Practical: Skills to be developed: Intellectual Skills:

1) Select appropriate flow and pressure measuring devices for a given situation.

2) Analyze the performance of pumps and turbines.

## Motor Skills:

- 1) Use flow and pressure measuring devices.
- 2) Operate pumps and turbines.

# List of Practicals:

- 1. Measure water pressure by using Bourdon's pressure gauge and U-tube Manometer. Also measure discharge of water by using measuring tank and stop watch.
- 2. Calibrate Bourdon's pressure gauge with the help of Dead weight pressure gauge.
- 3. Verify Bernoulli's theorem.
- 4. Determine Coefficient of Discharge of Venturimeter.
- 5. Determine coefficient of Discharge, Coefficient of Contraction and Coefficient of Velocity of Sharp edged circular orifice.
- 6. Determine Darcy's friction factor 'f' in pipes of three different diameters for four different discharges.
- 7. Determine minor frictional losses in pipe fittings.
- 8. Determine overall efficiency of Pelton wheel by using Pelton wheel test rig.
- 9. Determine overall efficiency of Centrifugal Pump & plot its operating characteristics by using Centrifugal pump test rig.
- 10. Determine overall efficiency of Reciprocating pump by using Reciprocating Pump test rig.

# Assignments

1. Information collection of Centrifugal, reciprocating, multistage pumps and submersible pumps from local market and from internet. Comparison of various models manufactured by different manufacturers. [The market survey is to be completed in a group of (max.) three to four students and the report of the same is to be included as part of term work.]

| DOORS     | •                                 |                                                                               |                                  |
|-----------|-----------------------------------|-------------------------------------------------------------------------------|----------------------------------|
| Sr.<br>No | Author                            | Title                                                                         | Publication                      |
| 01        | Ojha, Berndtsson,<br>Chnadramouli | Fluid Mechanics and Machinery                                                 | Oxford University Press          |
| 02        | Som S K , Biswas G.               | Introduction to Fluid Mechanics<br>and Fluid Machines 3 <sup>rd</sup> Edition | Tata McGraw-Hill Co.<br>Ltd.     |
| 03        | Modi P.N. Seth<br>S M             | Hydraulics and Fluid Mechanics<br>including Hydraulic Machines                | Standard Book House<br>New Delhi |
| 04        | Subramanya K.                     | Fluid Mechanics and Hydraulic<br>Machines: problems and solution              | Tata McGraw-Hill Co.<br>Ltd.     |
| 05        | Product catalogues of v           | various pump manufacturers                                                    | ·                                |

#### Learning Resources: Books:

Course Name : Mechanical Engineering Group Course code : AE/ME/MH/MI/PG/PT Semester : Fourth Subject Title : Theory of Machines Subject Code : 17412

## **Teaching and Examination Scheme:**

| Teac | ching Scł | neme | Examination Scheme |     |    |    |     |       |
|------|-----------|------|--------------------|-----|----|----|-----|-------|
| TH   | TU        | PR   | PAPER<br>HRS.      | TH  | PR | OR | TW  | TOTAL |
| 03   |           | 02   | 03                 | 100 |    |    | 25@ | 125   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

It is a core technology subject in Mechanical Engineering Discipline. Mechanical Engineers often come across various machines in practice. They should be able to identify and interpret various elements of machines in day to day life. In maintaining various machines, a diploma engineer should have sound knowledge of fundamentals of machine and mechanism. It will be helpful for them to understand the mechanisms from operational point of view in a better way. This subject imparts the kinematics involved in different machine elements and mechanisms like gear, cam-follower, follower, belt-pulley, flywheel, brake, dynamometer, clutch, etc.

Detailed knowledge of these aspects with deep insight into the practical applications develops a professional confidence in them to become successful Engineer.

This subject serves as a prerequisite for subjects like Machine Design to be learned in higher semester.

#### **Objectives:**

#### The student will be able to:

- 1. Understand different machine elements and mechanisms.
- 2. Understand Kinematics and Dynamics of different machines and mechanisms.
- 3. Draw cam profile suitable to various displacement diagram.
- 4. Select Suitable Drives and Mechanisms for a particular application
- 5. Understand the function, operation and application of flywheel and governor.
- 6. Understand the function, operation and application of brake, dynamometer, clutch and bearing

7. Find magnitude and plane of unbalanced forces.

# Theory:

| Topic and Content                                                                                                                     | Hours | Marks |
|---------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
| 1. Fundamentals and type of Mechanisms                                                                                                |       |       |
| Specific objectives:                                                                                                                  |       |       |
| Define various terms related to mechanisms.                                                                                           |       |       |
| Explain construction and working of various mechanisms                                                                                |       |       |
| 1.1 Kinematics of Machines:- Definition of Kinematics, Dynamics, statics,                                                             |       |       |
| Kinetics, Kinematic link, Kinematic pair and its types, constrained motion                                                            |       |       |
| and its types, Kinematic chain and its types, Mechanism, inversion, machine                                                           |       |       |
| and structure 8 Marks                                                                                                                 | 07    | 10    |
| 1.2 Inversion of Kinematic Chain                                                                                                      | 07    | 16    |
| • Inversion of four bar chain, coupled wheels of Locomotive, Beam engine, Pantograph.                                                 |       |       |
| • Inversion of single slider Crank chain –Pendulum pump, Rotary I.C.                                                                  |       |       |
| Engine mechanism. Oscillating cylinder engine. Whitworth quick return                                                                 |       |       |
| mechanism. Quick return mechanism of shaper.                                                                                          |       |       |
| • Inversion of Double Slider Crank Chain- Scotch Yoke Mechanism.                                                                      |       |       |
| Elliptical trammel. Oldham's Coupling8 Marks                                                                                          |       |       |
| 2. Velocity and Acceleration in Mechanisms                                                                                            |       |       |
| Specific objectives                                                                                                                   |       |       |
| Draw velocity and acceleration diagram for given mechanism                                                                            |       |       |
| 2.1 Concept of relative velocity and relative acceleration of a point on a link,                                                      |       |       |
| angular acceleration, inter-relation between linear and angular velocity and                                                          |       |       |
| acceleration.                                                                                                                         |       |       |
| 2.2 Analytical method (No derivation) and Klein's construction to determine                                                           | 08    | 16    |
| velocity and acceleration of different links in single slider crank mechanism.<br>8 Marks                                             |       |       |
| 2.3 Drawing of velocity and acceleration diagram of a given configuration,                                                            |       |       |
| diagrams of simple Mechanism. Determination of velocity and acceleration                                                              |       |       |
| of point on link by relative velocity method(Excluding Coriollis component                                                            |       |       |
| of acceleration) 8 Mark                                                                                                               |       |       |
| 3. Cams and Followers                                                                                                                 |       |       |
| Specific objectives                                                                                                                   |       |       |
| Define the terms related to Cam                                                                                                       |       |       |
| Classify Cams and Followers                                                                                                           |       |       |
| Draw cam profile as per the given applications                                                                                        |       |       |
| 3.1 Concept, definition and applications of Cams and Followers. Cam                                                                   |       |       |
| terminology                                                                                                                           | 06    | 12    |
| 3.2 Classification of Cams and Followers.                                                                                             | 00    | 12    |
| 3.3 Different follower motions and their displacement diagrams - Uniform                                                              |       |       |
| velocity, Simple harmonic motion, uniform acceleration and Retardation.                                                               |       |       |
| 4 Marks                                                                                                                               |       |       |
| 3.4 Drawing of profile of radial cam with knife-edge and roller follower with and                                                     |       |       |
| without offset with reciprocating motion (graphical method)                                                                           |       |       |
| ð Marks                                                                                                                               |       |       |
| 4. Power Transmission                                                                                                                 |       |       |
| Specific objectives                                                                                                                   | 10    | 20    |
| <ul> <li>Give broad classification of Drives.</li> <li>Select Switchle Drives and Machanisms for a nerticular application.</li> </ul> |       |       |
| $\sim$ select suitable prives and viechamisms for a particular application                                                            |       |       |

| Calculate various quantities like velocity ratio, belt tensions, slip, angle of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            |    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----|
| contact, power transmitted in belt drives                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |            |    |
| 4.1 Belt Drives- flat belt, V-belt & its applications, material for flat and V-belt.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |            |    |
| Selection of belts, angle of lap, length of belt, Slip and creep. Determination                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            |    |
| of velocity ratio of tight side and slack side tension, centrifugal tension and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            |    |
| initial tension, condition for maximum power transmission (Simple                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |            |    |
| numericals) 8 Marks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |    |
| 4.2 Chain Drives- Types of chains and sprockets, velocity ratio. Advantages &                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |    |
| Disadvantages of chain drive over other drives, Selection of Chain &                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |            |    |
| Sprocket wheels, methods of lubrication 4 Marks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            |    |
| 4.3 Gear Drives – Classification of gears, Law of gearing, gear terminology.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |            |    |
| Types of gear trains, their selection for different applications. Train value &                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            |    |
| velocity ratio for simple, compound, reverted and epicyclic gear trains.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |            |    |
| 8 Marks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |            |    |
| 5. Flywheel and Governors 8 Marks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |            |    |
| Specific objectives                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |    |
| Differentiate between flywheel and governor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |            |    |
| $\blacktriangleright$ Explain with neat sketch the construction and working of various                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |    |
| governors                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |            |    |
| 5.1 Flywheel –Concept, function and application of flywheel with the help of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |            |    |
| turning moment diagram for single cylinder 4-Stroke I.C Engine (no                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 04         | 08 |
| Numericals)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |            |    |
| Coefficient of fluctuation of energy, coefficient of fluctuation of speed and its                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |            |    |
| significance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |    |
| 5.2 Governors- Types, concept, function and application & Terminology of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |            |    |
| Governors.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |            |    |
| 5.3 Comparison between Flywheel and Governor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |    |
| 6. Brakes and Dynamometers 10Marks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |            |    |
| Specific objectives                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |    |
| List the differences between brakes and dynamometers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |            |    |
| Explain with neat sketch the construction and working of various brakes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |            |    |
| and dynamometers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |            |    |
| Calculate braking force, braking torque and power lost in friction in shoe                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |            |    |
| and band brake                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>2 -</b> | 10 |
| 6.1Function of brakes and Dynamometers, Type of brakes & Dynamometers,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 05         | 10 |
| comparison between brakes & Dynamometer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |            |    |
| 6.2 Construction and working i) shoe brake, ii)Band brake iii) Internal expending                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |            |    |
| shoe brake iv) Disc Brake                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |            |    |
| 6.3 Numerical problems to find braking force and braking torque and power for                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |    |
| shoe and band brake.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |            |    |
| 6.4 Construction and working of 1) Rope brake Dynamometer 11) Hydraulic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |            |    |
| Dynamometer 111) Eddy current Dynamometer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |            |    |
| 7. Clutches and Bearings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |            |    |
| Specific objectives                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |    |
| ► Explain the difference between uniform pressure and uniform wear                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |            |    |
| Evaluin with next skatch the construction of development of the second states of the second s |            |    |
| <ul> <li>Explain with heat sketch, the construction and working of various clutches</li> <li>Coloulate torque required to over some friction and never lost in friction</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 06         | 12 |
| <ul> <li>Calculate torque required to over come inclion and power lost in miction<br/>in clutches and footstep hearings</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1 I        |    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            |    |
| in clutches and looistep bearings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |            |    |
| 7 1 Clutches- Uniform pressure and Uniform Wear theories Function of Clutch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |            |    |
| <ul> <li>7.1 Clutches- Uniform pressure and Uniform Wear theories. Function of Clutch and its application. Construction and working of i) Single plate clutch ii)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |            |    |

| Multiplate clutch, iii) Centrifugal Clutch iv) Cone clutch v) Diaphragm clutch, (Simple numericals on single and Multiplate clutches). |    |     |
|----------------------------------------------------------------------------------------------------------------------------------------|----|-----|
| 7.2 Bearings- i) Simple Pivot, ii) Collar Bearing iii) conical pivot. Torque and                                                       |    |     |
| power lost in friction. (Simple numericals)                                                                                            |    |     |
| 8. Balancing                                                                                                                           |    |     |
| Specific objectives                                                                                                                    |    |     |
| Explain the concept of balancing                                                                                                       | 02 | 06  |
| Find balancing mass and position of plane, analytically and graphically.                                                               | 02 | 00  |
| 8.1 Concept of balancing. Balancing of single rotating mass. Analytical/Graphical                                                      |    |     |
| methods for balancing of several masses revolving in same plane.                                                                       |    |     |
| Total                                                                                                                                  | 48 | 100 |

#### Practicals: Skills to be developed:

# **Intellectual Skills:**

- 1. Determine velocity and acceleration of links in a given mechanism.
- 2. Analyse balancing of rotating masses in a single plane.
- 3. Interpret interrelationship between components of various braking mechanisms.
- 4. Compare various power transmission devices.

