 MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES																
COURSE NAME : CIVIL ENGINEERING GROUP																
COURSE CODE : CE/CS/CR/CV																
DURATION OF COURSE : 6 SEMESTERS for CE/CS/CR (8 SEMESTERS for CV)											WITH EFFECT FROM 2012-13					
SEMESTER : FOURTH											DURATION : 16 WEEKS					
PATTERN : FULL TIME - SEMESTER											SCHEME : G					
SR. NO	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME									SW (17400)
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)		
								Max	Min	Max	Min	Max	Min	Max	Min	
1	Environmental Studies \$	EST	17401	01	--	02	01	50#*	20	--	--	--	--	25@	10	50
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	
5	Hydraulics	HYD	17421	03	--	02	03	100	40	25#	10	--	--	25@	10	
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 (Optional)			Examination in 5th Semester Professional Practices-III												
<p>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 IVth semester & before Vth semester. Optional for the students & to be assessed in the Vth 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 5th Semester.</p> <ul style="list-style-type: none"> ➤ 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/AU**

Semester : Fourth

Subject Title : Environmental Studies

Subject Code : 17401

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

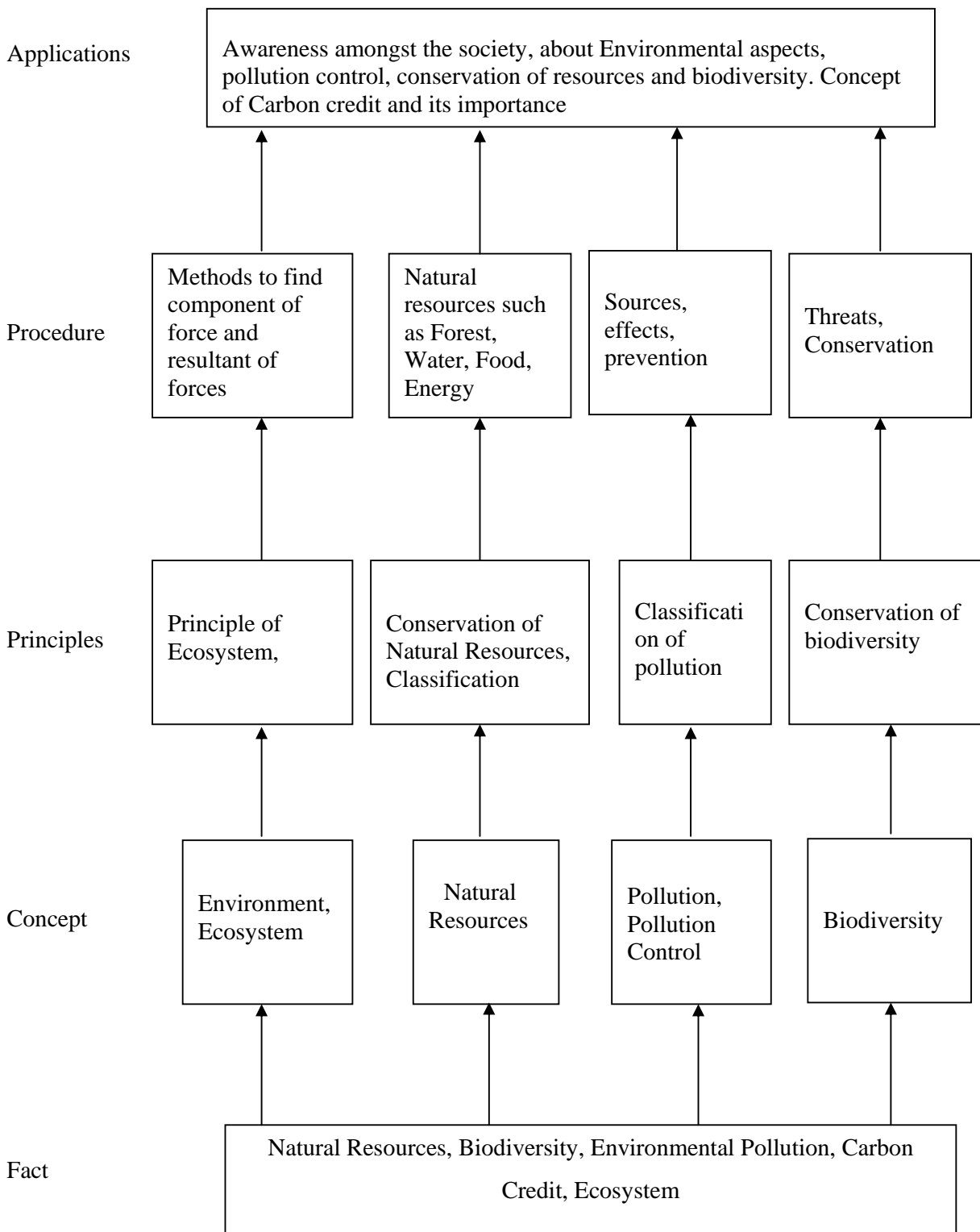
It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

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
<p>Topic 1: Nature of Environmental Studies</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define the terms related to Environmental Studies ➤ State importance of awareness about environment in general public <p>Contents:</p> <ul style="list-style-type: none"> • Definition, Scope and Importance of the environmental studies • Importance of the studies irrespective of course • Need for creating public awareness about environmental issues 	01	04
<p>Topic 2: Natural Resources and Associated Problems</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define natural resources and identify problems associated with them ➤ Identify uses and their overexploitation ➤ Identify alternate resources and their importance for environment <p>Contents:</p> <p>2.1 Renewable and Non renewable resources</p> <ul style="list-style-type: none"> • Definition • Associated problems <p>2.2 Forest Resources</p> <ul style="list-style-type: none"> • General description of forest resources • Functions and benefits of forest resources • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc. <p>2.3 Water Resources</p> <ul style="list-style-type: none"> • Hydrosphere: Different sources of water • Use and overexploitation of surface and ground water • Effect of floods, draught, dams etc. on water resources and community <p>2.4 Mineral Resources:</p> <ul style="list-style-type: none"> • Categories of mineral resources • Basics of mining activities • Mine safety • Effect of mining on environment <p>2.5 Food Resources:</p> <ul style="list-style-type: none"> • Food for all • Effects of modern agriculture • World food problem 	04	10
<p>Topic 3. Ecosystems</p> <ul style="list-style-type: none"> • Concept of Ecosystem • Structure and functions of ecosystem • Energy flow in ecosystem • Major ecosystems in the world 	01	04
<p>Topic 4. Biodiversity and Its Conservation</p> <ul style="list-style-type: none"> • Definition of Biodiversity • Levels of biodiversity 	02	06

<ul style="list-style-type: none"> • Value of biodiversity • Threats to biodiversity • Conservation of biodiversity 		
Topic 5. Environmental Pollution <ul style="list-style-type: none"> • Definition • Air pollution: Definition, Classification, sources, effects, prevention • Water Pollution: Definition, Classification, sources, effects, prevention • Soil Pollution: Definition, sources, effects, prevention • Noise Pollution: Definition, sources, effects, prevention 	03	08
Topic 6. Social Issues and Environment <ul style="list-style-type: none"> • Concept of development, sustainable development • Water conservation, Watershed management, Rain water 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 	03	10
Topic 7. Environmental Protection Brief description of the following acts and their provisions: <ul style="list-style-type: none"> • Environmental Protection Act • Air (Prevention and Control of Pollution) Act • Water (Prevention and Control of Pollution) Act • Wildlife Protection Act • Forest Conservation Act Population Growth: Aspects, importance and effect on environment <ul style="list-style-type: none"> • Human Health and Human Rights 	02	08
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. No.	Author	Title	Publisher
01	Anindita Basak	Environmental Studies	Pearson Education
02	R. Rajgopalan	Environmental Studies from Crises to Cure	Oxford University Press
03	Dr. R. J. Ranjit Daniels, Dr. 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:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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 tunnelling. 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.

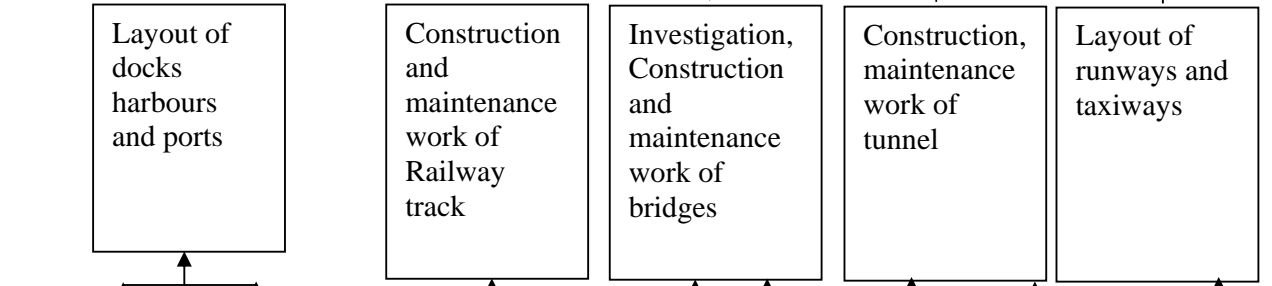
- Organize, supervise and coordinate the construction activities related to railway, bridges and tunnels

Learning Structure:

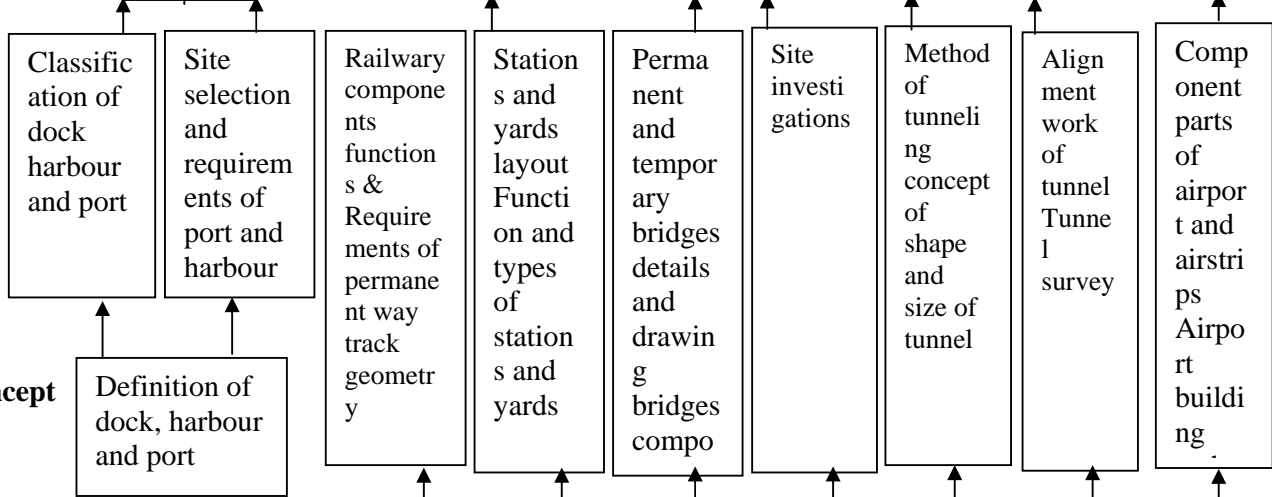
Application

Investigation, planning, preparation of drawing, construction, inspection, & maintenance of Railways, Bridges, Tunnel, Engineering Structures. Layout of docks, harbors and ports, runways and taxiways.

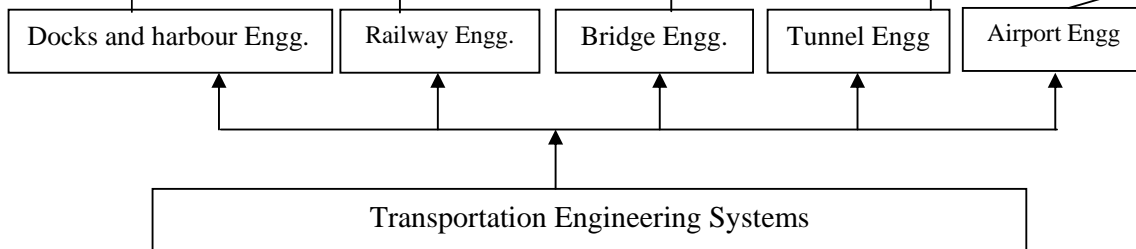
Procedure



Concept



Fact



Theory:

Topic and Contents	Hours	Marks
<p>Topic 1. Overview of Transportation Engineering</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> ➤ List various modes of transportation system with their merits and demerits ➤ State importance of cross drainage works <p>Contents:</p> <ul style="list-style-type: none"> • 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. 	02	04
<p>Topic 2. Railway Engineering</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> ➤ 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 <p>Contents:</p> <p>2.1 Alignment and Gauges and Permanent ways.....12</p> <ul style="list-style-type: none"> • 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 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. <p>2.2 Railway Track Geometrics and Branching of Tracks.....14</p> <ul style="list-style-type: none"> • 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. <p>2.3 Station and Yards and Track Maintenance.....06</p>	18	32

<ul style="list-style-type: none"> • Site selection for railway stations, Requirements of railway station, Types of stations (way side, crossing, junction and terminal) 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, organisation, duties of permanent way inspector, gang mate key man. 		
<p>Topic 3. Bridge Engineering Specific objectives:</p> <ul style="list-style-type: none"> ➤ Define different terminologies related to bridge engineering ➤ State functions of component parts of bridge ➤ Draw sketches of temporary and permanent bridges <p>Contents: 3.1 Site selection and investigation.....08 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 HFL. 3.2 Component parts of bridge.....16 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. Foundation – function, types. Piers-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. 3.3 Permanent and Temporary Bridges and Maintenance of Bridge...08</p> <ul style="list-style-type: none"> • 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 • Inspection and Maintenance Of Bridge Inspection of bridges-General points to be observed. Pre and post monsoon inspection-Purpose Maintenance of bridges: types – routine and special Maintenance. 	16	32
<p>Topic 4. Tunnel Engineering. Specific objectives:</p> <ul style="list-style-type: none"> ➤ Draw tunnel cross sections for highways and railways. ➤ List data for tunnel investigation and survey. ➤ State precautions in constructions of tunnel. <p>Contents: 4.1.....16</p> <ul style="list-style-type: none"> • Definition, necessity, advantages, disadvantages, Classification of tunnels, Shape and Size of tunnels, Tunnel Cross sections for highway and railways 	12	32

<ul style="list-style-type: none"> Tunnel investigations and surveying –Tunnel surveying locating center line on ground, transferring center line inside the tunnel. Shaft - its purpose and construction. 		
4.216		
<ul style="list-style-type: none"> Methods of tunneling in Soft rock-needle beam method, fore-poling method. Line plate method, shield method. Methods of tunneling in Hard rock-Full-face heading method, Heading and bench method, drift method Precautions in construction of tunnels Drilling equipments-drills and drills carrying equipments, Types of explosives used in tunneling. Tunnel lining and ventilation-Purpose and methods 		
Total	48	100

Learning Resources:**1. Books:**

Sr. No.	Title	Author	Publisher
01	Railway Engineering	S.C. Saxena	Dhanpatrai & sons
02	Railway Track	K.R. Antia	The New Book Co. Pvt. Ltd Mumbai
03	Principles of Railway Engineering	S.C. Rangwala	Charotar Publication
04	Principles and Practice of Bridge Engineering	S.P. Bindra	Dhanpatrai & sons
05	A Text book Transportation Book of Engineering	N.L.Arora and S.P. 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. No.	Title
01	IS 4880,I.S.5878,Part-I to X

Course Name : Civil Engineering Group**Course Code : CE/CR/CS/CV****Semester : Fourth****Subject Title : Advanced Surveying****Subject Code : 17419****Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