## Motor Skills:

- 1. Drawing of velocity and acceleration diagrams.
- 2. Dismantle and assemble given brakes and clutches.
- 3. Draw cam profiles for a given application
- 4. Draw velocity and acceleration diagram of the given mechanisms
- 5. Draw force polygon for unbalanced masses revolving in same plane

Note - The Term work shall consist of Journal / lab manual and A-3 size sketch book.

#### List of Practical:

- 1. Sketch and describe working of quick return mechanism for a shaper. Find the ratio of time of cutting stroke to the return stroke to understand quick return motion in shaping operation.
- 2. Sketch and describe the working of the following mechanisms with its application,
  - a) Bicycle free wheel sprocket mechanism
  - b) Geneva mechanism
  - c) Ackerman's steering gear mechanism
  - d) Foot operated air pump mechanism
- 3. Determine velocity and acceleration of various links of the given two mechanism, by relative velocity method for analysis of motion of links.
- 4. Determine velocity and acceleration in an I. C. engine's slider crank mechanism by Kleins's construction.
- 5. Draw the profile of a radial cam for the given follower type to obtain the desired follower motion.
- 6. Determine slip, length of belt, angle of contact in an open belt drive to understand its performance.
- 7. Draw a schematic diagram of centrifugal governor and describe its working. Draw a graph between radius of rotation versus speed of governor to understand its function.

- 8. Dismantle and assemble mechanically operated braking mechanism of two wheelers.Sketch the two wheeler braking system and identify the functions of various components.
- 9. Dismantle and assemble multi-plate clutch of two wheeler. Draw neat sketch and state the functions of various components.
- 10. Determine graphically counterbalance mass and its direction for complete balancing of a system of several masses rotating in a single plane.

# Learning Resources:

**Books:** 

| Sr.<br>No. | Title              | Author         | Edition | Publication                                     |
|------------|--------------------|----------------|---------|-------------------------------------------------|
| 01         | Theory of Machines | Khurmi Gupta   |         | Eurasia publishing House Pvt. Ltd. 2006 edition |
| 02         | Theory of Machines | S.S. Rattan    | Third   | McGraw Hill companies, II Edition               |
| 03         | Theory of Machines | P.L. Ballaney  |         | Khanna Publication                              |
| 04         | Theory of Machines | Jagdishlal     |         | Bombay metro-politan book limited               |
| 05         | Theory of Machines | Sadhu Singh    | Second  | Pearson                                         |
| 06         | Theory of Machines | Ghosh – Mallik |         | Affiliated East west press                      |
| 07         | Theory of Machines | Thomas Bevan   | Third   | Pearson                                         |
| 08         | Theory of Machines | J.E. Shigley   | Third   | Oxford                                          |

Course Name : Mechanical Engineering Group Course Code : AE/ME/PG/PT/MH/MI Semester : Fourth Subject Title : Professional Practices-II Subject Code : **17035** 

#### **Teaching and Examination Scheme:**

| Teac | hing Scl | heme | Examination Scheme |    |    |    |     |       |
|------|----------|------|--------------------|----|----|----|-----|-------|
| TH   | TU       | PR   | PAPER<br>HRS       | TH | PR | OR | TW  | TOTAL |
|      |          | 02   |                    |    |    |    | 50@ | 50    |

#### **Rational:**

The purpose of introducing Professional practices is to fulfill the need of students to stand in today's global market with knowledge and confidence. This can be achieved by arranging industrial visits, expert lectures attitude to present them-selves, get alternative solutions and validation of the selected alternatives, socially relevant activities, and modular courses. Professional Practices is helpful in broadening technology base of students beyond curriculum. Model making exercises allow students to think more creatively and innovatively and inculcating habit of working with their own hands. Modular courses are introduced with a view of learning and acquiring higher technology skills through industry experts and consultants from the respective fields.

#### **Objectives:**

The student will be able to:

- 1) Acquire information from different sources.
- 2) Prepare notes for given topics
- 3) Present seminar using power projection system.
- 4) Interact with peers to share thoughts.
- 5) Work in a team and develop team spirit.

#### **Intellectual Skill:**

Student will be able to-

- 1) Search information from various resources.
- 2) Prepare notes on selected topics.
- 3) Participate in group discussions.

#### **Motor Skills:**

- 1) Observe industrial practices during visits.
- 2) Prepare slides / charts for presentation in seminar.
- 3) Develop a model

# **Learning Structure:**

| Applications | Gaining confidence in report writing and presentations skills in identified<br>contents of curriculum, apply knowledge in model making. Developing self<br>learning habbit. |  |  |  |  |  |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|
|              |                                                                                                                                                                             |  |  |  |  |  |
| Procedures   | Writing skill, expert lectures, seminars, industrial visit, material conversion processes, brain storming technique.                                                        |  |  |  |  |  |
|              |                                                                                                                                                                             |  |  |  |  |  |
| Concepts     | Industry Institute Interaction, Team work, brain storming, information search.                                                                                              |  |  |  |  |  |
|              |                                                                                                                                                                             |  |  |  |  |  |
| Facts        | Contents of identified topics, Industrial experts, models, equipments, machinery, projection system, etc.                                                                   |  |  |  |  |  |

#### **Content:**

| Topic & Content                                                                               | Hours |
|-----------------------------------------------------------------------------------------------|-------|
| 1. Information Search:                                                                        |       |
| Information search be made through manufacturers catalogue, Hand books, magazines             |       |
| journal and websites, and submit a report on any Two Topics in a group of 3 to 4              |       |
| students, report size shall not be more than 10 pages.                                        |       |
| Following topics are suggested, any other equivalent topics may be selected.                  |       |
| i) Present scenario of electric power generation in Maharashtra state /India.                 |       |
| ii) Composite materials – Types, properties & application                                     |       |
| iii) Material handling equipments commonly used in industries.                                |       |
| iv) Advances in Automobile engines.                                                           |       |
| v) Hydraulic steering systems of Automobile.                                                  |       |
| vi) Mechanisms used to produce straight-line motion.                                          |       |
| vii) Mechanisms used for generating intermittent motion.                                      |       |
| viii) Advanced surface coating techniques like chemical vapor deposition, ion                 | 06    |
| implantation, physical vapor deposition.                                                      |       |
| ix) Types of cutting tools- specification, materials and applications.                        |       |
| x) Booking of E-Tickets for Railways/Buses/Air travel.                                        |       |
| xi) Profiles of 2 multinational companies.                                                    |       |
| xii) Engine lubricants, coolants and additives                                                |       |
| xiii) Power steering, power windows                                                           |       |
| xiv) ABS(anti lock braking systems)                                                           |       |
| xv) MPFI(multi point fuel injection) system                                                   |       |
| xvi) Role of MIDC, MSSIDC, DIC, Financial institutions in development of                      |       |
| industrial sector.                                                                            |       |
| xvii) Solar energy systems - Components and their functions, applications                     |       |
| xviii) Design data book - Study and use of types of data.                                     |       |
| 2. Lectures by professionals/Industry Experts:                                                |       |
| Two lectures of two hour duration be arranged on any two topics suggested below or any        |       |
| other suitable topics to acquire practical information beyond scope of curriculum.            |       |
| Students shall prepare a brief report of each lecture as a part of their term work.           |       |
| i) Components of project Report.                                                              |       |
| ii) Various loan schemes of banks, LIC and other agencies for education and                   |       |
| other purposes.                                                                               |       |
| iii) Use of plastics & rubbers in Automobiles industries.                                     |       |
| iv) Type of processes used to protect material surfaces from environmental effect.            |       |
| v) Product life cycle.                                                                        | 04    |
| vi) Industrial application of mechatronics.                                                   | 04    |
| vii) Special features of CNC machines                                                         |       |
| viii) Gear manufacturing & gear teeth finishing processes.                                    |       |
| ix) Gear boxes-industrial & Automobile applications.                                          |       |
| x) Super-finishing operation & their industrial applications.                                 |       |
| xi) Processing methods for plastic components.                                                |       |
| xii) Features of modern boilers                                                               |       |
| xiii) Strainers and filters –Types, functions and applications                                |       |
| xiv) Industrial drives-Types, components, comparison and applications.                        |       |
| xv) Introduction to Apprenticeship Training Scheme                                            |       |
| 3. Seminars:                                                                                  |       |
| One seminar be arranged on the subjects related to 4 <sup>th</sup> semester. Or topics beyond |       |
| curriculum.                                                                                   | 04    |
| Each student shall submit a report up to 10 pages and deliver the seminar.                    |       |
| batch size – 2-3 students.                                                                    |       |

| Source of information – books, magazine, Journals, Website, surveys,                        |  |  |  |  |  |  |
|---------------------------------------------------------------------------------------------|--|--|--|--|--|--|
| Topics suggested for guidance-                                                              |  |  |  |  |  |  |
|                                                                                             |  |  |  |  |  |  |
| i) Clutches- Types, Principles, working, & applications.                                    |  |  |  |  |  |  |
| ii) High pressure boilers.                                                                  |  |  |  |  |  |  |
| iii) Heat exchangers-Types, working, applications.                                          |  |  |  |  |  |  |
| iv) Hydraulic turbines-Types, working & applications.                                       |  |  |  |  |  |  |
| v) Hydraulic pumps -Types, working & applications.                                          |  |  |  |  |  |  |
| vi) Sensors - Types, principle, & applications.                                             |  |  |  |  |  |  |
| vii) Super conductor technology - Types, principle, & applications.                         |  |  |  |  |  |  |
| viii) Semi conductors- Types, materials, & applications.                                    |  |  |  |  |  |  |
| ix) Industrial breaks- Types, construction, working, & applications.                        |  |  |  |  |  |  |
| 4. Industrial Visits                                                                        |  |  |  |  |  |  |
| Structured industrial visits be arranged and report of the same shall be submitted by each  |  |  |  |  |  |  |
| student to form a part of the term work.                                                    |  |  |  |  |  |  |
| No of visits- At least one                                                                  |  |  |  |  |  |  |
| Scale of industry- medium scale unit, large scale unit.                                     |  |  |  |  |  |  |
| Group size- practical batch                                                                 |  |  |  |  |  |  |
| Report-not exceeding 7 to 10 pages.                                                         |  |  |  |  |  |  |
| Purpose ·                                                                                   |  |  |  |  |  |  |
| To study the profile of industry                                                            |  |  |  |  |  |  |
| <ul> <li>To see the advanced manufacturing processes &amp; machinery</li> </ul>             |  |  |  |  |  |  |
| <ul> <li>To observe working of CNC machines work centre's flexible manufacturing</li> </ul> |  |  |  |  |  |  |
| systems                                                                                     |  |  |  |  |  |  |
| To observe working in foundry forging shop press shop heat treatment shop etc.              |  |  |  |  |  |  |
| <ul> <li>To observe chin less manufacturing machines &amp; processes</li> </ul>             |  |  |  |  |  |  |
| To study process sheets quality control charts & production drawings metallurgical          |  |  |  |  |  |  |
| testing laboratory                                                                          |  |  |  |  |  |  |
| To observe Tool room, standards room etc.                                                   |  |  |  |  |  |  |
| roomed.                                                                                     |  |  |  |  |  |  |
| Following types of industries may be visited in & around the institute                      |  |  |  |  |  |  |
| i) Foundry                                                                                  |  |  |  |  |  |  |
| i) Forging units                                                                            |  |  |  |  |  |  |
| iii) Sheet metal processing unit                                                            |  |  |  |  |  |  |
| iv) Machine/ Automobile component manufacturing unit                                        |  |  |  |  |  |  |
| y) Eabrication unit/ powder metallurgy component manufacturing unit                         |  |  |  |  |  |  |
| v) Machine tool manufacturing unit                                                          |  |  |  |  |  |  |
| vii) Any processing industry like chemical textile sugar agriculture fertilizer             |  |  |  |  |  |  |
| industrias                                                                                  |  |  |  |  |  |  |
| viji) Auto workshop / four wheeler garage                                                   |  |  |  |  |  |  |
| iv) City water supply pumping station                                                       |  |  |  |  |  |  |
| x) Hydro electric power plant                                                               |  |  |  |  |  |  |
| vi) Wind mills Solar Park                                                                   |  |  |  |  |  |  |
| xi) wind mins, Solar Park                                                                   |  |  |  |  |  |  |

| 5. Socially Relevant Activities                                                               |    |  |  |  |  |
|-----------------------------------------------------------------------------------------------|----|--|--|--|--|
| Conduct any one activity through active participation of students and write the report.       |    |  |  |  |  |
| Group of students- maximum 4                                                                  |    |  |  |  |  |
| Report- Not more than 6 pages                                                                 |    |  |  |  |  |
| List of suggested activities- ( activities may be thought in terms of campus improvement)     |    |  |  |  |  |
| i) Awareness about carbon credit                                                              |    |  |  |  |  |
| ii) Anticorruption movement                                                                   | 04 |  |  |  |  |
| iii) Awareness about cyber crimes.                                                            |    |  |  |  |  |
| iv) Developing good citizens.                                                                 |    |  |  |  |  |
| v) Management of E- WASTE                                                                     |    |  |  |  |  |
| vi) Recycling of waste materials.                                                             |    |  |  |  |  |
| vii) Accident prevention & enforcement of safely rules.                                       |    |  |  |  |  |
| viii) Awareness about pollution and pollution control.                                        |    |  |  |  |  |
| ix) Any other relevant activity may be performed)                                             |    |  |  |  |  |
| 6. Mini Projects                                                                              |    |  |  |  |  |
| Students, in a group of 4, shall perform any one activity listed below.                       |    |  |  |  |  |
| i) Model making out of card board paper, wood, thermocol, plastics, metal, clay etc           |    |  |  |  |  |
| a) Any new idea/principle converted into model                                                |    |  |  |  |  |
| b) Mechanisms                                                                                 |    |  |  |  |  |
| c) Jigs/fixtures                                                                              |    |  |  |  |  |
| d) Material handling device etc                                                               |    |  |  |  |  |
| ii) Toy making with simple operating mechanisms                                               |    |  |  |  |  |
| iii Layout of workshop/department/college                                                     |    |  |  |  |  |
| iv) Experimental set $up/testing of a parameter$                                              |    |  |  |  |  |
| y) Display board indicating different type of machine components like bearing                 |    |  |  |  |  |
| fasteners couplings pipe fitting valves cams & followers exploded views of                    |    |  |  |  |  |
| assemblies type of welding equipment welding rods (drawings photo graphs)                     |    |  |  |  |  |
| vi) Any relevant project which will make students to collect information & work with          |    |  |  |  |  |
| their own hands                                                                               |    |  |  |  |  |
| Students shall arrange exhibition of all mini projects in the class/hall and present the task |    |  |  |  |  |
| to the audience/ exports/examiners. The student shell submit a brief report (May 5 pages)     |    |  |  |  |  |
| of the mini project                                                                           | 10 |  |  |  |  |
| OR                                                                                            |    |  |  |  |  |
| Modular course:                                                                               |    |  |  |  |  |
| Modular courses on any one of the suggested or equivalent tonic be undertaken by a            |    |  |  |  |  |
| group of 15 to 20 students                                                                    |    |  |  |  |  |
| i) Advance features in CAD                                                                    |    |  |  |  |  |
| i) Meshing of solid model using any suitable software                                         |    |  |  |  |  |
| iii) Developing Unfold Sheet or Hyperblank by using Blanking Software                         |    |  |  |  |  |
| iv) CAM Software                                                                              |    |  |  |  |  |
| v) Basics of DLC programming                                                                  |    |  |  |  |  |
| v) Applications of machatronics                                                               |    |  |  |  |  |
| vi) Applications of mechanomics                                                               |    |  |  |  |  |
| vii) Modern peckaging technology                                                              |    |  |  |  |  |
| viii) Ivioueni packaging technology                                                           |    |  |  |  |  |
| x) Dio proventia Dobota                                                                       |    |  |  |  |  |
| x) Dio-pheumanc Kobols                                                                        |    |  |  |  |  |
|                                                                                               | 22 |  |  |  |  |
| Total                                                                                         | 32 |  |  |  |  |

#### Note:-

The students who wish to undergo in plant training shall go through details regarding it in the syllabus of Professional Practices – III for fifth semester and complete the training in summer vacation at the end of fourth semester examination.

All such students will be assessed out of ten marks as per guidelines mentioned in the curriculum of professional practice III in the fifth semester

# Learning Resources: 1. Books:

| Sr.<br>No. | Author                         | Title                     | Publisher                     |  |  |
|------------|--------------------------------|---------------------------|-------------------------------|--|--|
| 01         | NRDC, Publication Bi           | Invention Intelligence    | National Research Development |  |  |
| 01         | Monthly Journal                | Journal                   | Corporation, GOI.             |  |  |
| 02         | DK Publishing                  | How things works          | DK Publishing                 |  |  |
| 02         | DR Fuolishing                  | encyclopedia              | DK rubising                   |  |  |
| 03         | Trott                          | Innovation mgmt.& new     | Pageson Education             |  |  |
| 05         | 1100                           | product development       | rearson Education             |  |  |
| 04         | EH McGrath SI                  | Basic Managerial Skills   | рні                           |  |  |
| 04         | E.II. MCOIAII, S.J.            | for All – Ninth Edition   | F 111                         |  |  |
| 05         | Apprenticeship Training Second | cheme:- Compiled By – BOA | AT (Western Region), Mumbai,  |  |  |
| 05         | Available on MSBTE Web         | Site.                     |                               |  |  |

#### 2. Web sites

www.engineeringforchange.org www.wikipedia.com www.slideshare.com www.teachertube.com Course Name : All Branches of Diploma in Engineering & Technology

# Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG

Industrial Training (Optional) after 4<sup>th</sup> semester examination.

Note:- Examination in Professional Practices of 5<sup>th</sup> Semester.

## INDUSTRIAL TRAINING (OPTIONAL)

#### Rational:-

There was a common suggestion from the industry as well as other stakeholders that curriculum of Engineering and Technology courses should have Industrial training as part of the curriculum. When this issue of industrial training was discussed it was found that it will be difficult to make industrial training compulsory for all students of all courses as it will be difficult to find placement for all the students. It is therefore now proposed that this training can be included in the curriculum as optional training for student who is willing to undertake such training on their own. The institutes will help them in getting placement or also providing them requisite documents which the student may need to get the placement.

Details:- Student can undergo training in related industries as guided by subject teachers / HOD.

- The training will be for four weeks duration in the summer vacation after the fourth semester examination is over.
- The student undergoing such training will have to submit a report of the training duly certified by the competent authority from the industry clearly indicating the achievements of the student during training. This submission is to be made after joining the institute for Fifth semester.
- The student completing this training will have to deliver a seminar on the training activities based on the report in the subject Professional Practices at Fifth Semester.
- The student undergoing this training will be exempted from attending activities under Professional Practices at Fifth semester except the seminar.
- The students who will not undergo such training will have to attend Professional Practices Classes/activities of fifth semester and will have to complete the tasks given during the semester under this head.
- There work will be evaluated on their submissions as per requirement and will be given marks out of 50. Or student may have to give seminar on training in Industry he attended.
- Institute shall encourage and guide students for Industry training.
- Evaluation:- Report of Training attended and delivery of seminar and actual experience in Industry will be evaluated in fifth semester under Profession Practices-III and marks will be given accordingly out of 50.

'G' Scheme

WITH EFFECT FROM 2012-13

**DURATION : 16 WEEKS** 

**SCHEME : G** 

# MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI

# **P** TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES

## **COURSE NAME : DIPLOMA IN PLASTIC ENGINEERING**

#### **COURSE CODE : PS**

## **DURATION OF COURSE : 6 SEMESTERS**

#### **SEMESTER : FOURTH**

#### **PATTERN : FULL TIME - SEMESTER**

|           |                                |                  | rev SUB<br>on CODE | TEACHING<br>SCHEME |                                                                                                      | EXAMINATION SCHEME |       |                  |     |        |     |        |     |        |     |            |
|-----------|--------------------------------|------------------|--------------------|--------------------|------------------------------------------------------------------------------------------------------|--------------------|-------|------------------|-----|--------|-----|--------|-----|--------|-----|------------|
| SR.<br>NO | SUBJECT TITLE                  | Abbrev<br>iation |                    |                    |                                                                                                      | 1E                 | PAPER | TH (1)           |     | PR (4) |     | OR (8) |     | TW (9) |     | SW (17400) |
|           |                                |                  |                    | ТН                 | TU                                                                                                   | PR                 | HRS.  | Max              | Min | Max    | Min | Max    | Min | Max    | Min | (17400)    |
| 1         | Environment Studies \$         | EST              | 17401              | 01                 |                                                                                                      | 02                 | 01    | 50# <sup>*</sup> | 20  |        |     |        |     | 25@    | 10  |            |
| 2         | Electrical and Electronics     | EAE              | 17424              | 04                 |                                                                                                      | 02*                | 03    | 100              | 40  |        |     |        |     | 25@    | 10  |            |
| 3         | Polymer Chemistry              | PCH              | 17446              | 03                 |                                                                                                      | 02                 | 03    | 100              | 40  | 50#    | 20  |        |     | 25@    | 10  |            |
| 4         | Plastic Materials              | PMA              | 17448              | 04                 |                                                                                                      | 02                 | 03    | 100              | 40  | 25#    | 10  |        |     | 25@    | 10  | 50         |
| 5         | Plastic Processing-I           | PPR              | 17449              | 04                 |                                                                                                      | 02                 | 03    | 100              | 40  |        |     | 25#    | 10  |        | i   |            |
| 6         | Computer Programming           | CPR              | 17045              | 01                 |                                                                                                      | 02                 |       |                  |     | 50@    | 20  |        |     |        |     |            |
| 7         | Professional Practice-II       | PPS              | 17046              |                    |                                                                                                      | 03                 |       |                  |     |        |     |        |     | 50@    | 20  |            |
|           |                                |                  | TOTAL              | 17                 |                                                                                                      | 15                 |       | 450              |     | 125    |     | 25     |     | 150    |     | 50         |
| **        | Industrial Training (Optional) |                  |                    | Exa                | ** Industrial Training (Optional) Examination in 5 <sup>th</sup> Semester Professional Practices-III |                    |       |                  |     |        |     |        |     |        |     |            |

Student Contact Hours Per Week: 32 Hrs.

# THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.

Total Marks: 800

@ - Internal Assessment, # - External Assessment, No Theory Examination, \$ - Common to all branches, #\* - Online Examination,

\* - Practicals of Electrical & Electronics at alternate week.

Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work.

\*\* Industrial Training (Optional) - Student can undergo Industrial Training of four weeks after fourth semester examination during summer vacation.

Assessment will be done in Fifth semester under Professional Practices-III. They will be exempted from activities of Professional Practices-III of 5<sup>th</sup> Semester.

Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subjects is to be converted out of 50 marks as sessional work (SW).

> Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.

Code number for TH, PR, OR, TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.

**Course Name : All Branches of Diploma in Engineering & Technology** 

# Course Code : AE/CE/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG/AU

Semester : Fourth

Subject Title : Environmental Studies

Subject Code : 17401

**Teaching and Examination Scheme:** 

| Teac | ching Scl | heme | Examination Scheme |      |    |    |     |       |  |
|------|-----------|------|--------------------|------|----|----|-----|-------|--|
| TH   | TU        | PR   | PAPER<br>HRS       | TH   | PR | OR | TW  | TOTAL |  |
| 01   |           | 02   | 01                 | 50#* |    |    | 25@ | 75    |  |

#### **#\* Online Theory Examination**

NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Environment essentially comprises of our living ambience, which gives us the zest and verve in all our activities. The turn of the twentieth century saw the gradual onset of its degradation by our callous deeds without any concern for the well being of our surrounding we are today facing a grave environmental crisis. The unceasing industrial growth and economic development of the last 300 years or so have resulted in huge ecological problems such as overexploitation of natural resources, degraded land, disappearing forests, endangered species, dangerous toxins, global warming etc.