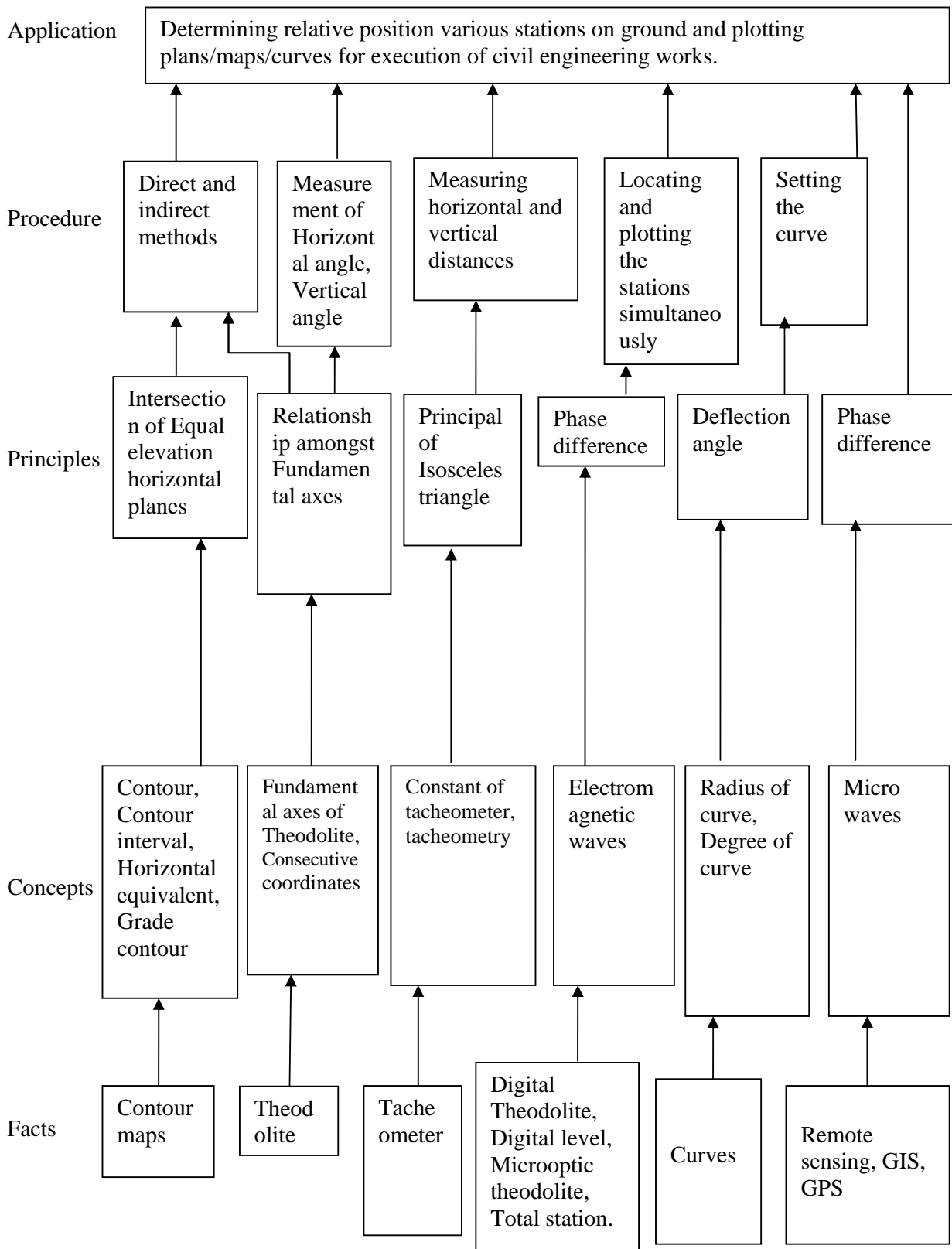
With the use of planimeter student will able to calculate area of contour and volume occupied. It is intended to abreast with new technology for which study and use of Total station becomes inevitable.

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.
- Interpret survey maps.

Learning Structure:



Theory:

Topic and Contents	Hours	Marks
<p>Topic 1. Contouring Specific objectives :</p> <ul style="list-style-type: none"> ➤ 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 <p>Contents:</p> <ul style="list-style-type: none"> • Concept of contour, contour interval and horizontal equivalent. Factors affecting contour interval, Characteristics of contours, Interpretation of ground features from contour map, Uses of contour map. • Methods of contouring, Direct method and Indirect 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. 	06	14
<p>Topic 2. Area and Volume Measurement Specific objectives :</p> <ul style="list-style-type: none"> ➤ Measure the area of plans/maps. ➤ Compute the volume <p>Contents:</p> <ul style="list-style-type: none"> • Instruments used for measuring the area- Polar Planimeter and Digital Planimeter. Polar Planimeter- Component parts and procedure of measurement of area. Simple numerical problems. • Digital planimeter- Component parts and procedure of measurement. • Computation of volume from contour maps by Trapezoidal and Prizmoidal formulae, Simple numerical problems. 	04	10
<p>Topic 3. Theodolite Survey Specific objectives :</p> <ul style="list-style-type: none"> ➤ Use the theodolite for measurement of horizontal angle, deflection angle, magnetic bearing and vertical angle ➤ Carry out theodolite traversing ➤ Carry out calculations for Gale's traverse table. <p>3.1(06) Types of theodolite, uses of theodolite, Component parts of transit theodolite and their functions, Reading the vernier of transit theodolite, Technical terms- Swinging, Transiting, Face left, Face right, Fundamental axes of transit theodolite and their relationship</p> <p>3.2(08) Temporary adjustment of transit theodolite, Measurement of horizontal angle- Direct and Repetition method, Errors eliminated 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)</p> <p>3.3.....(10) <ul style="list-style-type: none"> • Theodolite traversing by included angle method and deflection angle method. Check in open and closed traverse, Calculations of bearing from angles, Traverse computation-Latitude, Departure, Consecutive </p>	12	24

coordinates, Independent coordinates, Balancing traverse by Bowditch's rule and Transit rule, Gale's table calculations, Simple numerical problems		
<p>Topic 4. Tacheometry</p> <p>Specific objectives :</p> <ul style="list-style-type: none"> ➤ Use tacheometer to find horizontal and vertical distances ➤ Carry out contour survey by tacheometer <p>Contents:</p> <ul style="list-style-type: none"> • Meaning of tacheometer and tacheometry, Principle of tacheometry, Essential requirement of tacheometer. Tacheometric formula for horizontal distance with telescope horizontal and staff vertical, Field 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. 	06	12
<p>Topic 5. Modern Survey Instrument</p> <p>Specific objectives :</p> <ul style="list-style-type: none"> ➤ 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. ➤ Use the total station for surveying work <p>Contents:</p> <p>5.1(10) Component parts and procedure to set and use microoptic theodolite for measurement of horizontal and vertical angle, Component parts and 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.</p> <p>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.</p>	10	20
<p>Topic 6. Curves</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> ➤ List components of simple circular curve ➤ Set simple circular curve by offsets from long chord and Rankine's deflection angle method <p>Contents:</p> <ul style="list-style-type: none"> • 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. 	06	12
<p>Topic 7. Remote sensing and GIS</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> ➤ Describe remote sensing process ➤ Identify the components of GIS 	04	08

<p>➤ State applications of GPS</p> <p>Contents:</p> <ul style="list-style-type: none"> • Definition of remote sensing, Concept of remote sensing, Types of remote sensing system-Passive system, Active system, Distance of remote sensing, Remote sensing data, Remote sensing processes, Application of remote sensing, Advantages of remote sensing, Limitations of remote sensing • Definition of GIS, Key components of GIS, Application of GIS in Land information, Environmental field. • Introduction to GPS, Application of GPS in civil engineering. 		
Total	48	100

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. 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 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

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

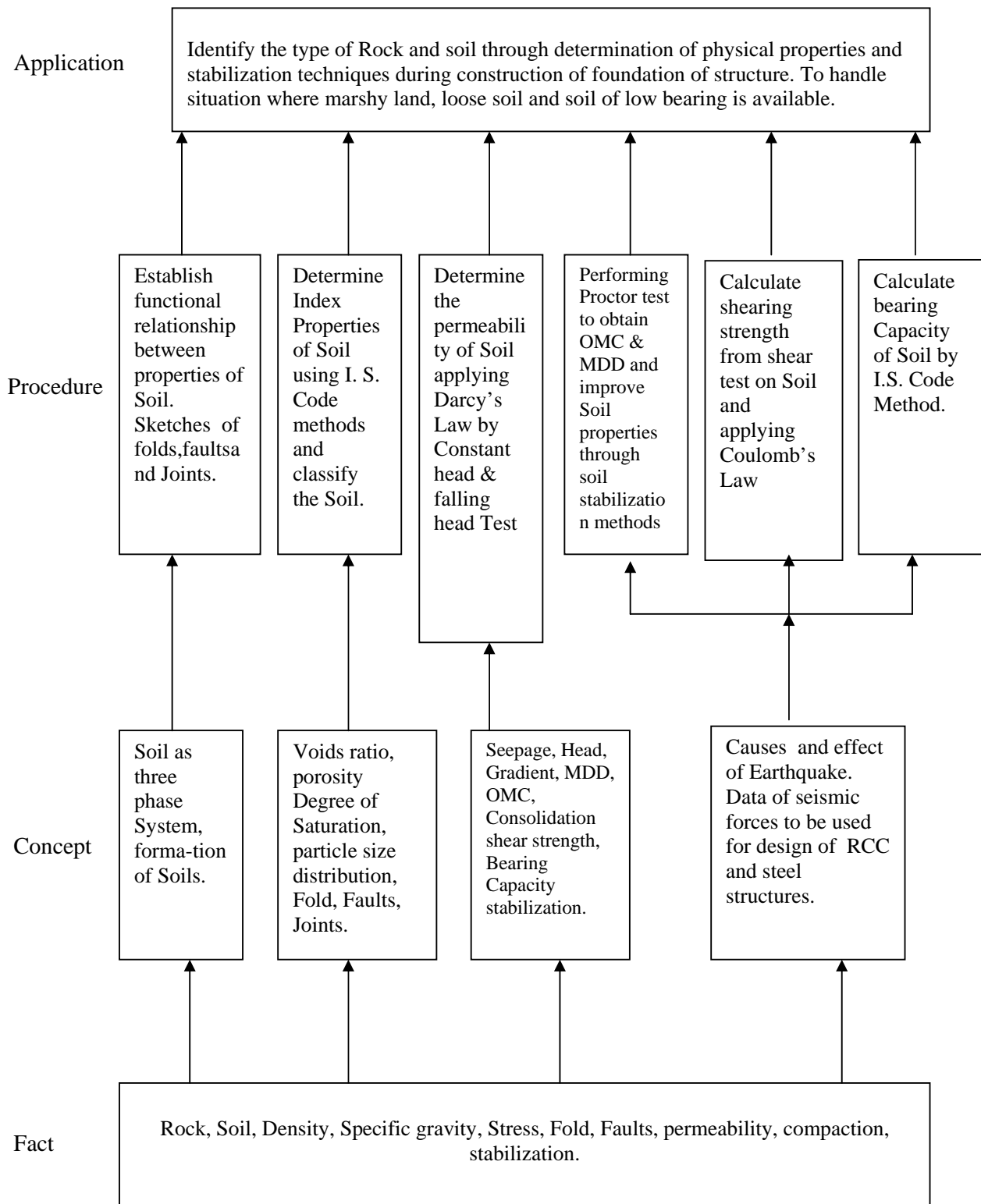
The content of this subject are also useful in designing basement, underground tank and underwater structures. Knowledge of geology, soil characteristics, and stress distribution under loading on soil, bearing capacity of soil is also useful to every engineer in the design, execution and stability analysis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

Learning Structure:



Theory:

Topic	Hours	Marks
<p>Topic 1: General geology, mineralogy and petrology.</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State purpose of geology in civil engineering. ➤ Describe different structure and composition of earth. <p>Contents:</p> <ul style="list-style-type: none"> • Introduction of geology, different branches of geology, importance of geology for civil engineering structure and composition of earth. Introduction to mineralogy, physical properties of minerals depending on light and state of aggregation. • Introduction of petrology, definition of a rock, classification based on their genesis (mode of origin), formation, classification and engineering uses of igneous, sedimentary and metamorphic rocks. 	04	06
<p>Topic 2: Structural Geology</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State the meaning of different terms related to structural geology. ➤ State causes and condition of formation of fold, fault and joints. <p>Contents:</p> <ul style="list-style-type: none"> • Structural Geology: Definition, importance, Outcrop, dip, strike, folds- Definition, parts and types, Joints- Definition and classification, Faults- Definition, parts and Types 	02	06
<p>Topic 3: Physical Geology.</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State the effect of weathering on rocks. ➤ Describe the Earth movement and Volcanism. <p>Contents:</p> <ul style="list-style-type: none"> • Introduction of Physical geology, weathering-Definition, Types. Soil- Definition, formation of soil, classification of soils. • 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 	06	12
<p>Topic 4: Overview Geotechnical Engineering</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State purpose of Soil as construction and Engineering material. ➤ Describe field application of Geo-technical Engineering. <ul style="list-style-type: none"> • IS definition of soil, Importance of soil in Civil Engineering as construction material in Civil Engineering Structures, as foundation bed for structures • Field application of geotechnical engineering for foundation design, pavement design, design of earth retaining structures, design of earthen dams, salient features of earthen dam in Maharashtra and India. 	02	06
<p>Topics 5: Physical Properties of Soil</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State the different physical properties of Soil. ➤ Classify the soil as per IS classification. <p>Contents:</p>	12	26

<p>5.1 Soil Properties (10 Marks)</p> <ul style="list-style-type: none"> • 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. <p>5.2 Consistency Limits of Soil (8 Marks)</p> <ul style="list-style-type: none"> • Consistency of soil, stages of consistency, Atterberg's limits of consistency viz. Liquid limit, plastic limit and shrinkage limit, plasticity index, determination of liquid limit, plastic limit and shrinkage limit as per IS code. <p>5.3 Grading of Soils (8 Marks)</p> <ul style="list-style-type: none"> • Particle size distribution, mechanical sieve analysis as per IS code particle size distribution curve, effective diameter of soil, Uniformity coefficient and coefficient of curvature, well graded and uniformly graded soils, particle size. classification of soils, I.S. classification of soil. 		
<p>Topics 6: Permeability and Shear Strength of Soil. Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State the factors affecting the permeability of soil. ➤ Describe the shear failure of cohesive and Non-cohesive soil. <p>Contents:</p> <ul style="list-style-type: none"> • 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 permeability tests, simple problems to determine coefficient of permeability. Seepage through earthen structures, seepage velocity, seepage pressure, phreatic line, flow lines, application of flow net, (No numerical problems.) • Shear failure of soil, field situation of shear failure, concept of shear strength of soil, components 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. 	06	16
<p>Topics 7: Bearing Capacity, Compaction and Stabilization of Soil Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Describe the procedure of test for Bearing Capacity of soil. ➤ State the necessity of compaction and stabilization of soil. <p>Contents:</p> <p>7.1 Bearing capacity and theory of earth pressure (14 Marks)</p> <ul style="list-style-type: none"> • Concept of bearing capacity, ultimate bearing capacity, safe bearing capacity and allowable bearing pressure, Introduction to Terzaghi’s analysis and assumptions made effect of water table on bearing capacity. • Field methods for determination of bearing capacity – Plate load test and standard penetration test. Test procedures as Per IS: 1888 & IS: 2131. • Definition of earth pressure, active earth pressure and passive earth 	16	28

<p>pressure, coefficient of earth pressure, Rankine's theory and assumptions made for non-cohesive Soils.</p> <p>7.2 Compaction and consolidation (14 Marks)</p> <ul style="list-style-type: none"> • Concept of compaction, purpose of compaction, field situations where compaction is required, Standard proctor test – test procedure as per IS code, Compaction curve, optimum moisture content, maximum dry density, Zero air voids line, Modified proctor test, factors affecting compaction, field methods of compaction – rolling, ramming and vibration and Suitability of various compaction equipments-smooth wheel roller, sheep foot roller, pneumatic tyred roller, Rammer and Vibrator, difference between compaction and consolidation. • 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. value. • Necessity of site investigation and sub-soil exploration, types of exploration, criteria for deciding the location and number of test pits and bores. Field identification of soil – dry strength test, dilatancy test and toughness test. 		
Total	48	100

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. Identify 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.