It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

The curriculum covers the aspects about environment such as Environment and Ecology, Environmental impacts on human activities, Water resources and water quality, Mineral resources and mining, Forests, etc.

General Objectives: The student will be able to,

- 1. Understand importance of environment
- 2. Know key issues about environment
- 3. Understands the reasons for environment degradation
- 4. Know aspects about improvement methods
- 5. Know initiatives taken by the world bodies to restrict and reduce degradation

2

# **Learning Structure:**



# Theory:

| Topic and Contents                                                                                                   | Hours | Marks |  |
|----------------------------------------------------------------------------------------------------------------------|-------|-------|--|
| Topic 1: Nature of Environmental Studies                                                                             |       |       |  |
| Specific Objectives:                                                                                                 |       |       |  |
| Define the terms related to Environmental Studies                                                                    |       |       |  |
| State importance of awareness about environment in general public                                                    | 01    | 04    |  |
| Contents:                                                                                                            | 01    | 04    |  |
| • Definition, Scope and Importance of the environmental studies                                                      |       |       |  |
| Importance of the studies irrespective of course                                                                     |       |       |  |
| Need for creating public awareness about environmental issues                                                        |       |       |  |
| <b>Topic 2: Natural Resources and Associated Problems</b>                                                            |       |       |  |
| Specific Objectives:                                                                                                 |       |       |  |
| Define natural resources and identify problems associated with                                                       |       |       |  |
| them                                                                                                                 |       |       |  |
| Identify uses and their overexploitation                                                                             |       |       |  |
| Identify alternate resources and their importance for environment                                                    |       |       |  |
| Contents:                                                                                                            |       |       |  |
| 2.1 Renewable and Non renewable resources                                                                            |       |       |  |
| • Definition                                                                                                         |       |       |  |
| • Associated problems                                                                                                |       |       |  |
| 2.2 Forest Resources                                                                                                 |       |       |  |
| • General description of forest resources                                                                            |       |       |  |
| • Functions and benefits of forest resources                                                                         |       |       |  |
| • Effects on environment due to deforestation, l'imber                                                               |       |       |  |
| extraction, Building of dams, waterways etc.                                                                         | 04    | 10    |  |
| 2.5 Water Resources<br>Hydrosphere: Different sources of water                                                       |       |       |  |
| Hydrosphere. Different sources of water                                                                              |       |       |  |
| Ose and overexploitation of surface and ground water     Effect of floods, drought, doms ato, on water resources and |       |       |  |
| • Effect of floods, draught, dams etc. on water resources and                                                        |       |       |  |
| 2.4 Mineral Resources:                                                                                               |       |       |  |
|                                                                                                                      |       |       |  |
| Categories of mineral resources                                                                                      |       |       |  |
| Basics of mining activities                                                                                          |       |       |  |
| • Mine safety                                                                                                        |       |       |  |
| • Effect of mining on environment                                                                                    |       |       |  |
| 2.5 Food Resources:                                                                                                  |       |       |  |
| • Food for all                                                                                                       |       |       |  |
| • Effects of modern agriculture                                                                                      |       |       |  |
| World food problem                                                                                                   |       |       |  |
| Topic 3. Ecosystems                                                                                                  |       |       |  |
| Concept of Ecosystem                                                                                                 |       |       |  |
| • Structure and functions of ecosystem                                                                               | 01    | 04    |  |
| • Energy flow in ecosystem                                                                                           |       |       |  |
| <ul> <li>Major ecosystems in the world</li> </ul>                                                                    |       |       |  |
| Topic 4. Biodiversity and Its Conservation                                                                           |       |       |  |
| Definition of Biodiversity                                                                                           | 02    | 06    |  |
| • Levels of biodiversity                                                                                             |       | -     |  |

| Total                                                                                                                                                                          | 16 | 50 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|
| Human Health and Human Rights                                                                                                                                                  |    |    |
| environment                                                                                                                                                                    |    |    |
| Population Growth: Aspects, importance and effect on                                                                                                                           |    |    |
| Forest Conservation Act                                                                                                                                                        |    |    |
| Wildlife Protection Act                                                                                                                                                        | 02 | 08 |
| • Water (Prevention and Control of Pollution) Act                                                                                                                              | 00 | 00 |
| • Air (Prevention and Control of Pollution) Act                                                                                                                                |    |    |
| • Environmental Protection Act                                                                                                                                                 |    |    |
| Brief description of the following acts and their provisions:                                                                                                                  |    |    |
| Topic 7. Environmental Protection                                                                                                                                              |    |    |
| <ul> <li>Concept of Carbon Credits and its advantages</li> </ul>                                                                                                               |    |    |
| and their effect on climate                                                                                                                                                    |    |    |
| Depletion Nuclear Accidents and Holocaust: Basic concepts                                                                                                                      |    |    |
| Climate Change Global warming Acid rain Ozone Laver                                                                                                                            | 03 | 10 |
| harvesting: Definition Methods and Benefits                                                                                                                                    |    |    |
| Water conservation Watershed management Pain water                                                                                                                             |    |    |
| • Concept of development sustainable development                                                                                                                               |    |    |
| Noise Polition: Definition, sources, effects, prevention     Topic 6 Social Issues and Environment                                                                             |    |    |
| <ul> <li>Son Fonduon: Definition, sources, effects, prevention</li> <li>Noise Pollution: Definition, sources, effects, prevention</li> </ul>                                   |    |    |
| <ul> <li>Soil Pollution: Definition sources offects provention</li> </ul>                                                                                                      |    |    |
| • water Pollution: Definition, Classification, sources, effects,                                                                                                               |    | 08 |
| prevention<br>Water Pallution: Definition Classification sources offects                                                                                                       | 03 |    |
| • Air pollution: Definition, Classification, sources, effects,                                                                                                                 |    |    |
| • Definition                                                                                                                                                                   |    |    |
| 1 opic 5. Environmental Pollution                                                                                                                                              |    |    |
| Conservation of biodiversity                                                                                                                                                   |    |    |
| • Threats to biodiversity                                                                                                                                                      |    |    |
| • Value of biodiversity                                                                                                                                                        |    |    |
| <ul> <li>Value of biodiversity</li> <li>Threats to biodiversity</li> <li>Conservation of biodiversity</li> <li>Topic 5. Environmental Pollution</li> <li>Definition</li> </ul> |    |    |
|                                                                                                                                                                                | 1  |    |

#### Practical: Skills to be developed:

# Intellectual Skills:

- 1. Collection of information, data
- 2. Analysis of data
- 3. Report writing

#### **Motor Skills:**

- 1. Presentation Skills
- 2. Use of multi media

# **List of Projects:**

Note: Any one project of the following:

- 1. Visit to a local area to document environmental assets such as river / forest / grassland / hill / mountain.
- 2. Visit to a local polluted site: Urban/Rural/Industrial/Agricultural.
- 3. Study of common plants, insects, birds
- 4. Study of simple ecosystems of ponds, river, hill slopes etc.
Prepare a project report on the findings of the visit illustrating environment related facts, analysis and conclusion. Also suggest remedies to improve environment.

### Learning Resources: Books:

| Sr.<br>No. | Author                                                | Title                                        | Publisher               |  |
|------------|-------------------------------------------------------|----------------------------------------------|-------------------------|--|
| 01         | Anindita Basak                                        | Environmental Studies                        | Pearson Education       |  |
| 02         | R. Rajgopalan                                         | Environmental Studies<br>from Crises to Cure | Oxford University Press |  |
| 03         | Dr. R. J. Ranjit Daniels, Dr.<br>Jagdish Krishnaswamy | Environmental Studies                        | Wiley India             |  |

#### Course Name : Diploma in Chemical Engineering/ Plastic Engineering

Course code : CH / PS Semester : Fourth Subject Title : Electrical and Electronics Subject Code : 17424

#### **Teaching and Examination Scheme:**

| Teac | ching Sch | neme | Examination Scheme |     |    |    |     |       |
|------|-----------|------|--------------------|-----|----|----|-----|-------|
| TH   | TU        | PR   | PAPER<br>HRS.      | TH  | PR | OR | TW  | TOTAL |
| 04   |           | 02*  | 03                 | 100 |    |    | 25@ | 125   |

#### \* - Practicals of Electrical & Electronics at alternate week.

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Most of the equipments used in chemical industry are electrically powered. A minor electrical faults can be attended by a shop floor chemical engineer. This subject of electrical engg. addresses the fundamental concepts and operating principles of electrical appliances. It will enable the students in better handling and commissioning of the equipments.

The second section of the subject deals with the basic of semiconductor devices and their circuits necessary for the electronic control gadgets. It provides the information about logic gates, digital displays, small signal amplifiers and power supplies. This will help the students in building skills of effective handling of electronic control equipments.

#### General Objectives: Student will be able to develop:

- Awareness of Electrical Safety.
- Recognize Electrical fault in Chemical Plant.
- Recognize fault in power supply, display & control panel.
- Understand working of basic semiconductor devices.

#### **Learning Structure:**



## Theory: :

Section- I Electrical Engineering

| Topic and Content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Hours | Marks |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
| Topic 1: Basic Fundamentals                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |       |
| Specific Objectives:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |
| State principle of electromagnetic induction.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |       |
| Calculate electrical power and energy from given data.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |       |
| Contents:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |       |
| <ul> <li>Ohm's Law – Simple problems on Ohm's Law</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 07    | 10    |
| • Types of supply – A.C. & D.C., definition, representation &                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |       |
| comparison.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |       |
| Principle of electromagnetic induction.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |       |
| • Concept of single Phase & Three Phase A.C. supply, comparison.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |       |
| • Electrical power, energy – definition, equation, simple problems.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |       |
| • Power factor & its importance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |       |
| Topics 2: D.C. Motor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |
| Specific Objectives:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |
| Draw electrical circuit diagram of D.C. shunt motor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |
| Draw diagram & explain armature voltage speed control method.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |       |
| Contents:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |       |
| • Working principle, construction, different parts – their material &                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 06    | 10    |
| application.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |       |
| • Types of D.C. motor – Electrical circuit of D.C shunt & series motor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |       |
| • Speed control of D.C Shunt & Series motor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |       |
| • Necessity of starter & its principle.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |       |
| • Applications of D.C. motors related to chemical plant.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |       |
| Topics 3: A.C. Motor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |
| Specific Objectives:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |
| > Draw electrical circuit diagram of $R$ – Split single phase induction motor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       |       |
| State any four parts & their material used for three phase induction motor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |       |
| Contents:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 05    | 08    |
| • Three phase induction motor – working principle, construction &                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |       |
| application.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |       |
| • Construction, working & application of following single phase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |       |
| induction motors.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |       |
| R - Split, C - Split.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |       |
| Topics 4: Transformer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |       |
| Specific Objectives:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |       |
| <ul> <li>Compare core type &amp; shell type transformer.</li> <li>Define and the exactly assument matically for the first state of the state of</li></ul> |       |       |
| Define voltage ratio, current ratio & transformation ratio of single phase<br>transformer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 06    | 10    |
| transformer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 06    | 10    |
| Contents:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |       |
| • Working principle of transformer, Elementary theory of an ideal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |       |
| transformer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |       |

| • Construction of core & shell type transformer, comparison.              |    |    |
|---------------------------------------------------------------------------|----|----|
| • EMF equation (No Derivation), simple problems.                          |    |    |
| • Transformation ratio – simple problems.                                 |    |    |
| • Autotransformer – Concept, advantages, limitations, applications.       |    |    |
| Topics 5: Electrical Wiring & Safety                                      |    |    |
| Specific Objectives:                                                      |    |    |
| State the necessity of fuse.                                              |    |    |
| State the necessity of earthing.                                          |    |    |
|                                                                           |    |    |
| Contents:                                                                 |    |    |
| • Types of wires – V.I.R., P.V.C., T.R.S., Specifications as per IS code. |    |    |
| • Fuse – Necessity, kit-kat & HRC fuse - construction, working.           |    |    |
| • Circuit breakers – MCCB, ELCB, principle & application.                 | 08 | 12 |
| • Electrical wiring – one lamp controlled by single way switch, two       |    |    |
| lamp controlled by two single way switches (independently), stair         |    |    |
| case wiring, godown wiring.                                               |    |    |
| • Lamps – Incandescent lamp, fluorescent lamp, mercury vapour &           |    |    |
| sodium vapour lamp - construction, application.                           |    |    |
| • Electrical safety – Safety precautions, Instruction for restoration of  |    |    |
| persons suffering from electric shock.                                    |    |    |
| • Earthing – Need, Types – plate & pipe                                   |    |    |
| Total                                                                     | 32 | 50 |