OR

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 part- XVII
OR
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
OR
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. No.	Author	Title	Publisher
1	M.T. Maruthesha reddy.	A text book of applied Engineering Geology.	New age International Publishers
2	Dr.R.B.Gupte	A text book of Engineering Geology.	Pune Vidyarthi Griha Prakashan.
3.	Prof.T.N.Ramamurthy & Prof.T.G.Sitharam	Geotechnical Engineering (Soil Mechanics)	S Chand and Company LTD.
4	Dr.B.C.Punmia	Soil Mechanics and Foundation Engineering	Standard Book House, 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 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.

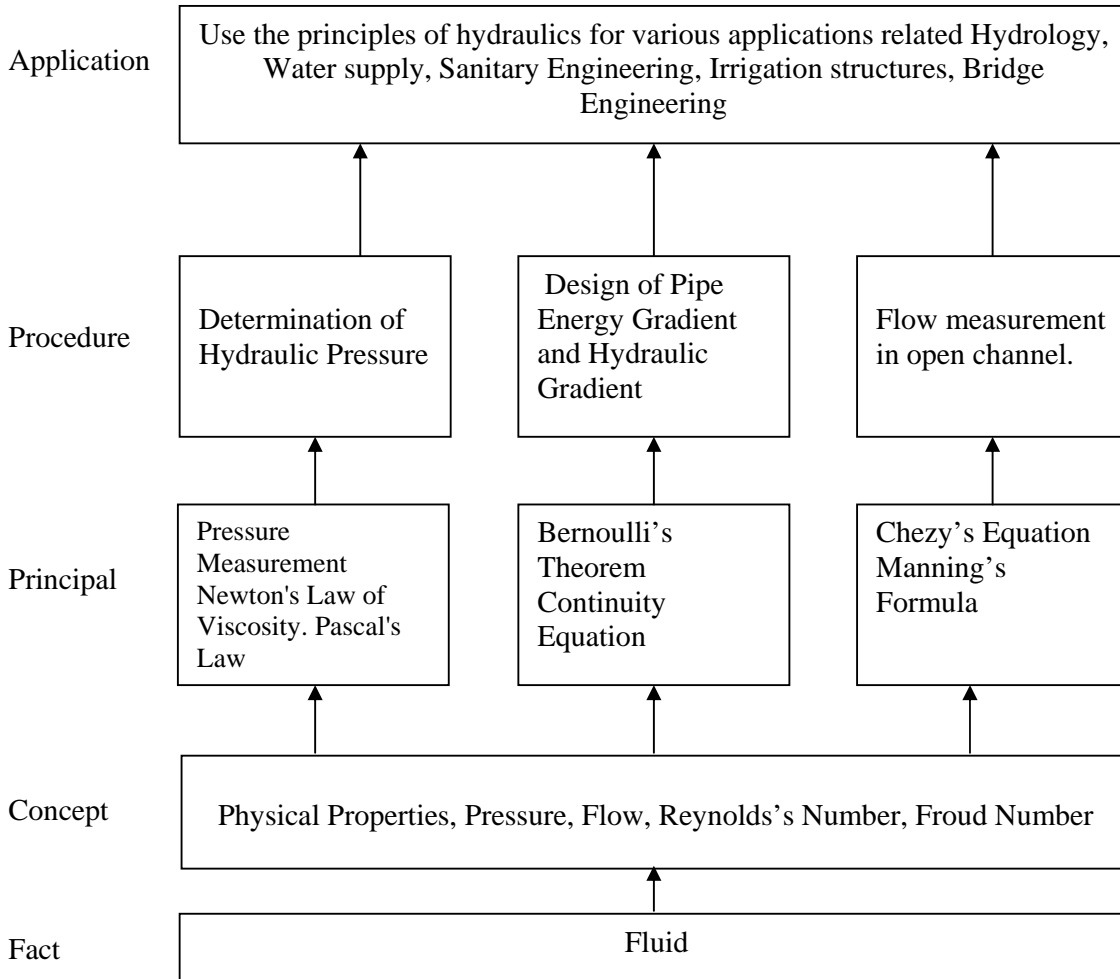
General Objectives:

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.

Learning Structure:



Theory:

Topic and Contents	Hours	Marks
<p>Topic 1: Properties of fluid Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Differentiate between fluids with solids ➤ List properties of fluids <p>Contents :</p> <ul style="list-style-type: none"> • Definition of fluid, Fluid mechanics and Hydraulics, Hydrostatics, Hydrodynamics. Difference in behavior of liquid with solids, • Application of hydraulics with respect to irrigation and environmental engineering. • 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. Newton's law of viscosity, simple numerical problems. 	04	08
<p>Topic 2: Hydrostatic Pressure Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State principles, laws of hydrostatic pressure ➤ Compute total hydrostatic pressure and centre of pressure on different surfaces <p>Contents :</p> <ul style="list-style-type: none"> • 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. • 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. 	08	12
<p>Topic 3: Measurement of Liquid Pressure In Pipes Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State meaning of liquid pressure, pressure head ➤ State principles and uses of different pressure measuring devices <p>Contents :</p> <ul style="list-style-type: none"> • Concept of pressure, pressure head and its unit, conversion of pressure head of one liquid into pressure head of other liquid. • 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 • Bourdon's pressure gauge – construction and principle of working. 	04	12
<p>Topic 4: Fundamentals of Fluid Flow Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Identify type of flow ➤ State the use of Reynolds number ➤ List the components of energy of liquid flow ➤ Write the statement of Bernoulli's theorem as applied to flow of liquid. 	06	12

<p>Contents:</p> <ul style="list-style-type: none"> • 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 energy and Bernoulli’s modified equation. Numerical Problems on all above topics. 		
<p>Topic 5: Flow of Liquid Through Pipes Specific Objectives:</p> <ul style="list-style-type: none"> ➤ List various losses in flow through pipes ➤ Estimate loss of head for flow through pipes ➤ List various pipe arrangements and calculate diameter of pipe <p>Contents :</p> <p>5.1 Loss of energy or loss of head in flow through pipe.....06</p> <ul style="list-style-type: none"> • Loss of head due to friction- Darcy-Weisbach Equation. • Moody’s diagram and its use, common range of friction factor for different types of pipe materials. • Minor loss of head in flow through pipe- loss of head due to sudden contraction, sudden expansion, entrance and exit losses. Losses in various pipe fittings. <p>5.2 Different Pipes arrangements and hydraulic gradient line.....10</p> <ul style="list-style-type: none"> • Flow through pipes in series and parallel pipes. • Syphon pipe. • Equivalent pipe- Dupit’s equition. • Hydraulic Gradient Line and Energy Gradient Line • Water Hammer- concept, causes, effects and remedial measures. • Use of Nomograms for design of pipe. Numerical Problems on above topics. 	08	16
<p>Topic 6: Flow Through Open Channel Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Work out discharge through open channel ➤ Design most economical section of channel <p>Contents :</p> <p>6.1 Open channel flow.....04</p> <ul style="list-style-type: none"> • Definitions of open channel flow. • Types of channels- artificial and natural. Different shapes of artificial channels. Geometrical properties of channel sections-wetted area, wetted perimeter, hydraulic radius, hydraulic mean depth. • Types of flow in open channel- steady, unsteady and uniform, non-uniform flow. <p>6.2 Determination of discharge through open channel.....08</p> <ul style="list-style-type: none"> • Chezy’s equation and Manning’s equation. • Most economical channel sections- conditions for most economical rectangular and trapezoidal channel sections. <p>6.3 Hydraulic Jump.....04</p>	07	16

<ul style="list-style-type: none"> • Froude’s number and its significance. • Hydraulic Jump, its occurrence in field, use . <p>Numerical Problems.on above all topics</p>		
<p>Topic 7: Flow Measurement Techniques Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Understand principles and working of flow measuring devices ➤ Determine discharge through pipes and open streams <p>Contents :</p> <p>7.1 Discharge measuring devices for pipes.....08</p> <ul style="list-style-type: none"> • 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, Discharge through small sharp edged circular orifice. <p>7.2 Discharge measuring devices for open channel.....08</p> <ul style="list-style-type: none"> • Notches –Types- Rectangular, ‘V’, Trapezoidal notches. Expression for discharge. • Weirs- Types, discharge over rectangular sharp crested weir. <p>Velocity area method of discharge measurement --</p> <ul style="list-style-type: none"> • Velocity measuring devices-floats, pitot tube, Current meter. • Study and use of water meter. <p>Numerical Problems. .on all above topics</p>	07	16
<p>Topic 8: Pumps and Turbines Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Identify various types of pumps and their uses in different situations ➤ Calculate power for pump <p>Contents :</p> <ul style="list-style-type: none"> • Pumps- Definition and types. • Suction head, delivery head, static head and manometric head of Pump. Computation of power required for pump. numerical problems. • Centrifugal pump, Reciprocating pump, Submersible pump and Jet 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. 	04	08
Total	48	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. Identify 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. No.	Author	Title	Publisher
01	Dr. P. N. Modi Dr. S. M. Seth	Hydraulics & Fluid Mechanics	Standard Book House, Dehli
02	Dr. R. K.Bansal	Fluid Mechanics & Hydraulic Mechanics	Laxmi Publication New Delhi
03	R. S. Khurmi	A Text Book of Hydraulics, Fluid Mechanics, Hydraulic Machines	S.Chand & Company Ltd. 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. 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			Examination Scheme					
TH	TU	PR	PAPER 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 determinate 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.

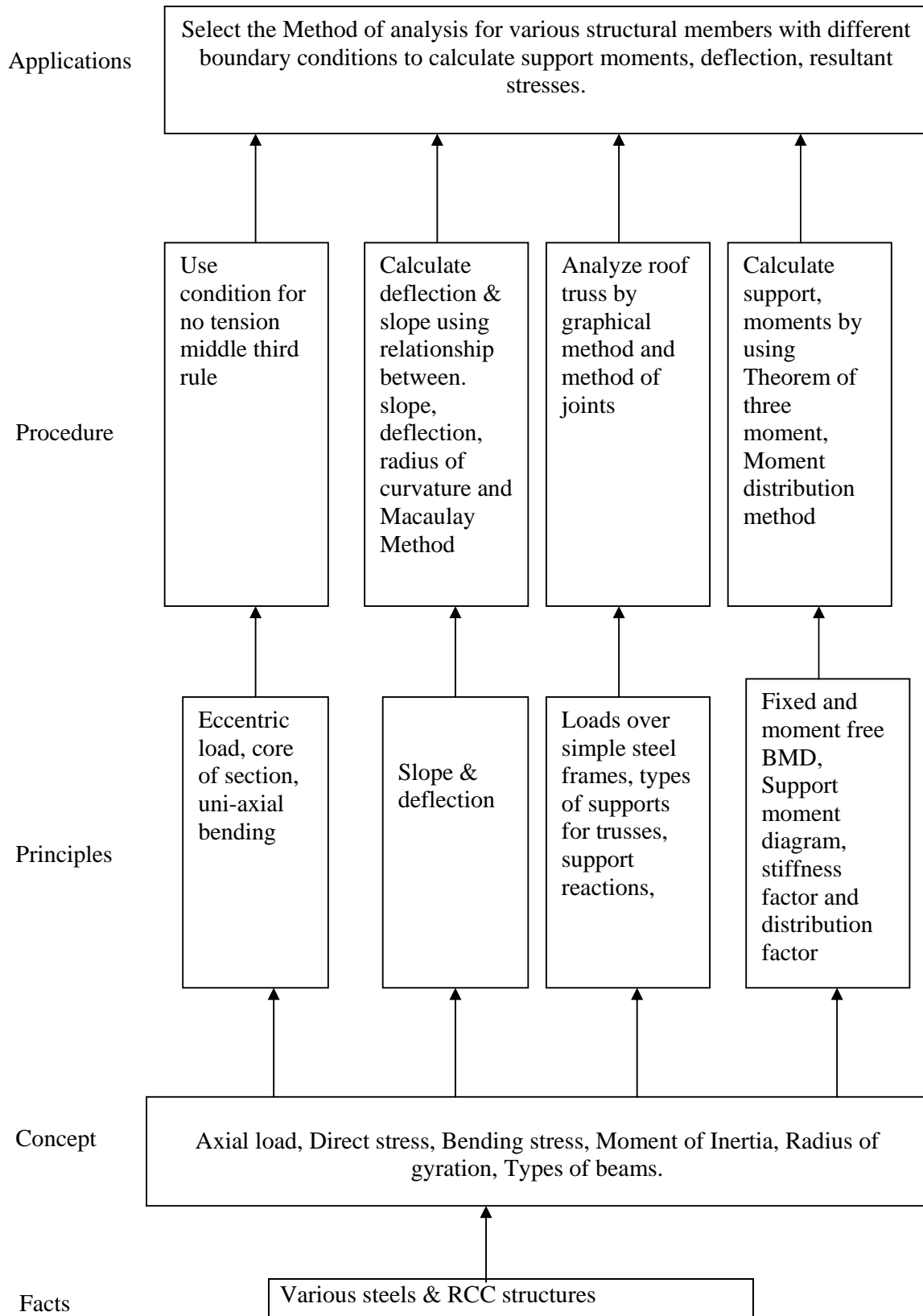
Thus the total contents of this subject forms the basic for the efficient and safe design of steel and RCC structures.

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.