# Section- II Electronics

| Tonic and Content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Hours | Marks   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | nours | IVIALKS |
| Topic 1: Semiconductor Electronic Devices                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |         |
| Specific Objectives:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |         |
| Draw V-I characteristics of different devices.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |         |
| State the symbols of different components.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |         |
| <ul> <li>Contents: <ol> <li>Resistor, inductor, capacitor – definition, symbols &amp; applications.</li> <li>Conductors, semiconductors, Insulators – definition, energy band diagram, examples.</li> <li>Semiconductors classification – Intrinsic and Extrinsic – N type &amp; P type, definition, charge carrier.</li> <li>PN junction diode – construction, symbol, working, forward &amp; reverse bias V-I characteristic, applications.</li> <li>Light emitting diode – Construction, symbol, working principle, applications.</li> <li>Junction breakdown.</li> <li>Zener diode - Construction, symbol, working principle, reverse bias V-I characteristic, applications.</li> </ol> </li> <li>1.2 Power devices - (08 marks) SCR - Construction, symbol, working principle, Applications.</li> </ul> | 12    | 20      |
| Topics 2: Bipolar Junction Transistor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |         |
| Specific Objectives:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 06    | 08      |

| <ul> <li>Draw output characteristics of CE configuration.</li> <li>Describe working of transistor amplifier.</li> </ul> |    |    |
|-------------------------------------------------------------------------------------------------------------------------|----|----|
| Contents:                                                                                                               |    |    |
| • BJT types – NPN & PNP, their symbols & construction,                                                                  |    |    |
| • Working of a NPN transistor.                                                                                          |    |    |
| • Transistor characteristics – Common emitter configuration.                                                            |    |    |
| • Single stage CE amplifier – circuit diagram & working.                                                                |    |    |
| • Power amplifier – Concept & types.                                                                                    |    |    |
| • Applications of transistor.                                                                                           |    |    |
| Topics 3: Power Supply                                                                                                  |    |    |
| Specific Objectives:                                                                                                    |    |    |
| Draw block diagram of power supply.                                                                                     |    |    |
| <ul> <li>Describe working of different rectifier circuits.</li> </ul>                                                   |    |    |
| 8                                                                                                                       |    |    |
| Contents:                                                                                                               |    |    |
| • Power supply – Necessity, block diagram.                                                                              | 07 | 12 |
| • Rectifier – Types, Half wave, Full wave (center tapped & bridge type)                                                 |    |    |
| - Circuit diagram, working, waveforms & their comparison.                                                               |    |    |
| • Filter - Need & types – shunt capacitor series inductor LC & $\pi$ type                                               |    |    |
| circuit diagram.                                                                                                        |    |    |
| <ul> <li>Voltage regulator - Need principle of zener shunt regulator</li> </ul>                                         |    |    |
| Tonics 4: Digital circuits                                                                                              |    |    |
| Specific Objectives                                                                                                     |    |    |
| <ul> <li>State symbols of different logic gates</li> </ul>                                                              |    |    |
| <ul> <li>Use NAND / NOR gate as universal gates.</li> </ul>                                                             |    |    |
|                                                                                                                         |    |    |
| Contents:                                                                                                               |    |    |
| • Digital signal, Negative & positive logic.                                                                            | 07 | 10 |
| • Boolean algebra.                                                                                                      | 07 | 10 |
| • Logic gates – AND OR NOT NAND NOR EX-OR Symbols                                                                       |    |    |
| logic expressions truth table.                                                                                          |    |    |
| <ul> <li>De- Morgan's theorems – statement, proof using truth table</li> </ul>                                          |    |    |
| <ul> <li>Universal gates – definition NAND NOR</li> </ul>                                                               |    |    |
| Digital display – Types of LED & LCD display                                                                            |    |    |
| Total                                                                                                                   | 32 | 50 |

#### **Practical:** Skills to be develor

Skills to be developed:

### Intellectual Skills:

- Correlate speed of the motor with its other parameters.
- Identify the simple faults in electrical and electronics systems.

#### **Motor Skills:**

- Use various tools and components for different electrical applications.
- Handle various electronic test and measuring equipments.

#### List of Practicals: Section-I

- 1) To verify ohm's law.
- 2) To measure electrical Power in Single phase AC circuit.
- 3) To plot the Speed & Armature voltage characteristics of DC shunt motor.
- 4) To plot the Speed & field current characteristics of DC shunt motor.
- 5) To determine transformation ratio of single phase transformer.
- 6) To prepare wiring for one lamp controlled by Single way switch.

### Section-II

- 1) To operate the various laboratory equipments & measuring instruments like power Supply, CRO, DMM.
- 2) To plot forward & reverse characteristics of Silicon Diode.
- 3) To measure percentage line regulation of Shunt Zener regulator.
- 4) To measure voltage gain of single stage common Emitter amplifier at 1 khz.
- 5) To verify the truth tables of various logic gates.
- 6) To verify De Morgan's First theorem.

### **Learning Resources:**

**Books:** 

| Sr.<br>No. | Author                       | Title                                                                       | Publisher                                |
|------------|------------------------------|-----------------------------------------------------------------------------|------------------------------------------|
| 1          | B.L. Theraja                 | Electrical Technology Vol. 1 & 2                                            | S.Chand & Company Ltd.                   |
| 2          | S.L. Uppal                   | Electrical Power                                                            | Khanna Publishers, Delhi.                |
| 3          | N.N. Bhargava,<br>S.C. Gupta | Basic Electronics & Linear<br>N.N. Bhargava, Technical Teachers<br>Circuits | Technical Teachers<br>Training Institute |
| 4          | B.L. Theraja                 | Basic Electronics (Solid State)                                             | S.Chand & Company Ltd.                   |
| 5          | R.P. Jain                    | Modern Digital Electronics                                                  | Tata Mc Graw Hill, Delhi.                |
| 6          | B.D.Arora                    | Electrical Wiring & Estimation<br>Costing                                   | R.B. Publications                        |

Course Name : Diploma in Plastic EngineeringCourse Code : PSSemester : FourthSubject Title : Polymer ChemistrySubject Code : 17446

#### **Teaching and Examination Scheme**:

| Teaching Scheme |    |    |              |     | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|-----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH  | PR        | OR        | TW  | TOTAL |
| 03              |    | 02 | 03           | 100 | 50#       |           | 25@ | 175   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

As per the present requirement new polymer materials are being invented and some are modified. The properties of these materials depend on the structure of polymer molucules. This subject provides information about monomers and organic chemical compounds. The basic understanding of polymerization reaction, its mechanism will help students to understand classification of polymers.

It is a Prerequisite to understand the properties of polymer materials and their applications.

### **Objectives:**

Students should be able to:

- 1. Classify various organic compounds used for polymer preparation.
- 2. Differentiate between types of polymers and their applications.
- 3. Describe various polymerization reactions.
- 4. Select appropriate polymer on the basis of molecular weight and properties.
- 5. State the effect of structure on the properties of polymer.

### **Learning Structure:**



### Theory

| Chapter | Name of Topics                                                      | Hours | Marks |
|---------|---------------------------------------------------------------------|-------|-------|
|         | Introduction to Polymers:                                           |       |       |
|         | Specific Objectives: - Students should be able to                   |       |       |
|         | Define the polymer, monomer and polymerization.                     |       |       |
|         | Classify the polymers.                                              |       |       |
| 1       | Differentiate between Thermoplastic & Thermosetting                 |       |       |
|         | plastic.                                                            |       |       |
|         | Content:                                                            | 06    | 16    |
|         | Classification of polymers natural, synthetic, organic, inorganic   |       |       |
|         | polymers, Plastics, elastomers, fibers & resins. Thermoplastic and  |       |       |
|         | Thermosetting plastics, commodity and Engineering plastics,         |       |       |
|         | homopolymer, copolymers-alternate, block, random & graft            |       |       |
|         | copolymers.                                                         |       |       |
|         | Polymerization Reactions :                                          |       |       |
|         | <b>Specific Objectives:</b> - Students should be able to            |       |       |
|         | Describe various polymerization reactions.                          |       |       |
|         | $\triangleright$ Understand the concept of functionality, co-       |       |       |
|         | polymerization, and free radicals.                                  |       |       |
| 2       | Content:                                                            | 10    | 26    |
| 2       | Addition polymerization, Free radical polymerization, Ionic         | 10    | -0    |
|         | polymerization, Co-ordination polymerization, chain transfer        |       |       |
|         | reaction. (Initiation, propagation, termination of each technique). |       |       |
|         | Concept of functionality & its importance, step polymerization,     |       |       |
|         | polycondensation, Basic concepts and types of co-polymerization,    |       |       |
|         | free radical, ionic & co poly condensation.                         |       |       |
|         | Polymerization Techniques (Introductory Level):                     |       |       |
|         | Specific Objectives: - Students should be able to                   |       |       |
|         | Describe various polymerization techniques.                         |       |       |
| 2       | Compare different techniques with respect to salient                | 00    | 16    |
| 3       | reatures.                                                           | 08    | 10    |
|         | Content:                                                            |       |       |
|         | Bulk, Solution, Suspension and Emulsion polymenzation, then         |       |       |
|         | features)                                                           |       |       |
|         | Molecular Weight of Polymer:                                        |       |       |
|         | Snecific Objectives: - Students should be able to                   |       |       |
|         | Select appropriate polymer on the basis of molecular                |       |       |
|         | weight and properties                                               |       |       |
|         | <ul> <li>Determine the average molecular weight by using</li> </ul> |       |       |
|         | different instruments.                                              |       |       |
|         | Understand the concept of 'K' value.                                |       |       |
| 4       | Content:                                                            | 10    | 22    |
|         | Concept of average molecular weight i.e. weight average             |       |       |
|         | molecular weight and number average molecular weight,               |       |       |
|         | molecular weight distribution. Methods for the determination of     |       |       |
|         | the average molecular weight of polymers for e.g. Viscometry,       |       |       |
|         | Cryoscopy, Ebulliometry, Osmosis, End group analysis, Ultra         |       |       |
|         | centrifugation, Sedimentation, concept of 'K' value, practical      |       |       |
|         | significance of average molecular weight.                           |       |       |
| 5       | Significance of Glass transition temperature in Polymers:           | 08    | 10    |

|   | <ul> <li>Specific Objectives: - Students should be able to</li> <li>➢ Define glass transition temperature.</li> <li>➢ Know the importance of glass transition temperature.</li> <li>Content:</li> <li>What is glass transition temperature? Factors influencing the glass transition temperature glass transition temperature and</li> </ul>                                                                         |    |     |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
|   | molecular weight, glass transition temperature and plasticizers,<br>glass transition temperature of copolymers, glass transition<br>temperature and melting point, importance of glass transition<br>temperature.                                                                                                                                                                                                    |    |     |
|   | Degradation of Polymers:                                                                                                                                                                                                                                                                                                                                                                                             |    |     |
| 6 | <ul> <li>Specific Objectives: - Students should be able to         <ul> <li>▷ Define the polymer degradation.</li> <li>▷ Understand the concept of different types of polymer degradation.</li> <li>▷ Prevent the polymer degradation.</li> </ul> </li> <li>Content:         <ul> <li>What is Polymer degradation? Mechanical, Oxidative, Thermal, UV Degradation, Prevention of degradation.</li> </ul> </li> </ul> | 06 | 10  |
|   | TOTAL                                                                                                                                                                                                                                                                                                                                                                                                                | 48 | 100 |

### **PRACTICALS:**

Skills to be developed:

#### **Intellectual Skills:**

- 1. To prepare the various polymers.
- 2. To analyze the structure of polymer.
- 3. To calculate the density of polymer.
- 4. To distinguish the various polymer.
- 5. To classify the polymer according to their sources.
- 6. To analyze the properties of polymer.
- 7. To compare the various chemicals.