Learning Structure:



Theory Content:

Topic and Contents	Hours	Marks
<p>Topic 1: Direct and Bending Stresses Specific Objectives:</p> <ul style="list-style-type: none"> ➤ List direct and eccentric loads on columns. ➤ 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. <p>Contents:</p> <p>1.1(12 Marks)</p> <ul style="list-style-type: none"> • Introduction of direct and eccentric loads, • Eccentricity about one principal axis, nature of stresses • Maximum and minimum stresses, resultant stress distribution diagram. • 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. <p>1.2(08 Marks)</p> <ul style="list-style-type: none"> • 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. 	10	20
<p>Topics 2: Slope and Deflection Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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 Macaulay method. ➤ State relationship between slope and deflection and radius of curvature. <p>Contents:</p> <p>2.1(08 Marks)</p> <ul style="list-style-type: none"> • Concept of slope and deflection, stiffness of beams. • Relation among bending moment, slope deflection and radius of curvature, differential equation (no derivation), double integration method to find slope and deflection of simply supported and cantilever beam. <p>2.2(12 Marks)</p> <ul style="list-style-type: none"> • Macaulay’s method for slope and deflection, application to simply supported and cantilever beam subjected to concentrated and uniformly distributed load on entire span,. 	10	20
<p>Topics 3: Fixed Beam Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State meaning of fixity effects and list advantages of fixed beam. ➤ Write the principle of superposition. ➤ Draw BMD and SFD for fixed beams with point load and UDL. <p>Contents: Fixed Beam</p>	06	12

<ul style="list-style-type: none"> • 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 over entire span, central point load, Point load other than mid span. • Application of standard formulae in finding moments and drawing S.F. and B.M. diagrams for a fixed beam (Derivation need not be asked in the examination). 		
<p>Topics 4: Continuous Beam</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State the effects of continuity of beams and nature of moments induced. ➤ Write Clapeyron's theorem of three moments (No derivation) ➤ Draw sketches of BMD and SFD for continuous beams. <p>Contents:</p> <p>Continuous Beam</p> <ul style="list-style-type: none"> • Definition, effect of continuity practical example, nature of moments 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. 	08	16
<p>Topics 5: Moment Distribution Method</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ List introduction and sign convention for fixed end moments. ➤ State meaning of carry over factor, stiffness factor and distribution factor. ➤ Draw BMD, SFD with support at same level. <p>Contents:</p> <p>Moment Distribution Method.</p> <ul style="list-style-type: none"> • Introduction, sign convention • 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) • Introduction to portal frames – Types of portal frames (No problems shall be asked on portal frames). 	08	16
<p>Topic 6: Simple Frames</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ List different types of roof trusses. ➤ State conditions for redundant and non- redundant frames. ➤ List types of forces in different members. <p>Contents:</p> <p>Simple Frames</p> <ul style="list-style-type: none"> • Types of trusses (Simple, Fink, compound fink, French roof truss, 	06	16

pratt roof truss, Howe roof truss, North light roof truss, King post and Queen post roof truss) <ul style="list-style-type: none"> • Calculate support reactions for point loads at nodal points. • Calculate forces in different members by using method of joints and Method of sections. • Graphical method of analysis of truss.(No problem in the theory examination) 		
Total	48	100

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. No.	Author	Title	Publisher
01	S. B. Junnarkar	Mechanics of structures Volume-I,II	Charotar Publishing House, Anand
02	S. Ramanrutham	Theory of Structures	Dhanpatrai & Sons, Delhi
03	R. S. Khurmi	Theory of Structures	S.Chand Publications, 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			Examination Scheme					
TH	TU	PR	PAPER 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:

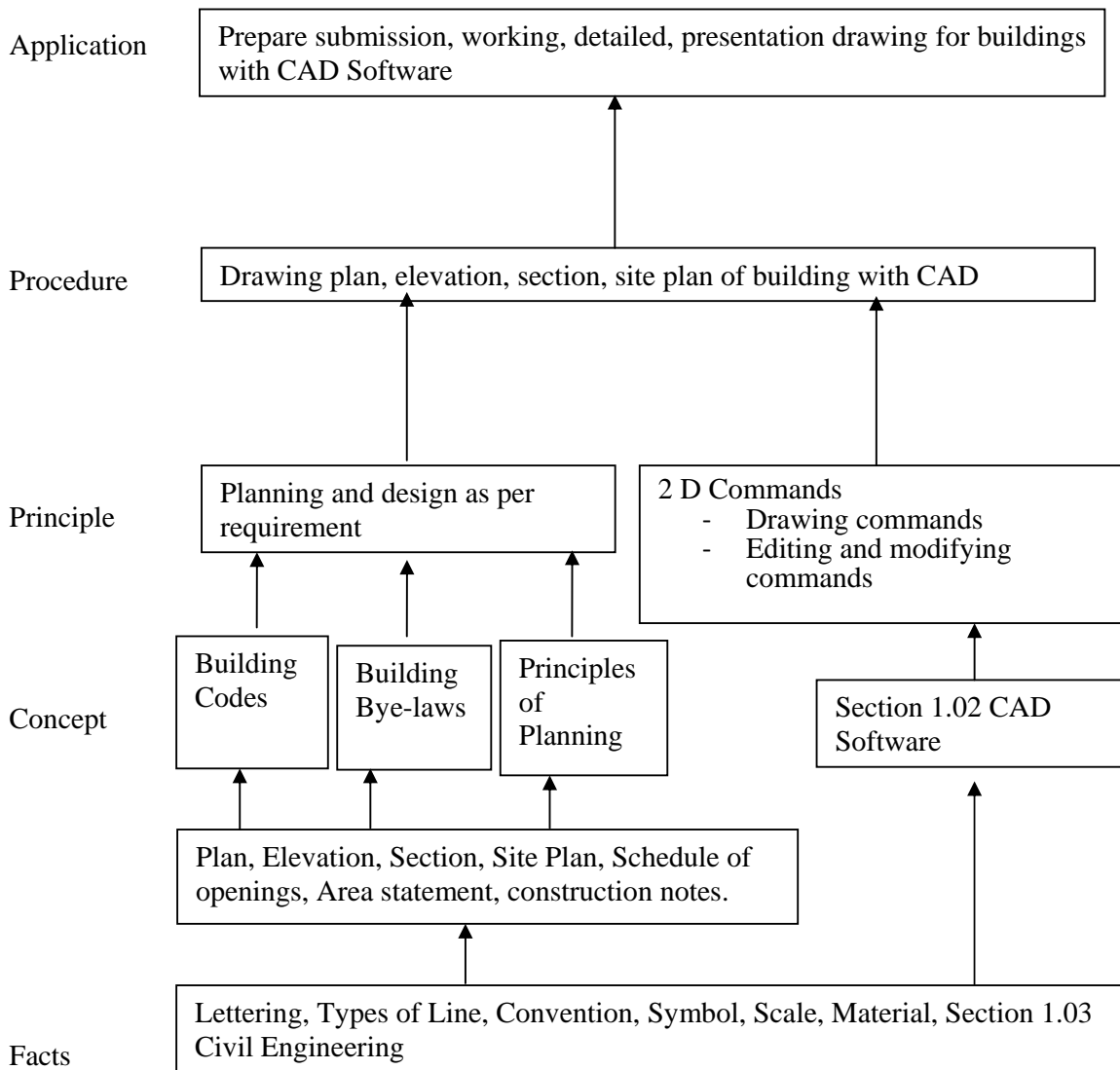
Intellectual Skills:

- 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

Learning Structure:



Theory:

Topic and Contents	Hours
Topic 1. FUNDAMENTAL OF CAD <ul style="list-style-type: none"> • CAD Software – Meaning, various CAD software's available in market, Advantages of CAD • Starting up of Cad, CAD Window, Toolbar, Drop down menu, Drop down menu, Introduction of starting Auto Cad Screen. • CAD fundamental, coordinate system in CAD. Absolute, Relative, Polar, Spherical, Cylindrical coordinate system, filters, Use of function key in AUTOCAD. 	08
Topic 2. CAD COMMANDS <ul style="list-style-type: none"> • WCS icon, UCS icon, coordinates, drawing limits , grid, snap, ortho features • Drawing commands- line circle, arc, polyline, multiline, construction line, sp line, ellipse, polygon, rectangle, table, block, text. • Editing commands – copy, move, offset, fillet, chamfer, trim, stretch, lengthen, extend, rotate, mirror, array etc. • Working with hatches, fills, dimensioning, text etc. • Important commands in insert menu, format menu, tools and dimensions. 	16
Topic3. SUBMISSION AND WORKING DRAWING <ul style="list-style-type: none"> • Preparation of line plan, detailed plan, developed plan, section, site plan, area statement • Procedure for printing drawings. 	36
Topic 4. INTRODUCTION TO 3D DRAWING <ul style="list-style-type: none"> • Preliminary commands required for 3D. 	04
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.**
3. Drawing symbols of construction materials /components such as stone, brick, glass, partition, wall doors and windows.**04 Hrs.**
4. Prepare working and detailed drawing for any two items, such as foundation plan, plan of Stair such as straight, dog legged, open Newel. **08 Hrs.**
5. Submission drawing, to the scale 1:100, of single storeyed Load Bearing Residential Building (2BHKD) with Flat Roof and staircase showing developed plan, elevation, section passing through Stair **or** W.C. and Bath, site plan (1:200), area statement, schedule of openings , construction notes show enlarged section with details **16 Hrs.**

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

6. Submission drawing, to the scale 1:100, of (G+1) Residential Building Framed Structure (2 BHKD with attached toilet to 1 bedroom showing the position of European type WC pan) showing developed plan, elevation, section passing through staircase, site plan (1:200), foundation plan (1:50), area statement, schedule of openings. (Also Show the place for Washing machine, WHB, Pooja, store etc. Also show bed position, Dining table with chairs, sofa, wardrobe etc.....) **12 Hrs.**

(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. 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- Basics 2010	Terence M. Shumaker David A. Madsen David P. Madsen	Goodheart- Willcox (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:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

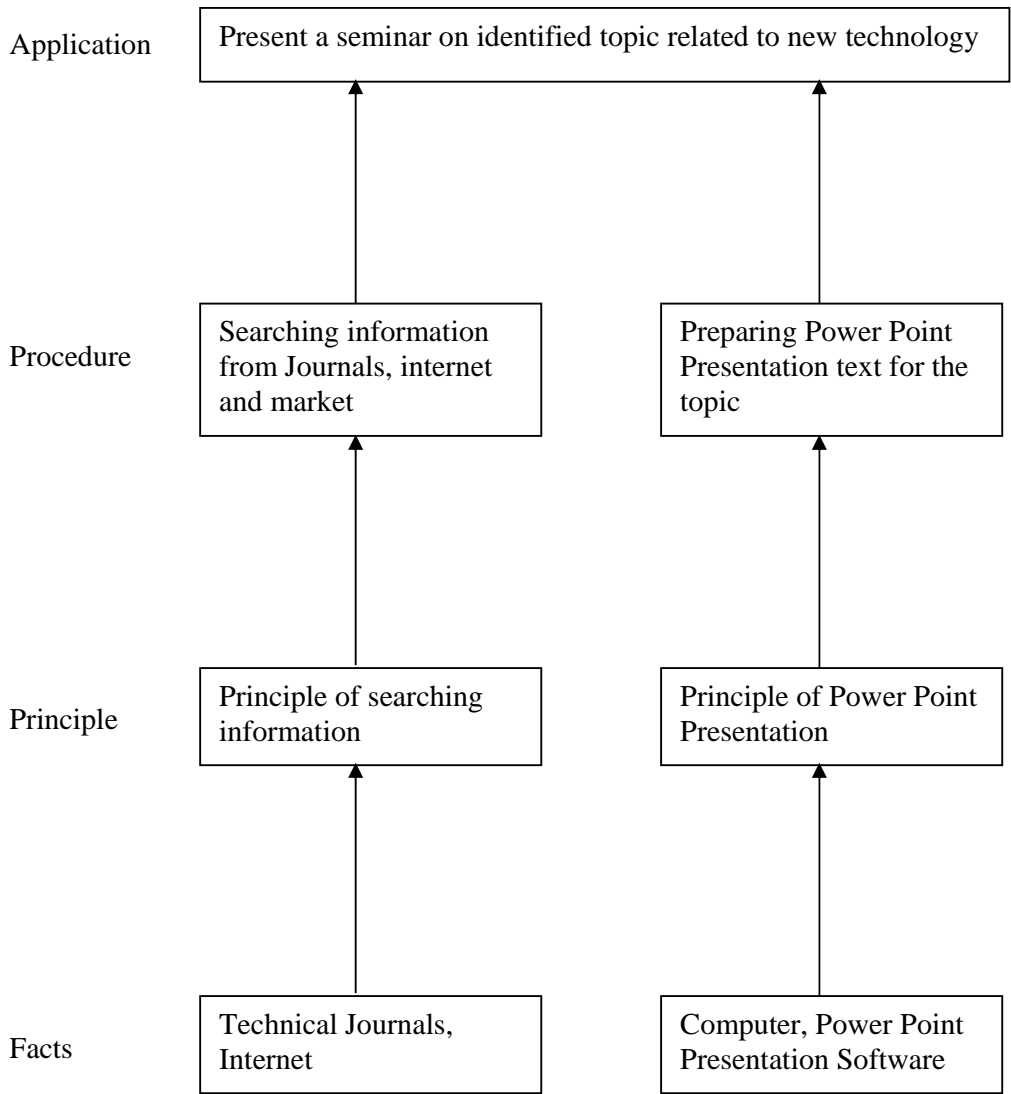
Objective:**To develop the following Skills:****Intellectual Skills**

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 No.	Content	Hours
1	<p>Field Visits: 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)</p> <ul style="list-style-type: none"> i) Bridges under construction ii) Tunnel site visit iii) Railway Station iv) Construction of basement / retaining wall /pile foundation v) Public building under construction vi) Airport / Docks and Harbour vii) Visit to different construction Exhibitions 	12
2	<p>Expert Lectures: Lectures by Professional persons / Industrial Expert / Entrepreneur Seminars based on information search, expert lectures to be organized from any two of the following areas :</p> <ul style="list-style-type: none"> i) Construction of Flyovers : Special Features ii) Ready Mix Concrete iii) Safety in Construction iv) Latest Trends in Construction activities like Water Proofing, Centering, Cladding, Plumbing v) Software for Drafting vi) Any other subject related to Civil Engineering vii) Introduction to Apprenticeship Training Scheme 	06
3	<p>Data Collection: Information search can be done through manufacturers, catalogue, internet, magazines, books etc. and a submit a report (any three)</p> <ul style="list-style-type: none"> i) Collection and reading of drawings of buildings from architect / Practicing engineers and listing of various features from the drawings. ii) Market survey for pumps, pipes and peripherals required for multi storied buildings. iii) Non conventional energy sources with focus on solar energy iv) Elevators - Installation and Maintenance v) Market survey for Advanced Construction material with respect to Quality, Rate and application vi) Modern products of Non-Conventional Energy like solar cooker, solar lamp, solar water heater, solar distillation 	08
4	<p>Seminar : Seminar topic should be related to the subject of fourth semester. Each student shall submit a report of at least 10 pages and deliver a seminar (Presentation time - 10 minutes) (Any one topic) Seminar topics may be from areas:</p> <ul style="list-style-type: none"> i) Geology ii) Soil Mechanics iii) Transportation Engineering iv) Surveying and Advance Surveying v) Environmental Science. 	10

Activity No.	Content	Hours
	vi) Building Construction vii) Materials for construction	
5	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 v) Student shall collect the information by visiting Electrical / 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	12
Total		48

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. 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.

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 4th semester examination.

Note:- Examination in Professional Practices of 5th 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.
- Their 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 Professional Practices-III and marks will be given accordingly out of 50.

 MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI TEACHING AND EXAMINATION SCHEME																	
COURSE NAME : DIPLOMA IN TEXTILE TECHNOLOGY																	
COURSE CODE : TC																	
DURATION OF COURSE : SIX SEMESTERS										WITH EFFECT FROM : 2012-13							
SEMESTER : FOURTH										DURATION : 16 WEEKS							
PATTERN : FULL TIME - SEMESTER										SCHEME : G							
SR. NO.	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME										SW (17400)
							PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)			
				TH	TU	PR		Max	Min	Max	Min	Max	Min	Max	Min		
1	Environmental Studies \$	EST	17401	01	--	02	01	50#*	20	--	--	--	--	25@	10	50	
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 Engg. Operation	ECH	17470	03	--	--	03	100	40	--	--	--	--	--	--		
6	Textile Testing	TTE	17471	03	--	02	03	100	40	--	--	--	--	25@	10		
7	Professional Practices-II	PPS	17052	--	--	03	--	--	--	--	--	--	--	50@	20		
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:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