#### **Motor Skills:**

- 1. To handle the instruments properly.
- 2. To handle the chemicals carefully.
- 3. To identify the different solvents for different polymers.
- 4. To find out the different solvents for different polymers.
- 5. To identify the chemicals.
- 6. To classify the monomers.

#### **List of Practicals:**

1. To prepare Phenol Formaldehyde resin.

#### MSBTE - Final Copy Dt. 30/08/2013

- 2. To prepare Urea Formaldehyde resin.
- 3. To prepare polystyrene by bulk polymerization technique.
- 4. To determine Hydroxyl value of given polymer.
- 5. To determine the viscosity of polymer solution by Ostwald viscometer.
- 6. To determine the melting point of given polymer.
- 7. To prepare the Polystyrene by Bulk Polymerization.
- 8. To compare properties of emulsion & suspension polymer (PVC) from industrial data. (Case Study)
- 9. To demonstrate manufacturing process of unsaturated polyesters.
- 10. To demonstrate manufacturing process of epoxies.
- 11. To demonstrate manufacturing process of alkyds.
- 12. To demonstrate manufacturing process of PMMA by solution polymerization.

### **References:**

#### **Books:**

- 1. Text Book of Polymer Science By Clindsivy Billmeyer (Willey Interscience)
- 2. Polymer Science By V. R. Gowarikar (Willey Interscience)
- 3. Outline of Polymer Technology By R.P.Sinha
- 4. Text Book of Polymer Science By Ghosh
- 5. Text Book of Polymer Chemistry By P.J.Flory
- 6. Plastic Materials by J. A. Brydson (Butterworth)
- 7. Properties and Structure of Polymers By A. V. Tobolsky (John Will's & Sons)

| Course Name   | : Diploma in Plastics Engineering |
|---------------|-----------------------------------|
| Course Code   | : PS                              |
| Semester      | : Fourth                          |
| Subject Title | : Plastics Materials              |
| Subject Code  | : 17448                           |

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |               |     | Examinati | on Scheme |     |       |
|-----------------|----|----|---------------|-----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS. | TH  | PR        | OR        | TW  | TOTAL |
| 04              |    | 02 | 03            | 100 | 25#       |           | 25@ | 150   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

This is an important subject for Plastic engineering. The course gives clear picture of types of Polymer Materials, their Grade and their end applications. The course summarize the Thermoplastic and Thermosetting materials, imparts knowledge about the preparation of Polymer material, which are used in plastic processing industries.

### **Objectives:**

- 1. To classify the plastics materials used in plastic industries.
- 2. To elaborate the features of preparation of plastic materials.
- 3. To interpret the property & application relationship
- 4. To select suitable plastics material depending on the end application.
- 5. To compare the different plastic materials according to their properties and structure.
- 6. To identify the given unknown plastics material.

#### **Learning Structure:**



### Theory:

| Chapter | Name of Topics                                                                                                                              | Hours | Marks |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
|         | History & Development of Plastics:                                                                                                          |       |       |
|         | Specific Objectives:                                                                                                                        |       |       |
|         | <ul> <li>Classify Polymers.</li> </ul>                                                                                                      |       |       |
| 1       | ▶ Know the origin of Plastic Materials.                                                                                                     |       |       |
| _       | Contents:                                                                                                                                   |       |       |
|         | • Revision of polymers, its classification. Origin of the materials                                                                         | 02    | 02    |
|         |                                                                                                                                             |       |       |
|         | Principle of Manufacturing, Properties & Applications of Plastics                                                                           |       |       |
|         | (Detail description of Manufacturing and flow sheet not expected)                                                                           |       |       |
|         |                                                                                                                                             |       |       |
|         | Commodity Plastics:                                                                                                                         |       |       |
|         | Specific Objectives:                                                                                                                        |       |       |
|         | Classify the plastics materials used in plastic industries.                                                                                 |       |       |
|         | > Understand the Principle of Manufacturing of different Plastic                                                                            |       |       |
|         | Materials.                                                                                                                                  |       |       |
|         | Contents:                                                                                                                                   |       |       |
|         | • Polyethylene (High pressure and low pressure process),                                                                                    | 10    | 10    |
| 2       | Polypropylene (using Ziegler-Natta catalyst process),                                                                                       | 10    | 18    |
|         | Polystyrene (using suspension and bulk polymerization                                                                                       |       |       |
|         | technique), High impact polystyrene, Expanded polystyrene.                                                                                  | 0.4   | 06    |
|         | • Poly (methyl methacrylate), Polyacryloamides,                                                                                             | 04    | 06    |
|         | Polyacrylonitrile.                                                                                                                          | 06    | 09    |
|         | • Poly (vinyl alcohol) by Hydrolysis process, Poly (vinyl acetate),                                                                         | 06    | 08    |
|         | Poly (vinyl chloride) by cracking process.                                                                                                  | 04    | 08    |
|         | • Polyesters such as Poly (ethylene terphthalate) and poly                                                                                  | 04    | 08    |
|         | (butylenes terphthalate)                                                                                                                    | 04    | 08    |
|         | • Cellulosic's – cellulose and its sources, cellulose nitrate,                                                                              | 04    | 08    |
|         | cellulose acetate and cellulose acetate butyrate.                                                                                           |       |       |
|         | Principle of Manufacturing, Properties & Applications of Plastics                                                                           |       |       |
|         | (Detail description of Manufacturing and flow sheet not expected)                                                                           |       |       |
|         | Engineering Plastics                                                                                                                        |       |       |
|         | Specific Objectives:                                                                                                                        |       |       |
|         | <ul> <li>Elaborate the features of preparation of plastic materials</li> </ul>                                                              |       |       |
| 3       | <ul> <li>Endobrate the reduces of preparation of plastic materials.</li> <li>Interpret properties and applications relationship.</li> </ul> |       |       |
| 5       | <ul> <li>Compare the different plastic materials according to their</li> </ul>                                                              |       |       |
|         | properties and structures                                                                                                                   |       |       |
|         | Contents.                                                                                                                                   |       |       |
|         | Acrylonitrile Butadien Styrene Polycarbonate Polyacetals                                                                                    | 10    | 14    |
|         | Polyamides such as Nylon-6 Nylon-66 Polyphenyleneoxide                                                                                      |       |       |
|         | Polytetrafluroethylene.                                                                                                                     |       |       |
|         | Principle of Manufacturing, Properties & Applications of Plastics                                                                           |       |       |
|         | (Detail description of Manufacturing and flow sheet not expected)                                                                           |       |       |
|         |                                                                                                                                             |       |       |
| Δ       | Thermosetting Plastics:                                                                                                                     |       |       |
| 4       | Specific Objectives:                                                                                                                        |       |       |
|         | Prepare the plastic materials by laboratory method.                                                                                         |       |       |
|         | Follow standard procedure for polymer preparation.                                                                                          |       |       |
|         | Contents:                                                                                                                                   | 08    | 12    |

|   | • Phenol formaldehyde, Urea formaldehyde, Melamine formaldehyde, Epoxy, Polyurethane, Unsaturated polyester.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |    |     |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
|   | Principle of Manufacturing, Properties & Applications of Plastics<br>(Detail description of Manufacturing and flow sheet not expected)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |    |     |
| 5 | <ul> <li>Engineering Plastics:</li> <li>Specific Objectives:</li> <li>Compare the plastic materials according to their properties.</li> <li>Select suitable plastic materials depending on the end applications.</li> <li>Identify plastics by flame test.</li> <li>Contents: <ul> <li>Ethylene vinyl acetate, Styrene acrylonitrile, PPS, PEEK, Polyamide-imide, Bismelamide.</li> </ul> </li> </ul>                                                                                                                                                                                                                   | 06 | 08  |
| 6 | <ul> <li>Additives &amp; Compounding :<br/>Specific Objectives:</li> <li>&gt; Use different additives for Plastic Materials Processing.</li> <li>&gt; Select the suitable compounding equipments.</li> <li>Contents: <ul> <li>Need of compounding, Plasticizers, Heat and Light stabilizers, Fillers, Colorants, Lubricants, Extenders, Flame retardants, Impact modifiers, Blowing agents, their functions, examples and selection criteria. Equipments of compounding such as Tumbler mixer, High speed mixer, Internal mixer, Batch mixer, Continuous mixer, Two roll mill and Banbury mixer.</li> </ul> </li> </ul> | 10 | 16  |
|   | Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 64 | 100 |

### **Practical:**

Skills to be developed:

### **Intellectual Skill**

- 1. To prepare the plastics materials by laboratory methods
- 2. To select additives for compounding of plastics materials.
- 3. To compare the plastics materials according to their properties
- 4. To select the suitable compounding equipment.

### **Motor Skills**

- 1. To follow standard procedure of polymer preparation.
- 2. To run machine successfully.
- 3. To understand the operation of machine.
- 4. To identify plastics by flame test.

### **List of Practicals:**

MSBTE - Final Copy Dt. 30/08/2013

| Sr.<br>No. | List of Experiments                                               |  |  |  |  |  |
|------------|-------------------------------------------------------------------|--|--|--|--|--|
|            | Identification of commodity plastics by flame and solvent test    |  |  |  |  |  |
| 1          | To identify the given polymer : Polystyrene (PS)                  |  |  |  |  |  |
| 2          | To identify the given polymer : Poly Vinyl Chloride (PVC)         |  |  |  |  |  |
| 3          | To identify the given polymer : Low Density Polyethylene (LDPE)   |  |  |  |  |  |
| 4          | To identify the given polymer : High Density Polyethylene (HDPE)  |  |  |  |  |  |
| 5          | To identify the given polymer : Polypropylene (PP)                |  |  |  |  |  |
| 6          | To prepare compound of Poly (vinyl chloride) by high speed mixer. |  |  |  |  |  |
| 7          | To Mix the additives with plastics by tumbler mixer.              |  |  |  |  |  |
| 8          | To determine the Bulk factor of Plastic Materials.                |  |  |  |  |  |
| 9          | To determine density of plastic material.                         |  |  |  |  |  |
| 10         | To determine acid value of given plastic material.                |  |  |  |  |  |
| 11         | To determine iodine value of given plastic material.              |  |  |  |  |  |
| 12         | Determination of moisture content of plastics materials.          |  |  |  |  |  |
| 13         | Determination of softening range of polymers.                     |  |  |  |  |  |
| 14         | Simple test for cure of plastic articles and laminates.           |  |  |  |  |  |

# Learning Resources:

Books:

| Sr.<br>No. | Title                                                                         | Author              | Publisher           |
|------------|-------------------------------------------------------------------------------|---------------------|---------------------|
| 1          | Plastic Materials                                                             | J. A. Brydson       | Butterworth         |
| 2          | Polymer Science                                                               | V. R. Gowarikar     | Willey Interscience |
| 3          | Text Book of Polymer Science                                                  | Clindsivy Billmeyer | Willey Interscience |
| 4          | PVC Technology                                                                | Titow               | Willey Interscience |
| 5          | Handbook of Additives                                                         | John Murphy         | Willey Interscience |
| 6          | A Text Book of Polymer (Chem. &<br>Technology of Polymer, Vol. 1 &<br>Vol. 2) | M. S. Bhatnagar     |                     |
| 7          | Plastics Material Properties &<br>Application (Vol. 1,2,3)                    | Birlen              | Willey Interscience |
| 8          | Handbook of Plastics Material & Technology                                    | Rubin               | Willey Interscience |

| Course Name   | : Diploma in Plastics Engineering |
|---------------|-----------------------------------|
| Course Code   | : PS                              |
| Semester      | : Fourth                          |
| Subject Title | : Plastics Processing-I           |
| Subject Code  | : 17449                           |

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |               |     | Examinati | on Scheme |    |       |
|-----------------|----|----|---------------|-----|-----------|-----------|----|-------|
| TH              | TU | PR | PAPER<br>HRS. | TH  | PR        | OR        | TW | TOTAL |
| 04              |    | 02 | 03            | 100 |           | 25#       |    | 125   |

#### NOTE:

- > Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- > Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

#### **Rationale:**

Plastic engineers are supposed to with various plastic processing machines .This course is introduce to induce abilities among the technician by providing the knowledge work of principle construction working and setting parameters of various machinery used for the plastic processing. This course also gives knowledge of process optimization.

### **Objectives:**

- 1. To select suitable processing technique.
- 2. To optimize the process.
- 3. To understand the principle and operation of processing technique.
- 4. To analyze and overcome the faults arising during processing.

#### **Learning Structure:**



## **Contents: Theory**

| Chapter | Name of the Topic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Hours | Marks |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
| 1       | <ul> <li>Extrusion:</li> <li>Specific Objectives:</li> <li>The student will be able to:</li> <li>Analyse practical significance of extrusion</li> <li>Describe configuration of extrusion</li> <li>Find faults, causes and remedies in extruded product</li> <li>Contents</li> <li>Basic process, Single screw extruder- constructional features of different parts such as hopper barrel, screw, heating and cooling systems, breaker plate and screen pack etc. Drive systems for extruder. (06 Marks)</li> <li>Extrusion line diagrams <ul> <li>a) Pelletizing unit. Pipe extrusion- Process plant layout and auxiliary equipments such as sizing device, cooling trough, take-off unit, cutter, and coiler. Tilting platform socketing, printing.</li> <li>b) Sheet extrusion- process layout and auxiliary equipments such as cooling unit, stripping roll-unit, gauging heads, cut-out unit, sheet stacker and coiler.</li> <li>c) Blown film extrusion- process plant layout and auxiliary equipments such as venture ring support, bubble blowing unit, cooling unit, bubble collapsing plates film treatment winder unit, co extrusion (12 Marks)</li> </ul> </li> <li>Extrusion Dies <ul> <li>Description and constructional details of the following extrusion dies. Basic die terminology, General design considerations. Wire and cable coating die, Pipe die and their types- Plain pipe and corrugated pipe, Sheet die and cast film die- Coat hanger die, T-die, and fish tail die, control of thickness.Types of blown film die - side fed &amp; bottom fed. (10 Mark)</li> <li>Twin screw extruder - Types of screw, co-rotating, counter rotating, Driving mechanism, its comparison with single screw. Trouble shooting in extrusion i.e. defects, causes and remedies. (06 Mark)</li> </ul> </li> </ul> | 17    | 34    |
| 2       | <ul> <li>Injection Moulding:</li> <li>Specific Objectives: The student will be able to: <ul> <li>Analyse practical significance of injection moulding</li> <li>Describe configuration of injection moulding</li> <li>Discuss the trouble shooting guide for injection Molding</li> </ul> </li> <li>Contents <ul> <li>Basic process, types of injection moulding machine-plunger type, screw type moulding machine, criteria for its selection.</li> <li>Injection moulding cycle, moulding materials. Constructional features of hopper, barrel, screw, nozzle. Description of injection unit, shot capacity, plasticizing capacity, injection pressure. Description of locking unit, mould clamping force, size of platen, daylight opening.</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 17    | 30    |

|   | (10 Marks)                                                                                                                                                                                                                                                                                                                                                                                |    |    |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|
|   | <ul> <li>Comparison between mechanical and hydraulic clamping<br/>system. Effect of processing parameters on quality of<br/>product. Advantages and disadvantages of injection<br/>moulding. Moulding defects-causes and remedies.(08<br/>Mark)</li> </ul>                                                                                                                                |    |    |
|   | • Injection Moulding of thermosets. Gas assisted injection moulding Reaction injection moulding- basic process, materials & applications. (06Mark)                                                                                                                                                                                                                                        |    |    |
|   | Blow Moulding                                                                                                                                                                                                                                                                                                                                                                             |    |    |
|   | <ul> <li>Specific Objectives: The student will be able to:</li> <li>Analyse practical significance of blow moulding,</li> <li>Describe configuration of blow moulding,</li> <li>Find faults, causes and remedies in blow moulded products.</li> </ul>                                                                                                                                     |    |    |
| 3 | <ul> <li>Contents-</li> <li>Principle, materials and applications, Types of blow molding - continuous extrusion, intermittent extrusion, injection and stretch blow moulding. (06 Mark)</li> <li>Parision cutting devices, Parison thickness control methods,</li> </ul>                                                                                                                  | 14 | 10 |
|   | Process parameters and their effect on quality of products,<br>Trouble shooting (04 Mark)                                                                                                                                                                                                                                                                                                 |    |    |
|   | 4. Thermoforming:                                                                                                                                                                                                                                                                                                                                                                         |    |    |
|   | <ul> <li>&gt; Analyse practical significance of therforming</li> <li>&gt; Describe configuration of therforming</li> <li>&gt; Know process variables in therforming.</li> <li>&gt; Find defects, causes and remedies in therforming.</li> </ul>                                                                                                                                           |    |    |
|   | Contents-                                                                                                                                                                                                                                                                                                                                                                                 |    |    |
| 4 | • Basic process, materials and applications. Methods of<br>Thermoforming, plug assist forming, Drape forming, plug<br>and Ring forming, Slip forming, Ridge forming, Reverse<br>Draw with plug Assists, vacuum forming, snap back<br>forming, match mold forming, plug & ring, pressure<br>forming, dual - sheet forming , trimming methods (08<br>Mark)                                  | 10 | 14 |
|   | • Process variables:- air temperature, mould temperature, plastic memory, hot elongation /strength, Remedies and causes of defects in thermoforming. Advantages and disadvantages of thermoforming. Comparison of thermoforming with injection moulding. (06 Mark)                                                                                                                        |    |    |
| 5 | <ul> <li>Cellular Plastics-</li> <li>Specific Objective</li> <li>The student should be able to</li> <li>Distinguish the application of cellular plastic products</li> <li>Analyse the practical significance of cellular plastics</li> <li>Acquire skill of identifying the art of cellular plastics</li> <li>Understading the principle and operation of calendaring process.</li> </ul> | 06 | 12 |
|   |                                                                                                                                                                                                                                                                                                                                                                                           |    |    |

| Contents:                                                                                                                                                                                                                                                                                                                                                                                                               |    |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
| • Basic process, methods of foam manufacturing, chemical blowing agents, choice of chemical blowing agents (azobis isobutyro nitril, dinitroso petamethylene tetramine, azodicarbonamide, benzene sulphonylhydrazide),(04 Mark)                                                                                                                                                                                         |    |     |
| <ul> <li>Methods of preparation, properties and applications of following foams, Polyurethane foam - processing rigid PU foam, processing flexible PU foam (Slab Stock Process), Properties of PU foam, Applications of PU foam.</li> <li>PS foam:- Extruded PS foam and moulded bead PS foam, PS foam properties, applications for PS foam.</li> <li>PVC foam :- method of preparation of PVC foam by using</li> </ul> |    |     |
| Total                                                                                                                                                                                                                                                                                                                                                                                                                   | 64 | 100 |

### Practicals: Intellectual Skills:

- 1. Select the process
- 2. Set process parameters for accurate molding
- 3. Find out faults of machine ,product during processing & set remedies accordingly
- 4. Optimization of process

### Motor Skills:

- 1. Start & stop the machine.
- 2. Select the proper machine for particular job work.
- 3. Loading & unloading the molds.
- 4. Run the process successfully without hazards.
- 5. Take safety precaution during processing.

## List of Praticals:

- 1. Trial on hand injection moulding machine
- 2. Demonstrate Compression molding process
- 3. To measure technical specification of single screw extruder
- 4. To study effect of process parameter on quality of injection molding product.

27

- 5. Trial on blow molding machine
- 6. To study effect of process parameter on quality of blow molding product
- 7. To demonstrate loading and unloading of injection mould on machine.
- 8. Trouble shooting in injection moulding.
- 9. Trial on extrusion blow moulding machine
- 10. Trouble shooting in blow moulding

11. To demonstrate thermoforming process.

#### Learning Resources: Books:

| в | 0 | 0 | K | S | : |  |
|---|---|---|---|---|---|--|
|   |   |   |   |   |   |  |

| Sr.<br>No. | Title                                                  | Author            | Publisher        |
|------------|--------------------------------------------------------|-------------------|------------------|
| 1          | Compression and Transfer<br>Moulding                   | J. Butler         |                  |
| 2          | SPI Plastics Engineering Hand<br>Book                  | Michael L. Berino | Chapman & hall   |
| 3          | Handbook of Injection Moulding                         | Rosato            |                  |
| 4          | Handbook of thermoforming                              | Throne            | HANSER           |
| 5          | Basic Principles of Thermoforming                      | Bruins            | SPC              |
| 6          | Plastics Extraction Tech. Handbook                     | Sidney Lery       | Industrial Press |
| 7          | A textbook of polymer ( chemistry & tech of polymers ) | M.S.Bhatnagar     |                  |
| 8          | Moulding of thermosetting plastics                     | Whealane          |                  |
| 9          | Handbook of Blow Moulding                              | Rosato            | Hanser           |

Course Name : Diploma in Plastics EngineeringCourse Code : PSSemester : FourthSubject Title : Computer ProgrammingSubject Code : 17045

### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |    | Examinati | on Scheme |    |       |
|-----------------|----|----|--------------|----|-----------|-----------|----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH | PR        | OR        | TW | TOTAL |
| 01              |    | 02 |              |    | 50@       |           |    | 50    |

### **Rationale:**

In advanced age of computer, it becomes essential to understand how to give instructions to computers. This course intends to expose a student to the basic principles of programming through a structured programming language like 'C'. Study of this course would enable the students to learn any advanced Object Oriented Language.

### **Objectives:**

Students should be able to:

- 1. Break a given task into subtasks.
- 2. Enhance logical thinking.
- 3. Develop 'C' programs for simple applications.

#### **Learning Structure:**



#### **Contents: Theory**

| Chapter | Name of the Topic                                                                                                                                                                                                              | Hours |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 1       | <b>Introduction:</b><br>Problem, definition and analysis, algorithm, flow charts, tracing and dry running of algorithms. Introduction to 'C' programming, simple program using Turbo 'C' compiler and execution of 'C' program | 02    |
| 2       | C Fundamentals: Character set, constants, data types, identifiers, key words, variable declarations<br>Types of Operators - unary, binary, arithmetic, relational, logical, assignment.                                        | 03    |
|         | Hierarchy of operators, expressions, library functions, Use of input/ output functions viz. Printf(), Scanf(), getch(), putch()                                                                                                |       |
| 3       | Use of Control Statements: if-else, while loop, do - while loop, for loop,<br>switch, break and continue.<br>Writing, Compiling, Executing and debugging programs                                                              | 05    |
| 4       | Introduction to Subscripted variables, arrays, defining and declaring one<br>and two dimensional arrays, reading and writing                                                                                                   | 03    |
| 4       | Concept of String, string input / output functions<br>Defining and accessing a user defined functions, Passing of arguments,<br>declaration of function prototypes<br>Storage classes: automatic, external, static variables   | 03    |
|         | Total                                                                                                                                                                                                                          | 16    |

### Practical: Skills to be developed:

#### **Intellectual Skills:**

- 1. Prepare and interpret flow chart of a given problem.
- 2. Represent data in various forms.
- 3. Use various control statements and functions

### **Motor Skills:**

- 1. Write program in 'C' language.
- 2. Run and debug 'C' program successfully.

#### **List of Practical:**

To write simple programme having engineering application involving following statements

- 1. Use of Sequential structure.
- 2. Use of if-else statements.
- 3. Use of for statement.
- 4. Use of Do-While Statement.

- 5. Use of While statement.
- 6. Use of brake and Continue statement.
- 7. Use of multiple branching Switch statement.
- 8. Use of different format specifies using Scanf() and Printf()
- 9. Use of one dimensional array e.g. String, finding standard deviation of a group data.
- 10. Use of two dimensional arrays of integers/ reals.
- 11. Defining a function and calling it in the main.

# Learning Resources:

**Books:** 

| Sr.<br>No. | Author                          | Title                           | Publication                |
|------------|---------------------------------|---------------------------------|----------------------------|
| 01         | Byron Gotfried                  | Introduction to 'C' programming | Tata McGraw Hill           |
| 02         | Yashwant Kanitkar               | Let us 'C'                      | BPB publications           |
| 03         | Denis Ritchie and<br>Kerninghan | Introduction to 'C' programming | Prantice Hall Publications |
| 04         | Balguruswamy                    | Programming in 'C'              | Tata McGraw Hill           |

Course Name : Diploma in Plastics EngineeringCourse Code : PSSemester : FourthSubject Title : Professional Practices-IISubject Code : 17046

#### **Teaching and Examination Scheme:**

| Teaching Scheme |    |    |              |    | Examinati | on Scheme |     |       |
|-----------------|----|----|--------------|----|-----------|-----------|-----|-------|
| TH              | TU | PR | PAPER<br>HRS | TH | PR        | OR        | TW  | TOTAL |
|                 |    | 03 |              |    |           |           | 50@ | 50    |

### **Rationale:**

The purpose of introducing Professional practices is to fulfill the need of students to stand in today's global market with knowledge and confidence. This can be achieved by arranging industrial visits, expert lectures attitude to present them-selves, get alternative solutions and validation of the selected alternatives, socially relevant activities, and modular courses. Professional practices is helpful in broadening technology base of students beyond curriculum. Model making exercises allow students to think more creatively and innovatively and inculcating habit of working with their own hands. Modular courses are introduced with a view of learning and acquiring higher technology skills through industry experts and consultants from the respective fields.

### **Objectives:**

The student will be able to:

- 1) Acquire information from different sources.
- 2) Prepare notes for given topics.
- 3) Present seminar using power projection system.
- 4) Interact with peers to share thoughts.
- 5) Work in a team and develop team spirit.

### Intellectual Skill:

Student will be able to:

- 1) Search information from various resources.
- 2) Prepare notes on selected topics.
- 3) Participate in group discussions.

#### **Motor Skills:**

1) Observe industrial practices during visits.

MSBTE - Final Copy Dt. 30/08/2013

- 2) Prepare slides / charts for presentation in seminar.
- 3) Develop a model

## **Learning Structure:**

| Applications | Gaining confidence in report writing and presentations skills in identified<br>contents of curriculum, apply knowledge in model making. Developing self<br>learning habbit. |  |  |  |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
|              |                                                                                                                                                                             |  |  |  |
| Procedures   | Writing skill, expert lectures, seminars, industrial visit, material conversion processes, brain storming technique.                                                        |  |  |  |
|              |                                                                                                                                                                             |  |  |  |
| Concepts     | Industry Institute Interaction, Team work, brain storming, information search.                                                                                              |  |  |  |
|              |                                                                                                                                                                             |  |  |  |
| Facts        | Contents of identified topics, Industrial experts, models, equipments, machinery, projection system, etc.                                                                   |  |  |  |

## **Content: Theory**

| Topic & Content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Hours |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <b>1. Information Search:</b><br>Information search be made through manufacturers catalogue, Hand books, magazines journal and websites, and submit a report on <b>any Two Topics</b> in a group of 3 to 4 students, report size shall not be more than 10 pages.<br>Following topics are suggested, any other equivalent topics may be selected.                                                                                                                                                                  |       |
| <ol> <li>Collect the information related to manufacturer, suppliers, grades &amp; cost of the plastic materials.</li> <li>Collect the information related to manufacturer, suppliers, type of the plastic machine manufacture</li> <li>Collect the information related to manufacturer, suppliers, of the plastic mold.</li> <li>Collect the information related to different machining carry out on mold plate.</li> <li>Collect the information related to different heat treatment on mold material.</li> </ol> | 06    |
| 2. Lectures by professionals/Industry Experts-                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |
| Two lectures of two hour duration be arranged on any two topics suggested below or<br>any other suitable topics <b>to acquire practical information beyond scope of</b>                                                                                                                                                                                                                                                                                                                                            |       |
| <ul> <li>Students shall prepare a brief report of each lecture as a part of their term work.</li> <li>i) Components of project Report.</li> <li>ii) Various loan schemes of banks, LIC and other agencies for education and other purposes.</li> </ul>                                                                                                                                                                                                                                                             | 06    |
| <ul> <li>iii) Use of plastics &amp; rubbers in Automobiles industries.</li> <li>iv) Type of processes used to protect material surfaces from environmental effect.</li> <li>v) Product life cycle.</li> <li>vi) Industrial application of PTEE</li> </ul>                                                                                                                                                                                                                                                          |       |
| <ul><li>vii) Processing of RPVC for pipe manufacturing application.</li><li>viii) Quality control in plastic industries.</li><li>xiii) Industrial drives-Types, components, comparison and applications.</li></ul>                                                                                                                                                                                                                                                                                                 |       |
| <b>3. Seminars:</b><br>One seminar be arranged on the subjects related to 4 <sup>th</sup> semester. Or topics beyond                                                                                                                                                                                                                                                                                                                                                                                               |       |
| curriculum.<br>Each student shall submit a report up to 10 pages and deliver the seminar.<br>batch size – 2-3 students.<br>Source of information – books, magazine , Journals, Website ,surveys,                                                                                                                                                                                                                                                                                                                   |       |
| <ul> <li>Topics suggested for guidance-</li> <li>i) Foam Extrusion.</li> <li>ii) Two component injection molding.</li> <li>iii) Gas assist injection molding.</li> </ul>                                                                                                                                                                                                                                                                                                                                           | 06    |
| <ul> <li>iv) Multilayer extrusion process.</li> <li>v) On line thermoforming process.</li> <li>vi) Quality control in injection molding.</li> <li>vii) Microinjection molding.</li> </ul>                                                                                                                                                                                                                                                                                                                          |       |
| <ul><li>viii) Fully electrical operated injection molding machine.</li><li>ix) Twin screw extrusion techniques.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                          |       |

| 4. Industrial visits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| <ul> <li>4. Industrial visits</li> <li>Structured industrial visits be arranged and report of the same shall be submitted by each student to form a part of the term work.<br/>No of visits- At least one</li> <li>Scale of industry- medium scale unit, large scale unit.</li> <li>Group size- practical batch</li> <li>Report-not exceeding 7 to 10 pages.</li> <li>Purpose : <ul> <li>To study the profile of industry</li> <li>To see the advanced manufacturing processes &amp; machinery.</li> <li>To observe working of Plastic industry.</li> <li>To observe working in different shops in plastic industries</li> <li>To study process sheets, quality control charts &amp; production drawings, Plastic testing laboratory</li> <li>To observe Tool room, standards room etc.</li> </ul> </li> </ul> |  |  |
| <ul> <li>Following types of industries may be visited in &amp; around the institute.</li> <li>i) Mold manufacturing</li> <li>ii) Extrusion molding process( Pipe/ film)</li> <li>iii) Thermoforming industries</li> <li>iv) Injection molding industries.</li> <li>v) Compression &amp; transfer molding industries</li> <li>vi) Printing &amp; decorating techniques industries.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  |
| <ul> <li>5. Socially Relevant Activities</li> <li>Conduct any one activity through active participation of students and write the report.</li> <li>Group of students- maximum 4</li> <li>Report- Not more than 6 pages</li> <li>List of suggested activities- (activities may be thought in terms of campus improvement)</li> <li>i ) Awareness about carbon credit</li> <li>ii) Anticorruption movement</li> <li>iii) Awareness about cyber crimes.</li> <li>iv) Developing good citizens.</li> <li>v) Management of E- WASTE</li> <li>vi) Recycling of waste materials.</li> <li>vii) Accident prevention &amp; enforcement of safely rules.</li> <li>viii) Awareness about pollution and pollution control.</li> <li>(Any other relevant activity may be performed)</li> </ul>                              |  |  |
| <ul> <li>6. Individual Assignment</li> <li>At least one Assignment from each theory subject of 4<sup>th</sup> sem. shall be chosen to form a part of term work.</li> <li>* Assignment shall be problem solving type, comparative study type, application oriented etc.</li> <li>* Subject teacher of various subjects shall prepare 'question bank 'and allot the Assignment Individually or in a group of 3to4 students.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                           |  |  |

| 7. Mini Projects |                                                                                                                                                                                                                                                                                            |    |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Stude            | <ul> <li>nts, in a group of 4, shall perform any one activity listed below.</li> <li>odel making out of card board paper, wood, thermocol, plastics, metal, clay etc.</li> <li>a) Any new idea/principle converted into model</li> <li>b) Mechanisms</li> <li>c) Toggles system</li> </ul> |    |
| ii) T            | oy making with simple operating mechanisms                                                                                                                                                                                                                                                 |    |
| iii L            | ayout of workshop/department/college                                                                                                                                                                                                                                                       | 12 |
| iv) E            | xperimental set up/testing of a parameter                                                                                                                                                                                                                                                  |    |
| v) D             | bisplay board indicating different type of machine components like screw,                                                                                                                                                                                                                  |    |
| b                | arrel, heater, fasteners, couplings ,pipe fitting, valves, thermocouple, exploded                                                                                                                                                                                                          |    |
| v                | iews of assemblies,                                                                                                                                                                                                                                                                        |    |
| vi) A            | ny relevant project which will make students to collect information & work with                                                                                                                                                                                                            |    |
| tl               | neir own hands.                                                                                                                                                                                                                                                                            |    |
| S                | tudents shall arrange exhibition of all mini projects in the class/hall and present the                                                                                                                                                                                                    |    |
| ta               | ask to the audience/ experts/examiners. The student shall submit a brief report                                                                                                                                                                                                            |    |
| (]               | Max. 5 pages) of the mini project.                                                                                                                                                                                                                                                         |    |

# Learning Resources:

## 1. Books:

| Sr.<br>No. | Author                                  | Title                                            | Publisher                                          |
|------------|-----------------------------------------|--------------------------------------------------|----------------------------------------------------|
| 01         | NRDC, Publication Bi<br>Monthly Journal | Invention Intelligence Journal                   | National Research Development<br>Corporation, GOI. |
| 02         | DK Publishing                           | How things works<br>encyclopedia                 | DK Publishing                                      |
| 03         | Trott                                   | Innovation mgmt.& new product development        | Pearson Education                                  |
| 04         | Joe Tidd                                | Managing innovation                              | Winey Publication                                  |
| 05         | E.H. McGrath, S.J.                      | Basic Managerial Skills for<br>All-Ninth Edition | РНІ                                                |

### 2. Web sites

www.start2think.com www.Innovationgoldmine.com www.engineeringforchange.org www.qcfihq.com www.wikipedia.com www.slideshare.com www.teachertube.com

# Course Name : All Branches of Diploma in Engineering & Technology Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/FG Industrial Training (Optional) after 4<sup>th</sup> semester examination.

Note:- Examination in Professional Practices of 5<sup>th</sup> Semester.

## INDUSTRIAL TRAINING (OPTIONAL)

### Rational:-

There was a common suggestion from the industry as well as other stakeholders that curriculum of Engineering and Technology courses should have Industrial training as part of the curriculum. When this issue of industrial training was discussed it was found that it will be difficult to make industrial training compulsory for all students of all courses as it will be difficult to find placement for all the students. It is therefore now proposed that this training can be included in the curriculum as optional training for student who is willing to undertake such training on their own. The institutes will help them in getting placement or also providing them requisite documents which the student may need to get the placement.

Details:- Student can undergo training in related industries as guided by subject teachers / HOD.

- The training will be for four weeks duration in the summer vacation after the fourth semester examination is over.
- The student undergoing such training will have to submit a report of the training duly certified by the competent authority from the industry clearly indicating the achievements of the student during training. This submission is to be made after joining the institute for Fifth semester.
- The student completing this training will have to deliver a seminar on the training activities based on the report in the subject Professional Practices at Fifth Semester.
- The student undergoing this training will be exempted from attending activities under Professional Practices at Fifth semester except the seminar.
- The students who will not undergo such training will have to attend Professional Practices Classes/activities of fifth semester and will have to complete the tasks given during the semester under this head.
- There work will be evaluated on their submissions as per requirement and will be given marks out of 50. Or student may have to give seminar on training in Industry he attended.
- Institute shall encourage and guide students for Industry training.
- Evaluation:- Report of Training attended and delivery of seminar and actual experience in Industry will be evaluated in fifth semester under Profession Practices-III and marks will be given accordingly out of 50.