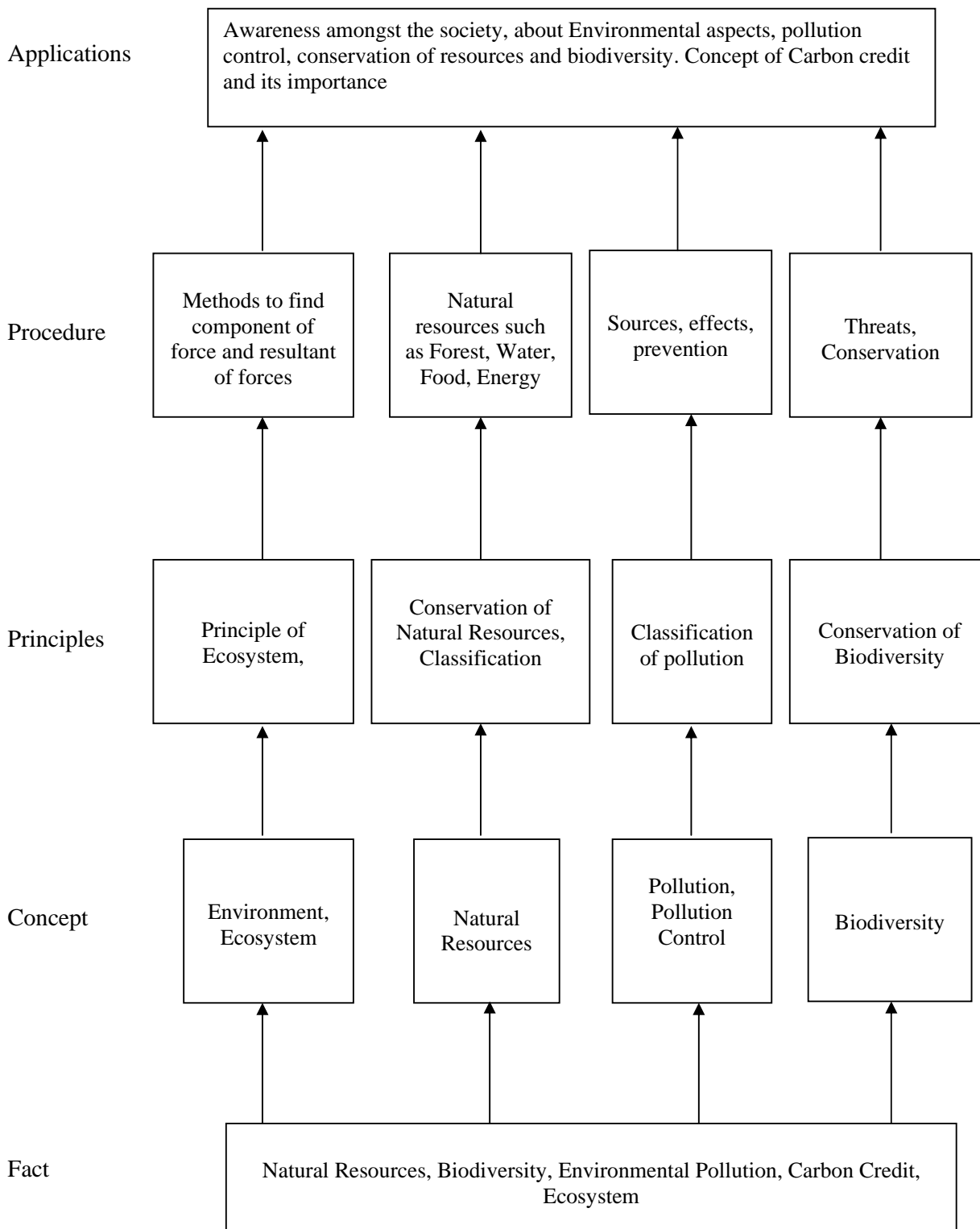
It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

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: <ul style="list-style-type: none"> ➤ Define the terms related to Environmental Studies ➤ State importance of awareness about environment in general public Contents: <ul style="list-style-type: none"> • Definition, Scope and Importance of the environmental studies • Importance of the studies irrespective of course • Need for creating public awareness about environmental issues 	01	04
Topic 2: Natural Resources and Associated Problems Specific Objectives: <ul style="list-style-type: none"> ➤ 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 <ul style="list-style-type: none"> • Definition • Associated problems 2.2 Forest Resources <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • Categories of mineral resources • Basics of mining activities • Mine safety • Effect of mining on environment 2.5 Food Resources: <ul style="list-style-type: none"> • Food for all • Effects of modern agriculture • World food problem 	04	10
Topic 3. Ecosystems <ul style="list-style-type: none"> • Concept of Ecosystem • Structure and functions of ecosystem • Energy flow in ecosystem • Major ecosystems in the world 	01	04
Topic 4. Biodiversity and Its Conservation <ul style="list-style-type: none"> • Definition of Biodiversity • Levels of biodiversity • Value of biodiversity • Threats to biodiversity 	02	06

<ul style="list-style-type: none"> • Conservation of biodiversity 		
Topic 5. Environmental Pollution <ul style="list-style-type: none"> • Definition • Air pollution: Definition, Classification, sources, effects, prevention • Water Pollution: Definition, Classification, sources, effects, prevention • Soil Pollution: Definition, sources, effects, prevention • Noise Pollution: Definition, sources, effects, prevention 	03	08
Topic 6. Social Issues and Environment <ul style="list-style-type: none"> • Concept of development, sustainable development • Water conservation, Watershed management, Rain water 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 	03	10
Topic 7. Environmental Protection Brief description of the following acts and their provisions: <ul style="list-style-type: none"> • Environmental Protection Act • Air (Prevention and Control of Pollution) Act • Water (Prevention and Control of Pollution) Act • Wildlife Protection Act • Forest Conservation Act Population Growth: Aspects, importance and effect on environment <ul style="list-style-type: none"> • Human Health and Human Rights 	02	08
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. No.	Author	Title	Publisher
01	Anindita Basak	Environmental Studies	Pearson Education
02	R. Rajgopalan	Environmental Studies from Crises to Cure	Oxford University Press
03	Dr. R. J. Ranjit Daniels, Dr. 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			Examination Scheme					
TH	TU	PR	PAPER 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).**

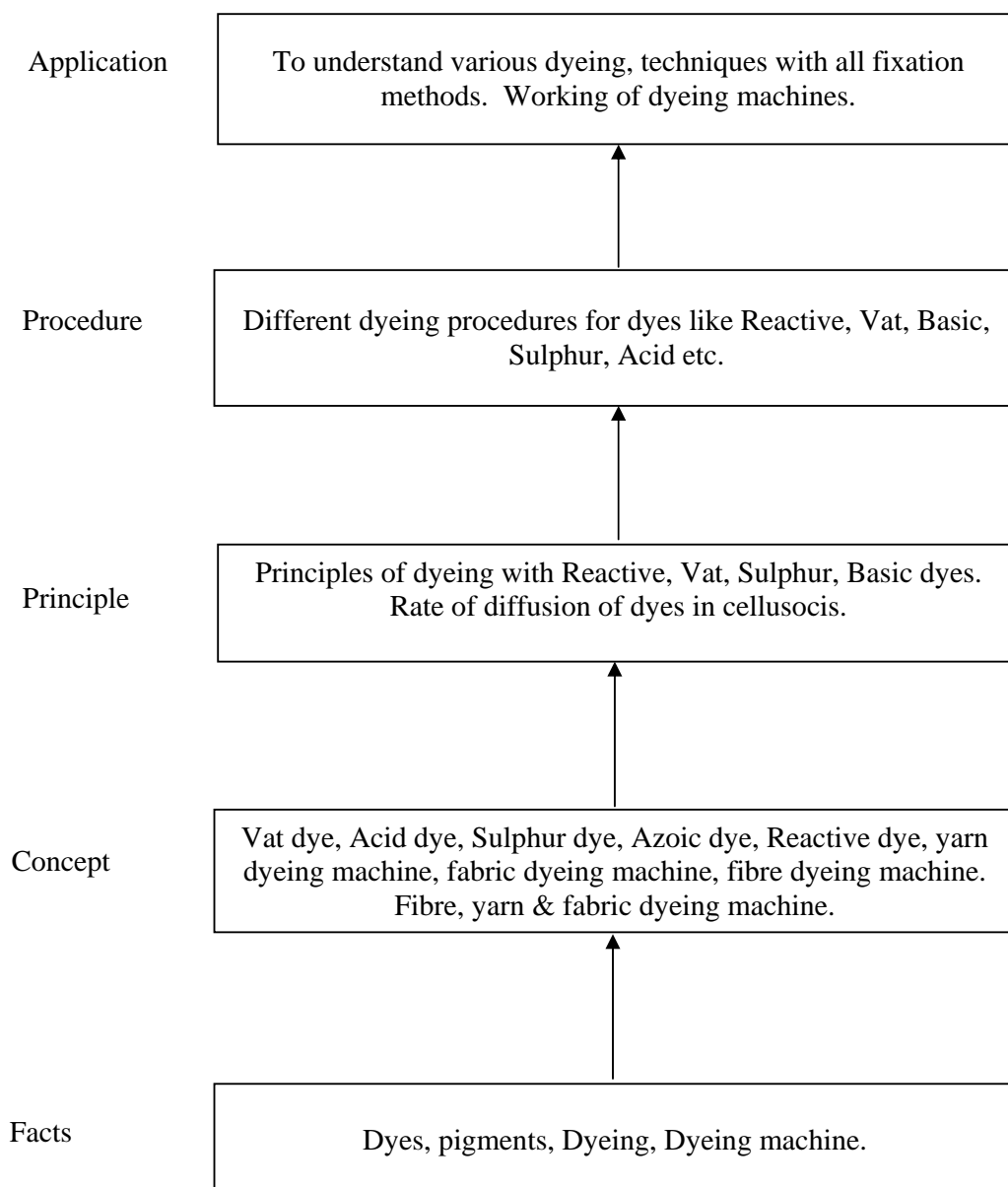
Rationale:

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
01	<p>Introduction to Dyeing Specific Objectives:</p> <ul style="list-style-type: none"> To understand basic concept of dyeing Learn terminologies used in dyeing To understand effect of pretreatments on dyeing <p>Contents: 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</p>	07	12
02	<p>Direct Dyeing Specific Objectives:</p> <ul style="list-style-type: none"> To understand chemical properties and classification of direct dyes To study dyeing procedure To analyze faults and remedies <p>Contents: Direct Dyes: Properties, Classification, Mechanism, Effect of - 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</p>	05	08
03	<p>Reactive Dyeing Specific Objectives:</p> <ul style="list-style-type: none"> To learn chemical properties and classification of reactive dyes To understand dyeing procedure To analyze faults and remedies <p>Contents: Reactive Dyes - Properties, Classification 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 Fastness properties</p>	08	12

04	<p>Vat Dyeing Specific Objectives:</p> <ul style="list-style-type: none"> To learn chemical properties and classification of vat dyes To understand dyeing procedure To analyze faults and remedies <p>Contents: Vat Dyes - Properties, Classification Application steps – vatting, dyeing, oxidation, after treatment Methods – Leuco-vat dyeing (exhaust, padding), Pigmentation, vat acid Fastness properties Faults and remedies</p>	08	12
05	<p>Solubalised Vat Dyeing Specific Objectives:</p> <ul style="list-style-type: none"> To learn chemical properties and classification of Solubilised vat dyes To understand dyeing procedure To analyze faults and remedies <p>Contents: Properties Steps involved in dyeing Dyeing method Fastness properties Faults and remedies</p>	04	06
06	<p>Sulphur Dyeing Specific Objectives:</p> <ul style="list-style-type: none"> To learn chemical properties and classification of sulphur dyes To understand dyeing procedure To analyze faults and remedies <p>Contents: Sulphur Dyes - Properties, Classification Application steps – Reduction, dyeing, oxidation, after treatment Fastness properties Faults and remedies</p>	07	10
07	<p>Azoic Dyeing Specific Objectives:</p> <ul style="list-style-type: none"> To learn chemical properties and mechanism of azoic colour formation To understand dyeing procedure To analyze faults and remedies <p>Contents: Properties Naphtholation, Diazotisation, Coupling Shop floor method of application on cotton After treatments Fastness properties Faults and remedies</p>	05	08

08	<p>Dyeing with Basic Dyes Specific Objectives:</p> <ul style="list-style-type: none"> • To learn chemical properties and classification of Basic dyes • To understand dyeing procedure • To analyze faults and remedies <p>Contents: Properties Mechanism of dyeing on – cellulosic fibres, protein fibres Dyeing of silk fibre Dyeing of wool fibre Dyeing of cellulosic fibres After treatments Fastness properties</p>	04	06
09	<p>Dyeing With Acid Dyes Specific Objectives:</p> <ul style="list-style-type: none"> • To learn chemical properties and classification of Acid dyes • To understand dyeing procedure • To analyze faults and remedies <p>Contents: Acid dyes – Properties, Classification Dyeing mechanism of protein fibres Dyeing of silk fibre Dyeing of wool fibre After treatments Fastness properties</p> <p>Dyeing With Metal Complex Dyes Metal Complex dyes - Properties, Classification Dyeing mechanism of protein fibres Dyeing of wool fibre After treatments Fastness properties</p>	04	08
10	<p>Dyeing With Natural Dyes Specific Objectives:</p> <ul style="list-style-type: none"> • To learn sources of natural dyes • To understand dyeing procedure • To analyze faults and remedies <p>Contents: Classification of natural dyes Properties Application on cellulosic material Faults and remedies</p>	04	06

11	<p>Dyeing Machines Specific Objectives:</p> <ul style="list-style-type: none"> • To understand types of dyeing machines • To learn construction and working of m/cs • To compare advantages and limitations of different m/cs <p>Contents: Construction , working , advantages and disadvantages of:</p> <ul style="list-style-type: none"> • Fibre/Yarn Dyeing Machine - Hank Dyeing, Package Dyeing • Jigger Dyeing Machine • Winch Dyeing Machine • Semi continuous and Continuous Dyeing Machines 	08	12
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. No.	Author	Title	Edition	Year of Publication	Publisher & Address
1	Dr. C. V. Koushik & Mr. Antao Irwin Josico	Chemical Processing of Textiles	1 st	2003	NCUTE, 8 th Floor, Main Building, IIT, Hauz Khas, New Delhi-110016
2	V. A. Shenai	Technology of Dyeing	2 nd	2000	Sevak Publications Mumbai - 400031
3	T. L. Vigo	Textile processing & properties	2 nd	1994	Elsevier Science B.V. Amsterdam
4	Clifford Pireston	The dyeing of cellulose fibres	1 st	--	Dyers co. Publication Trust. England.
5	F. Sadav	Chemical technology of fibres materials	1 st	1973	Mir Publication Miscrow
6	M. L. Gulrajani	Silk dyeing printing & finishing	3 rd	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			Examination Scheme					
TH	TU	PR	PAPER 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:

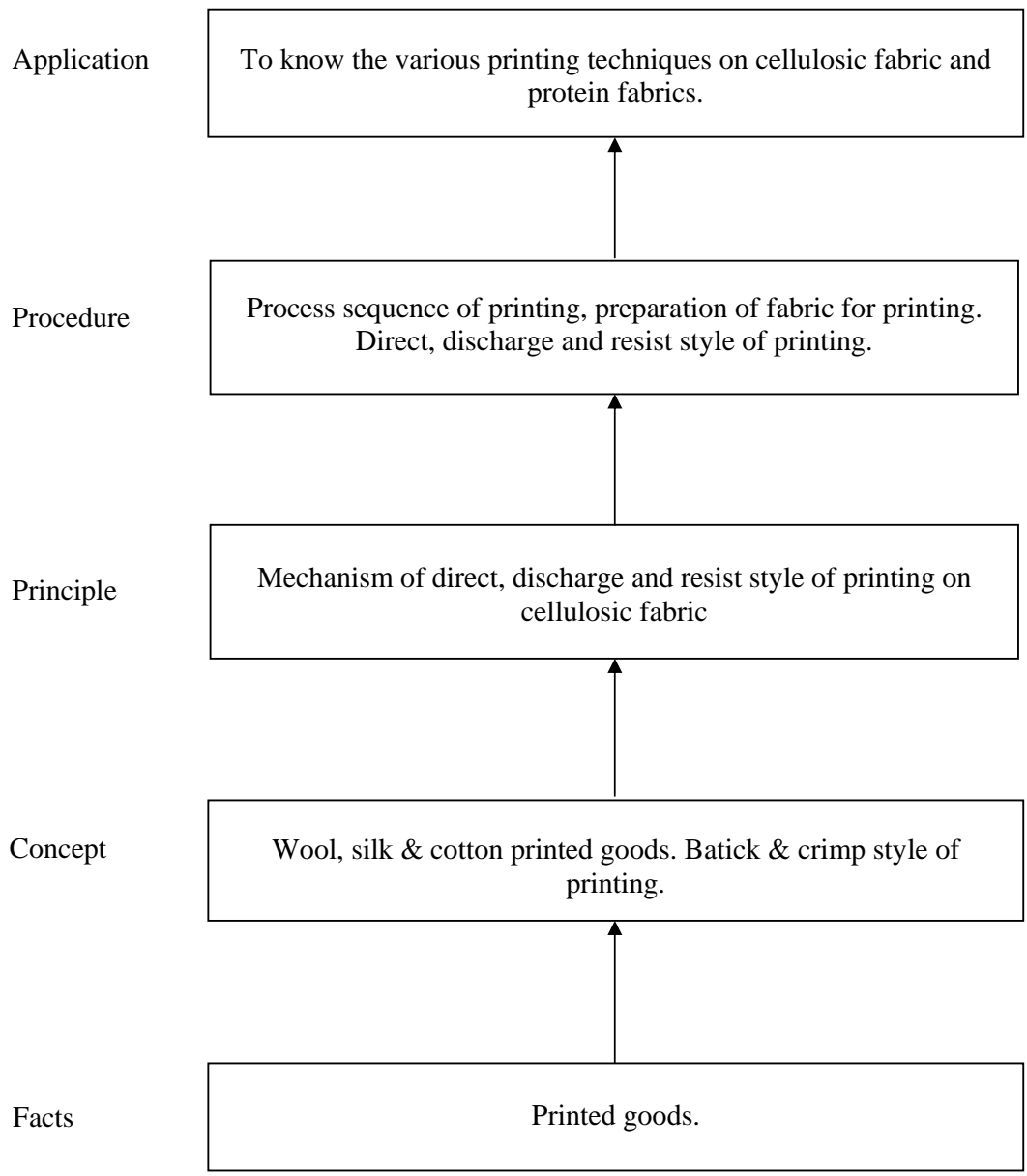
The chemical processing of textile is a value addition process by way of exhausting the aesthetic properties through printing and other processes. The students will be acquainted with the operation of printing. In general this subject will impact knowledge and skills in the areas of printing of textile 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
1	<p>Introduction to Textile Printing Specific Objectives: Student will be able to understand</p> <ul style="list-style-type: none"> ➤ Importance of pretreatments for fabric printing ➤ Various ingredients and their role in printing <p>Contents:</p> <ul style="list-style-type: none"> • Preparation of cotton fabric for printing • Print paste ingredients and their functions • Classification of thickeners, chemistry of thickeners • Advantages and limitations of thickeners. • Selection criteria of thickeners for various dyes 	10	16
2	<p>Methods of printing and styles of printing: Specific Objectives: Student will be able to understand</p> <ul style="list-style-type: none"> ➤ Various methods of printing ➤ Various styles of printing <p>Contents:</p> <ul style="list-style-type: none"> • General classification of methods of printing • Tie and dye method, batik printing, stencil printing and block printing. • Classification of styles of printing • Principles of direct ,discharge, resist styles of printing 	10	12
3	<p>Printing machinery Specific Objectives: Student will be able to understand</p> <ul style="list-style-type: none"> ➤ Working of machineries for printing ➤ Advantages and limitations of every machinery <p>Contents:</p> <ul style="list-style-type: none"> • Table printing – Technical features, faults , causes and remedies. • 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 • Screen exposing for rotary printing machine. 	14	24
4	<p>Printing of Cotton: Specific Objectives: Student will be able to understand</p> <ul style="list-style-type: none"> ➤ Fixation mechanism of prints ➤ Print paste formulation for direct, reactive and azoic colours. <p>Contents:</p> <p>4.1 Print fixation methods 8 Marks</p> <ul style="list-style-type: none"> • Methods of print fixation • Mechanism of print fixation during steaming • Steaming machineries- Star ager and rapid ager <p>4.2 Formulation of print paste 16 Marks</p>	20	30

	<ul style="list-style-type: none"> • Printing with direct dye – Print paste formulation for direct style of printing and discharge style of printing. • Printing with reactive dye - Print paste formulation for direct style of printing, discharge style of printing and resist style of printing. • Printing with azoic colours: Print paste formulation for direct style of printing. <p>4.3 Special print effects 6 Marks</p> <ul style="list-style-type: none"> • Khadi printing • Magic and Crimp styles of printing on cotton 		
5	<p>Printing with pigment on Cotton:</p> <ul style="list-style-type: none"> • Principle of pigment printing, • Print paste ingredients, • Print paste formulation for pigment printing and process sequence. 	04	10
6	<p>Printing of Wool and Silk:</p> <ul style="list-style-type: none"> • Preparation of fabrics for printing, • Print paste formulation for direct style of printing on wool and silk fabric using acid, metal complex and basic dyes with process sequence. 	06	08
Total		64	100

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. No.	Author	Title	Edition	Year of Publication	Publisher
1	Prof. N.L. Gulrajani	Silk Dyeing, Printing & Finishing	2 nd	1988	Dept. Of Textile Technology, IIT Delhi
2	Dr. K.V. Datye & A.A. Vaidya	Chemical Processing Of Synthetic And Its Blends	2 nd	1984	A Wiley Inter Science Publication
3	L.W. C. Miles	Textile Printing	2 nd	1981	The Dyer Company Publication Trust
4	Dr. V. A. Shenai	Technology. Of Printing, Vol. IV	3 rd	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			Examination Scheme					
TH	TU	PR	PAPER 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.

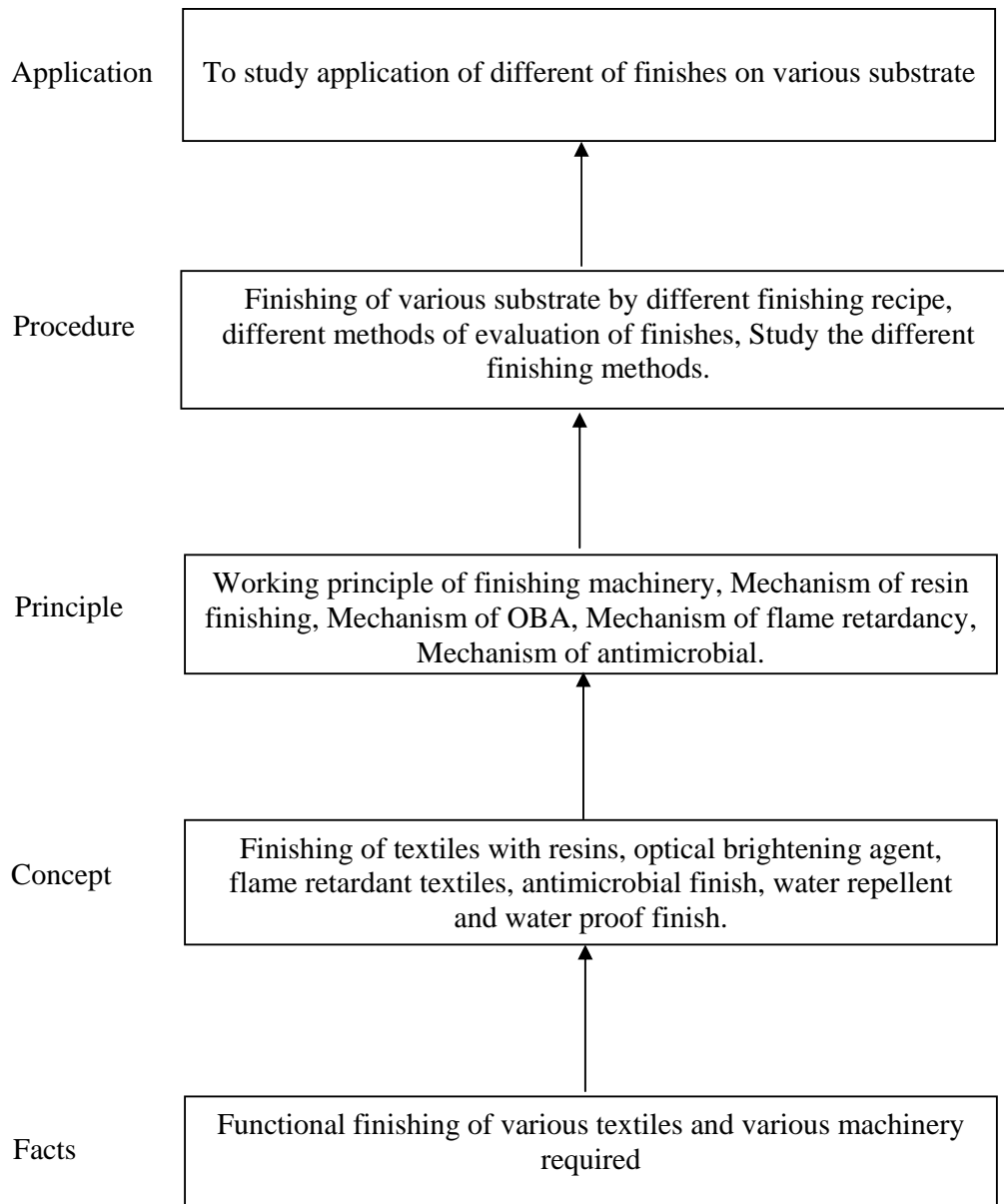
The terms finishing and functional finishing are therefore similar and both play a fundamental role for the commercial excellency of the results of textiles, strictly depending on market requirements that are becoming increasingly stringent and unpredictable and permit very short response times.

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
01	<p>Introduction to Finishing and application techniques Objects of finishing, classification of finishing, Application techniques-</p> <ul style="list-style-type: none"> • Review of exhaust method of application • Padding - Concept of percentage expression, weight pick-up, and operation <p>Working principle of machinery like Calendaring, Sueding, Sanforising, Stenter.</p>	08	20
02	<p>Softeners & Stiffeners Classification of softener, Properties, mode of action and application of Cationic, Anionic, Non-ionic, Reactive and Emulsion softeners. Softeners for cotton, wool, silk, polyester. Classification of stiffeners, examples and their application.</p>	08	16
03	<p>Resin Finishing Object of resin finishing, Mechanism of creasing and resin finishing, General recipe for Resin finishing, Role of catalyst in resin finishing, Concept of anticrease, wash-n-wear and Durable Press. Classification and properties of resin and catalysts. Concept 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.</p>	10	20
04	<p>Optical Brightening Agent Finishing Chemistry, mechanism and application methods of OBA for cotton, wool, silk, polyester. Stripping of OBA.</p>	04	08
05	<p>Flame Retardancy Burning cycle and thermal behaviour of textile fibres. Concept of flame proof and flame retardancy. Limiting oxygen Index and its importance, Classification of flame retardants. Mechanism of Solid Phase and Gas Phase flame retardant. Factors affecting 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 test method.</p>	06	16
06	<p>Antimicrobial Finishing Objects, requirements, types and mechanism of antimicrobial finishing. Desirable properties of a good antimicrobial finish, Various antimicrobial finishes for Cotton, Wool, and Silk. Moth proofing of wool, Evaluation of antimicrobial finishes.</p>	06	10
07	<p>Introduction to Special Finishes Waterproof and water repellent finishing, Biopolishing, Scroopy finish for silk, Concept of Nano-finishes.</p>	06	10
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. No.	Author	Title	Edition	Year of Publication	Address of Publisher
1	Dr. K.V. Datye & A.A. Vaidya	Chemical Processing of Synthetic and Its Blends	2 nd	1984	A Wiley Inter science Publication
2	Dr. A. V. Shenai	Tech. of Finishing Vol. X	3 rd	1990	Sevak Publication
3	J.T. Marsh	Introduction To Textile Finishing	2 nd	1979	B.I. Publication
4	Marks, Atlas & Wooding	Chemical After Treatments of Textiles.	4 th	1971	Wiley Inter science
5	R.M. Mittal & S. S Trivedi	Chemical Processing of Polyester & Cellulosic Blends	3 rd	1984	ATIRA, Ahemadabad
6	R. S. Bhagwat	Handbook of Textile Finishing Machinery	--	--	--
7	ACMIT	Finishing, Reference Book of Textile 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			Examination Scheme					
TH	TU	PR	PAPER 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).

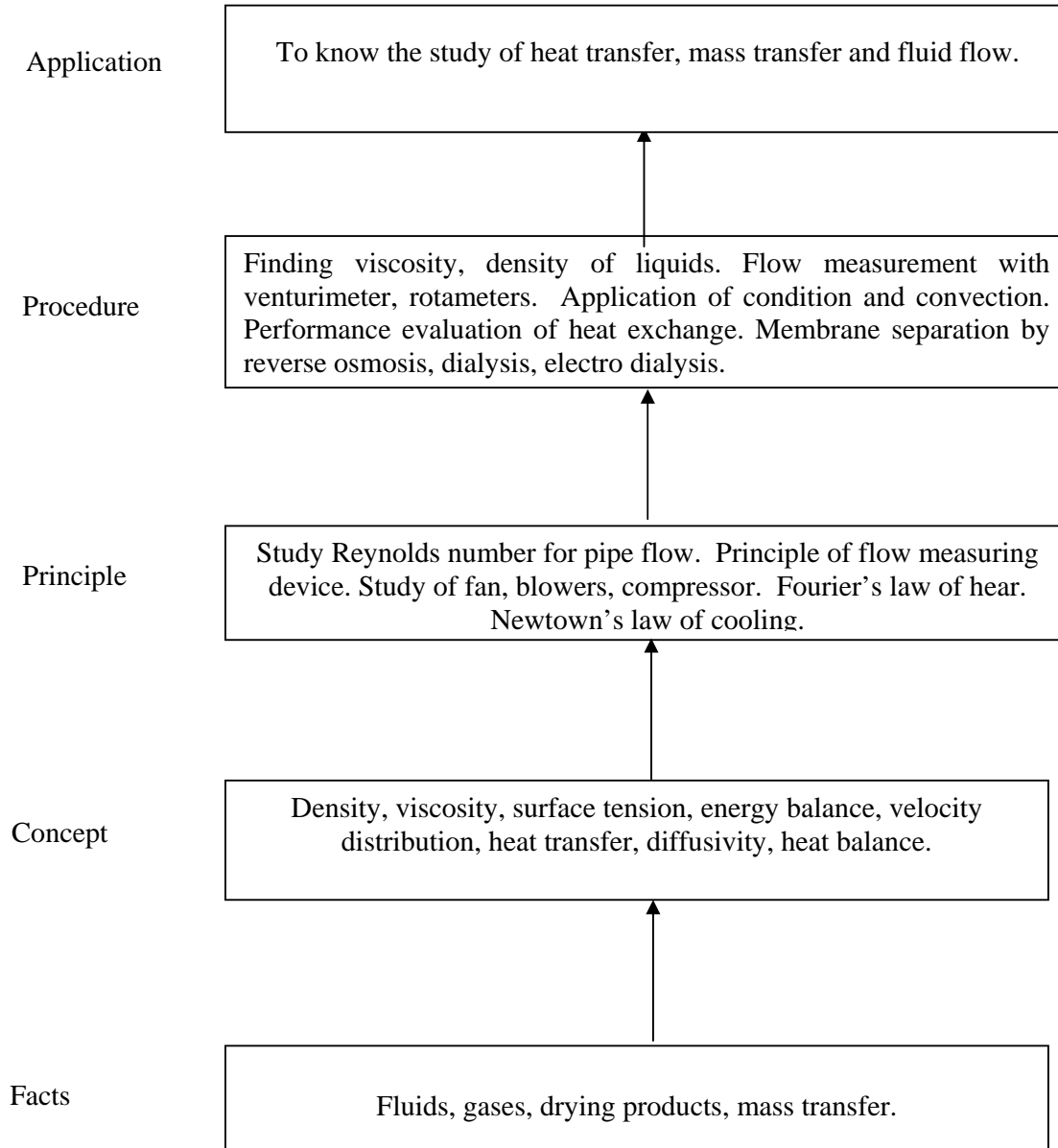
Rational:

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
01	Unit Systems And Introduction to Fluid Flow Specific Objectives: Student will be able to understand <ul style="list-style-type: none"> ➤ Different unit systems and conversions ➤ Properties of fluids & their variations <ul style="list-style-type: none"> • Review of various unit systems. • Study of units and conversions of some of the important physical quantities. • 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. 	07	12
02	Study of Fluids In Motion Specific Objectives: Student will be able to understand <ul style="list-style-type: none"> ➤ Various flow equations & their significance ➤ Material & energy balances <ul style="list-style-type: none"> • Reynolds Experiment for fluid flow through pipes. • Equation of continuity and Bernoulli's Equation (Only expressions no derivation) with the significance of the equations. • Concept of energy losses & friction factor (no derivations & no numerical) • Pipe Fittings: Types & Purpose 	05	12
03	Transportation of Fluids And Measurements of Fluid Flow: Specific Objectives: Student will be able to <ul style="list-style-type: none"> ➤ Understand working of machineries required for fluid transfer ➤ Measure & control the flow rates <ul style="list-style-type: none"> • Need for pumping of liquids, • Principle, construction & working of centrifugal pump.. • Importance of fluid flow measurement in textile. • classification of flow measuring devices: • Construction, principle, and working of venturi meter, orifice meter. 	05	14
04	Introduction to Heat Transfer Specific Objectives: Student will be able to understand <ul style="list-style-type: none"> ➤ Concepts of heat transfer ➤ Application of conduction <ul style="list-style-type: none"> • Definition of heat transfer operation. • Study of modes of heat transfer. • 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 	08	14

	<ul style="list-style-type: none"> • Conduction heat transfer: Fourier's law of heat conduction, • Study of heat flow through a thick slab, thick cylindrical pipe. • Study of thermal insulations. • Applications of conduction heat transfer in textile industry. 		
05	<p>Convection & Radiation heat transfer Specific Objectives: Student will be able to understand</p> <ul style="list-style-type: none"> ➤ Concept of convection & radiation ➤ Applications of above from textile point of view <ul style="list-style-type: none"> • Statement of Newton's Law of cooling, • concept of heat transfer coefficient, • Study of free & forced convection. • Applications of convection heat transfer to textile industry. • Concept of heat transfer by radiation, • concept of black body radiation, • statement of basic laws of radiation • Applications 	05	14
06	<p>Introduction to Mass Transfer Operation Specific Objectives: Student will be able to understand</p> <ul style="list-style-type: none"> ➤ Unit operations ➤ Control of mass transfer, avoid wastage, conservation of mass <ul style="list-style-type: none"> • Concept of mass transfer operation & diffusion. • Definition of diffusion co-efficient, mass transfer rate. • Study of modes of mass transfer viz. molecular diffusion and eddy diffusion. • Classification of mass transfer operations. • Definition and applications of distillation, extraction, absorption, adsorption, crystallization, evaporation. 	05	10
07	<p>Simultaneous heat & Mass transfer operations Specific Objectives: Student will be able to understand</p> <ul style="list-style-type: none"> ➤ About drying & its need ➤ Working of driers <ul style="list-style-type: none"> • Introduction to drying as a unit operation. • Applications of drying techniques in general & particularly to textile industry • Study of diffusion and capillary theory of drying. Brief • study of textile dryers :tumble drier, stenter • Introduction to humidification operation. Importance of humidification in textile mills. • Definitions of the terms like dry bulb and wet bulb tempratures, dew point , humidity, percent humidity, absolute and relative humidity, 	09	14
08	<p>Filtration and Membrane Separation Techniques Specific Objectives: Student will be able to understand</p> <ul style="list-style-type: none"> ➤ Filtration & its application in textile industry ➤ advance techniques for effluent treatment <ul style="list-style-type: none"> • Introduction to filtration operation, filter aids, filter media, 	04	10

	<ul style="list-style-type: none"> • Applications of filtration to textile industry. • Introduction to membrane separation Techniques. • Advantages of membrane technology & applications of these techniques in general & in particular to textile industry. • Study of micro, ultra filtration, reverse osmosis. 		
Total		48	100

Learning Resources:**Books:**

Sr. No	Author	Title	Edition	Year of Publication	Address of Publisher
01	Badger & Banchero	Introduction to Chemical Engineering	2 nd	1991	McGraw Hill Publication
02	Treybal	Mass Transfer	5 th	1985	McGraw Hill Publication
03	Coulson & Richardson	Chemical Engineering	Vol 1-5	1991	McGraw Hill 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			Examination Scheme					
TH	TU	PR	PAPER 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:

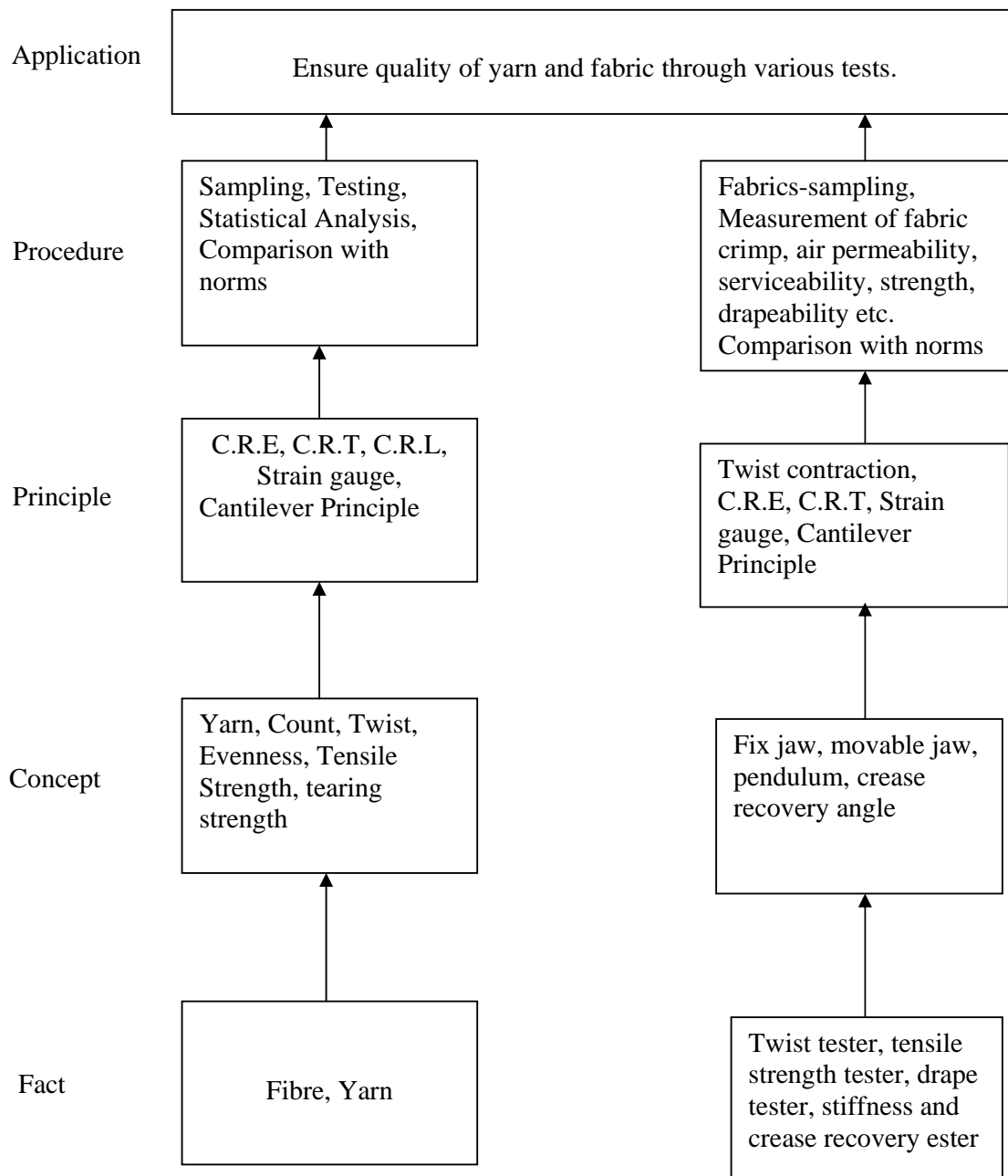
Variety of raw materials for textile manufacturing are used, such as cotton, silk, synthetic fibers, etc. These raw materials are being used individually or mixed in different proportions to form a yarn of desired quality. The raw materials can be tested for numerous characteristics like fiber length, 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
1	YARN TESTING: Specific Objectives <ul style="list-style-type: none"> ➤ 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: <ul style="list-style-type: none"> • Different systems of yarn numbering.(direct, indirect) • Definition : British count, Metric, Tex, Denier count • Standard method of determination of yarn count with electronic balance 1.2 Yarn Twist: Definition, direction twist, effect of twist on yarn and fabric properties. Measurement of yarn twist - <ul style="list-style-type: none"> • Twist Contraction principle • Twist and Untwisting principle 	10	16
	1.3 Yarn evenness: Concept, Types of variations in yarn (random& periodic), Expressions used for unevenness: U%, C.V. %, Imperfections. Effect of yarn unevenness on yarn & fabric properties.	06	08
2	FABRIC TESTING: Specific Objectives <ul style="list-style-type: none"> ➤ Know different fabric properties to be tested. ➤ List importance of fabric testing. ➤ Interpretation of test results. ➤ Selection of Testing Methods as per End use. 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.	06	16
	2.3 Stiffness & Drape of fabric: Measurement of drape &stiffness. 2.4 Crease Recovery Measurement by crease recovery angle	04	14
	2.5 Serviceability of fabric Definition: serviceability, wear, and abrasion. Measurement of wear: Martindales Abrasion tester. Pilling of fabric: factors responsible for pilling of fabric. Measurement of pilling ICI Pill box tester.	06	12

	<p>2.6 Water and Air relation to fabric Definitions : Waterproof, shower proof fabrics, water Repellent fabrics. Measurement: <ul style="list-style-type: none"> • Spray test, • Hydrostatic water head test. Definition : Air-permeability, Air resistance, Porosity Measurements of air permeability, Factors affecting air-permeability.</p>	08	12
3	<p>Specific Objectives</p> <ul style="list-style-type: none"> ➤ Describe the process of tensile strength testing of yarn and fabric ➤ Describe the process of tearing strength, Bursting strength testing of and fabric. ➤ Use appropriate method of testing of tensile, tearing strength. <p>3.1 Tensile Strength Testing: Definitions: load, elongation, Mass Stress, tenacity, work of rupture, work factor, elastic recovery.</p> <p>3.2 Yarn Strength: Measurement of single yarn strength & lea strength. Count Strength Product (CSP)</p>	04	10
	<p>3.3 Fabric strength Testing: Sample size, principle, working of testers for Fabric tensile strength, tearing strength, Bursting strength.</p>	04	12
	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 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. No.	Author	Title	Publisher
1	Angappan	Textile Testing	SS Textile Inst, 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:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

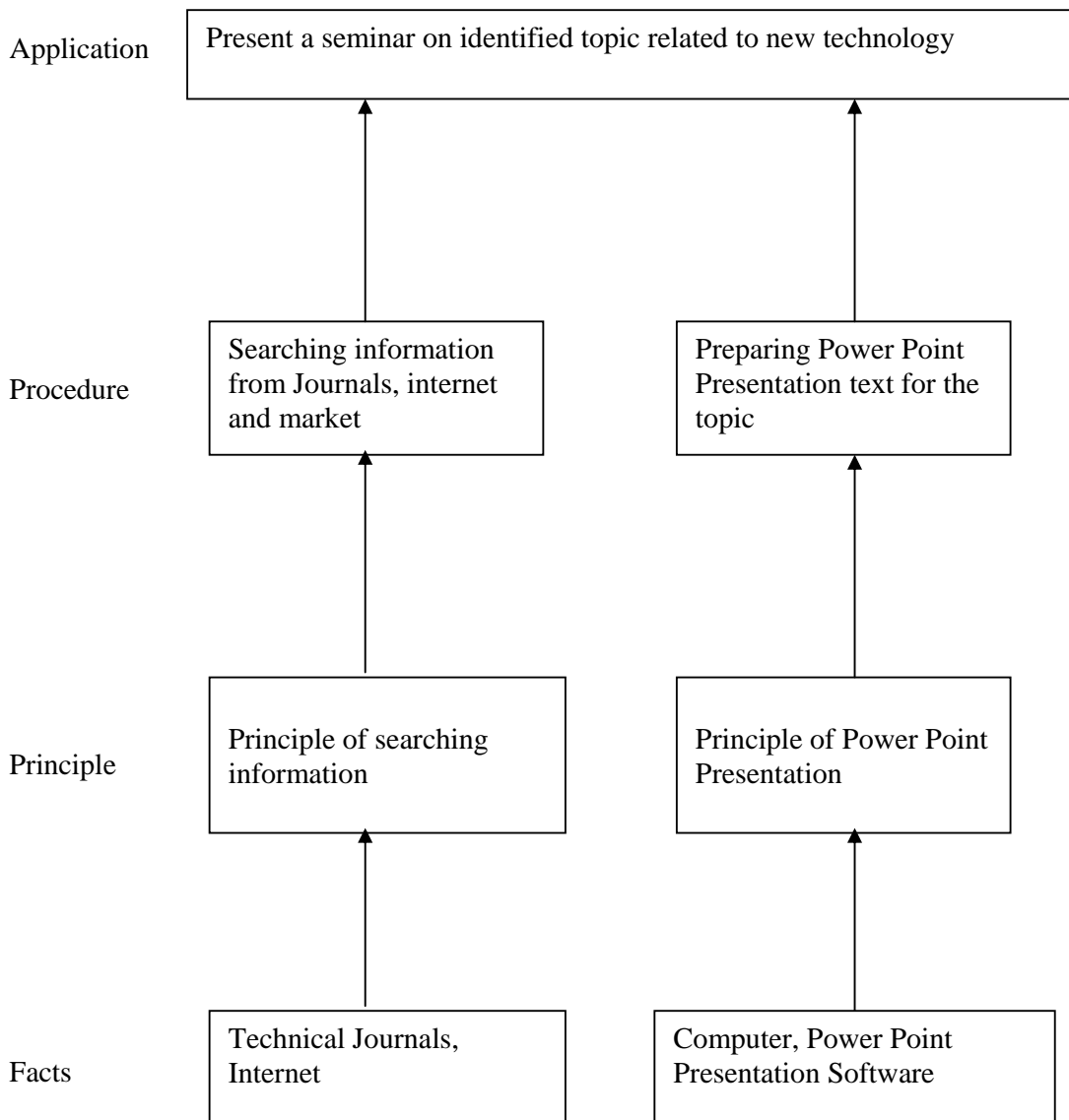
The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation 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
1	<p>Industrial Visits</p> <p>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.</p> <p>The industrial visits may be arranged in the following areas / industries :</p> <ul style="list-style-type: none"> i) Effluent treatment plant ii) Auxiliary manufacturing unit iii) Research unit. iv) Quality testing unit. v) Machine manufacturing unit vi) Dyeing & Printing Unit 	14
2	<p>Lectures by Professional / Industrial Expert lectures to be organized from any two of the following areas:</p> <ul style="list-style-type: none"> i) Interview Techniques. ii) Energy conservation in textile. iii) Non conventional energy sources. iv) Woven and knit goods continuous processing & machines. v) Nanotechnology. 	06
3	<p>Information Search:</p> <p>Information search can be done through manufacturer's catalogue, websites, magazines, books etc. and submit a report any one topic.</p> <p>Following topics are suggested :</p> <ul style="list-style-type: none"> i) Advances in chemicals & Auxiliaries. 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. 	08
4	<p>Seminar :</p> <p>Seminar topic shall 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)</p>	10
5	<p>Mini Project / Activities : (any one)</p> <ul style="list-style-type: none"> a) Conventional process study of any one machine in dyeing. b) Conventional process study of any one machine in printing. c) Conventional process study of any one machine in bleaching. d) Sketch and working of analytical instrument like spectrophotometer or microscope. e) Literature survey of any one given topic. 	10
Total		48

Course Name : Diploma in Textile Technology

Course Code : TC

Semester : Fourth

Subject Title : Industrial Training

Subject Code : 17053

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

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, decatizing, 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.

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.


MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI
TEACHING AND EXAMINATION SCHEME
COURSE NAME : DI A IN TEXTILE MANUFACTURES
COURSE CODE : TX
DURATION OF COURSE : 6 SEMESTER
WITH EFFECT FROM 2012-13
SEMESTER : FOURTH
DURATION : 16 WEEKS
PATTERN : FULL TIME - SEMESTER
SCHEME : G

SR. NO.	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME								SW (17400)	
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)		
								Max	Min	Max	Min	Max	Min	Max		Min
1	Environmental Studies \$	EST	17401	01	--	02	01	50#*	20	--	--	--	--	25@	10	50
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	
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

Student Contact Hours Per Week: 32 Hrs.
THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.
Total Marks: 950

 @ 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

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:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

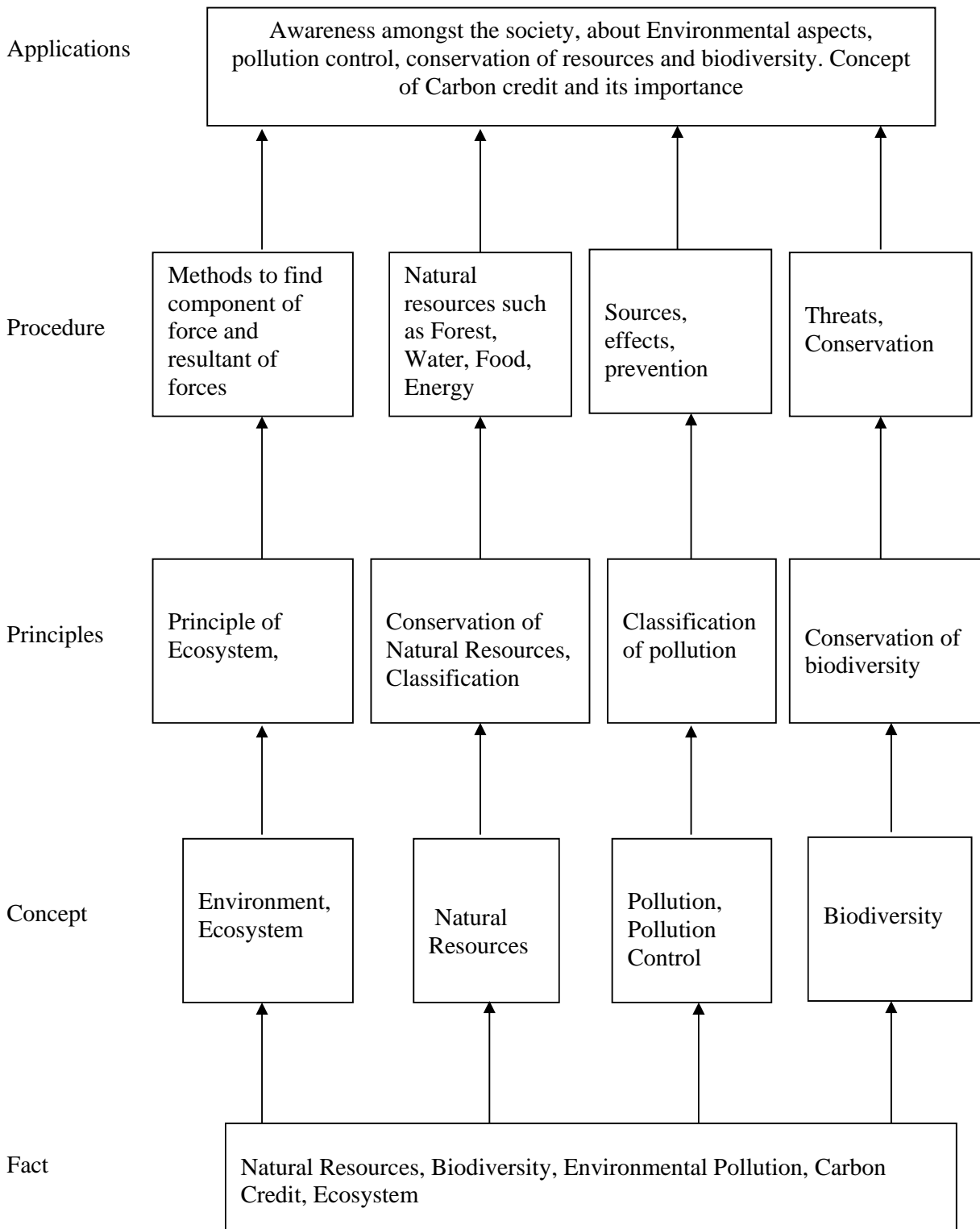
The curriculum covers the aspects about environment such as Environment and Ecology, Environmental impacts on human activities, Water resources and water quality, Mineral resources and mining, Forests, etc.

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
<p>Topic 1: Nature of Environmental Studies</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define the terms related to Environmental Studies ➤ State importance of awareness about environment in general public <p>Contents:</p> <ul style="list-style-type: none"> • Definition, Scope and Importance of the environmental studies • Importance of the studies irrespective of course • Need for creating public awareness about environmental issues 	01	04
<p>Topic 2: Natural Resources and Associated Problems</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define natural resources and identify problems associated with them ➤ Identify uses and their overexploitation ➤ Identify alternate resources and their importance for environment <p>Contents:</p> <p>2.1 Renewable and Non renewable resources</p> <ul style="list-style-type: none"> • Definition • Associated problems <p>2.2 Forest Resources</p> <ul style="list-style-type: none"> • General description of forest resources • Functions and benefits of forest resources • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc. <p>2.3 Water Resources</p> <ul style="list-style-type: none"> • Hydrosphere: Different sources of water • Use and overexploitation of surface and ground water • Effect of floods, draught, dams etc. on water resources and community <p>2.4 Mineral Resources:</p> <ul style="list-style-type: none"> • Categories of mineral resources • Basics of mining activities • Mine safety • Effect of mining on environment <p>2.5 Food Resources:</p> <ul style="list-style-type: none"> • Food for all • Effects of modern agriculture • World food problem 	04	10
<p>Topic 3. Ecosystems</p> <ul style="list-style-type: none"> • Concept of Ecosystem • Structure and functions of ecosystem • Energy flow in ecosystem • Major ecosystems in the world 	01	04
<p>Topic 4. Biodiversity and Its Conservation</p> <ul style="list-style-type: none"> • Definition of Biodiversity • Levels of biodiversity • Value of biodiversity • Threats to biodiversity 	02	06

<ul style="list-style-type: none"> • Conservation of biodiversity 		
Topic 5. Environmental Pollution <ul style="list-style-type: none"> • Definition • Air pollution: Definition, Classification, sources, effects, prevention • Water Pollution: Definition, Classification, sources, effects, prevention • Soil Pollution: Definition, sources, effects, prevention • Noise Pollution: Definition, sources, effects, prevention 	03	08
Topic 6. Social Issues and Environment <ul style="list-style-type: none"> • Concept of development, sustainable development • Water conservation, Watershed management, Rain water 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 	03	10
Topic 7. Environmental Protection Brief description of the following acts and their provisions: <ul style="list-style-type: none"> • Environmental Protection Act • Air (Prevention and Control of Pollution) Act • Water (Prevention and Control of Pollution) Act • Wildlife Protection Act • Forest Conservation Act Population Growth: Aspects, importance and effect on environment <ul style="list-style-type: none"> • Human Health and Human Rights 	02	08
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. No.	Author	Title	Publisher
01	Anindita Basak	Environmental Studies	Pearson Education
02	R. Rajgopalan	Environmental Studies from Crises to Cure	Oxford University Press
03	Dr. R. J. Ranjit Daniels, Dr. 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

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

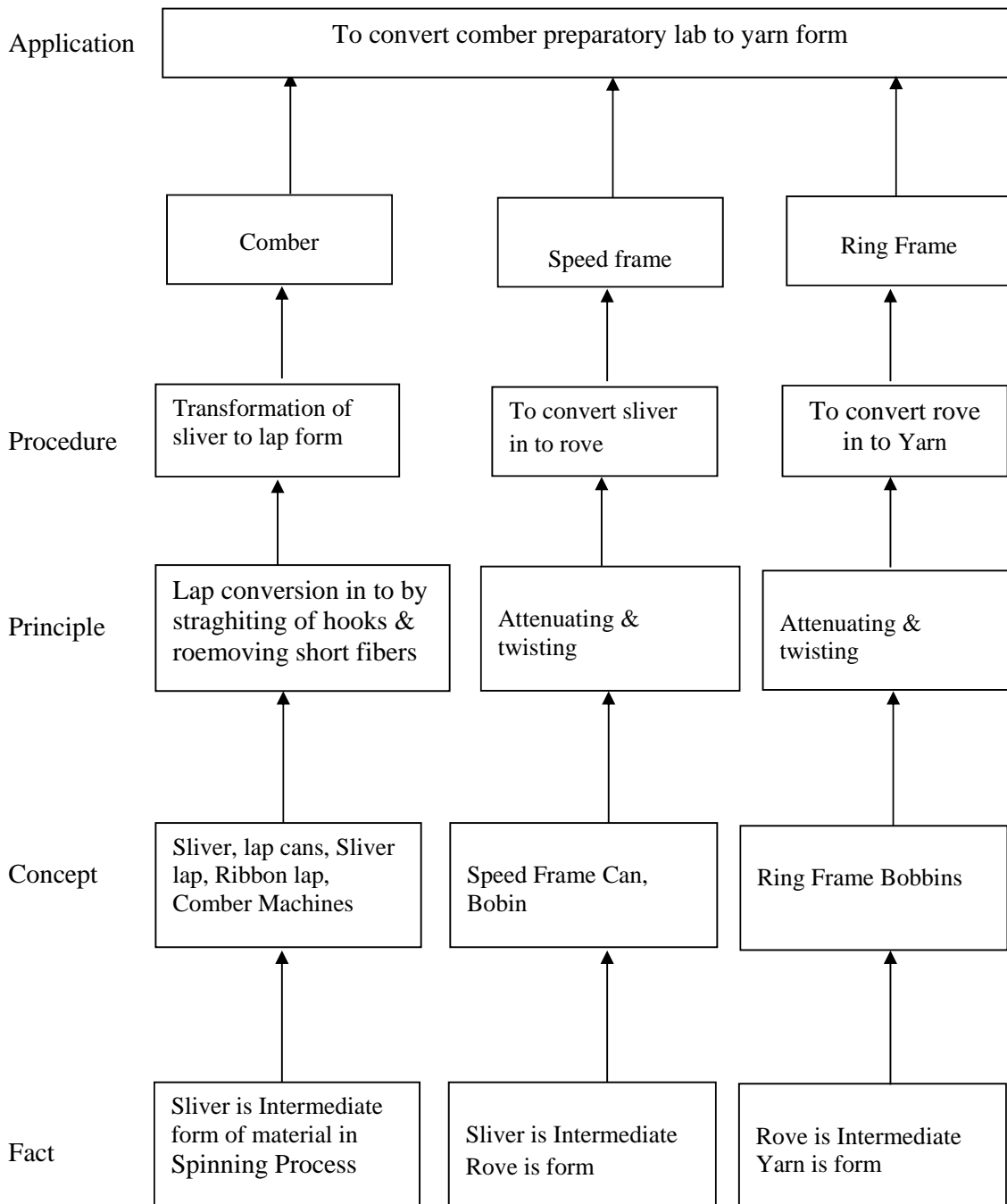
In this fourth semester, Yarn Manufacturing III - is a continuation of the detailed study of spinning process. This subject covers further part of spinning process comber preparatory and comber fly frame & ring frame. It covers the study of principles and description of these processes and functions 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
<p>Topic 1. Study of Comber lap preparation and Comber</p> <p>Specific objective: The student will able to</p> <ul style="list-style-type: none"> ➤ Understand the concept of parallelization & blending of fibers ➤ Understand effect of setting & process parameters on material. ➤ Understand the importance of comber needles. ➤ Understand the defect in combing preparatory & combing process <p>Content:-</p> <p>1.1 Introduction – Preparation to combing and comber operation</p> <p>1.2 Objects of Sliver lap, Ribbon Lap and Super Lap.</p> <p>1.3 Study of construction and working of lap preparation machine-sliver lap, Ribbon lap and Super lap.</p> <p>1.4 Influence of lap preparation on combing- evenness of lap sheet, deposition of the hooks.</p> <p>1.5 Causes of defective production and their remedies at above machines</p> <p>1.6 Calculation related to production & draft of Sliver lap & Ribbon Lap</p> <p>1.7 Types of Comber - Sequence of operation of rectilinear comber</p> <p>1.8 Technology of combing- parameters influencing the combing operation, influence of the combing on quality.</p> <p>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.</p> <p>1.10 The comb- cylinder comb, top comb, operations of comb</p> <p>1.11 Drafting arrangement, waste removal</p> <p>1.12 Study of important setting and its effects on working - step gauge, distance gauge, top comb settings.</p> <p>1.13 Specification of Modern Comber</p> <p>1.14 Causes and remedies of defective production at Comber</p> <p>1.15 Calculation of Hank, Draft, Production ,and Noil Percentage</p>	24	36
<p>Topic 2.The study of Speed frame</p> <p>Specific objective: The student will able to</p> <ul style="list-style-type: none"> ➤ 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. <p>Content:</p> <p>2.1 The necessity of Speed frame.</p> <p>2.2 Description of functions of Speed frame – operating sequence, effect of arrangement of bobbins in two rows.</p> <p>2.3 Operating regions of the roving- creel, Spindle and flyer - Imparting twist, the spindle, the flyer, the flyer top, the presser arm.</p> <p>2.4 Winding of the bobbin. Flyer leading and bobbin leading its comparison</p> <p>2.5 Gearing diagram of Speed frame (Question not to be asked in theory Exam)</p> <p>2.6 Bobbin drive, cone drive transmission, lifter motion</p> <p>2.7 Study of building mechanism of Speed frame- shifting of cone belt, reversal of bobbin rail, shortening of lift.</p> <p>2.8 Monitoring device- sliver stop motion, roving stop motion</p> <p>2.9 Gear change position of the Speed frame.</p> <p>2.10 Modern developments in Speed frames – creel, drafting and collecting zones</p> <p>2.11 Calculation of Hank, Draft, Twist & Production.</p>	20	32

2.12 Causes of defects and remedies.		
Topic.3. Study of Ring frame process Specific objectives: The student will able to <ul style="list-style-type: none"> ➤ 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: <p>3.1 Introduction</p> <p>3.2 Function and mode of operation.</p> <p>3.3 Design feature of machine- Frame, creel, drafting arrangement,</p> <p>3.4 Spindle drive, yarn guiding device, balloon control ring, separators, types of rings,</p> <p>3.5 Traveller-task and function, Types, wire profile of Traveller, Traveller clearer, Traveller numbering system</p> <p>3.7 Variable drive</p> <p>3.8 Structure of Ring bobbin, Winding process, Builder motion of ring bobbin, building the base.</p> <p>3.9 Monitoring system, ring data system</p> <p>3.10 Modern development in Ring frame</p> <p>3.11 Calculation of draft, twist and production of Ring frame,</p> <p>3.12 Average count and 20^s conversion.</p>	20	32
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. No.	Author	Titles	Publication
1	T. K. Pattabhiram	Essential Facts in Cotton Spinning.	Somaiya Publication Pvt. Ltd. Mumbai.
2	A. R. Garde (Editor)	Spinning Tablet Series (9 numbers)	The Textile association, India.
3	A. E. De Barr, H. Catling	The Principles and Theory Of Ring Spinning. Vol. 5	The Textile Institute Manchester.
4	Ed. By K. Ganesh, A. R. Garde	Cotton Spinning.	The Textile association, India.
5	R.Chattopadhyay, Rengasamy J	R. Spinning- Drawing, Combing and Roving.	NCUTE, IIT Delhi
6	K. R. Salhotra, R. Alagirusamy, R. Chattopadhyay	Ring Spinning, Doubling and 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. Mumbai.

Course Name : Diploma in Textile Manufactures

Course Code : TX

Semester : Fourth

Subject Title : Fabric Manufacturing-III

Subject Code : 17463

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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:

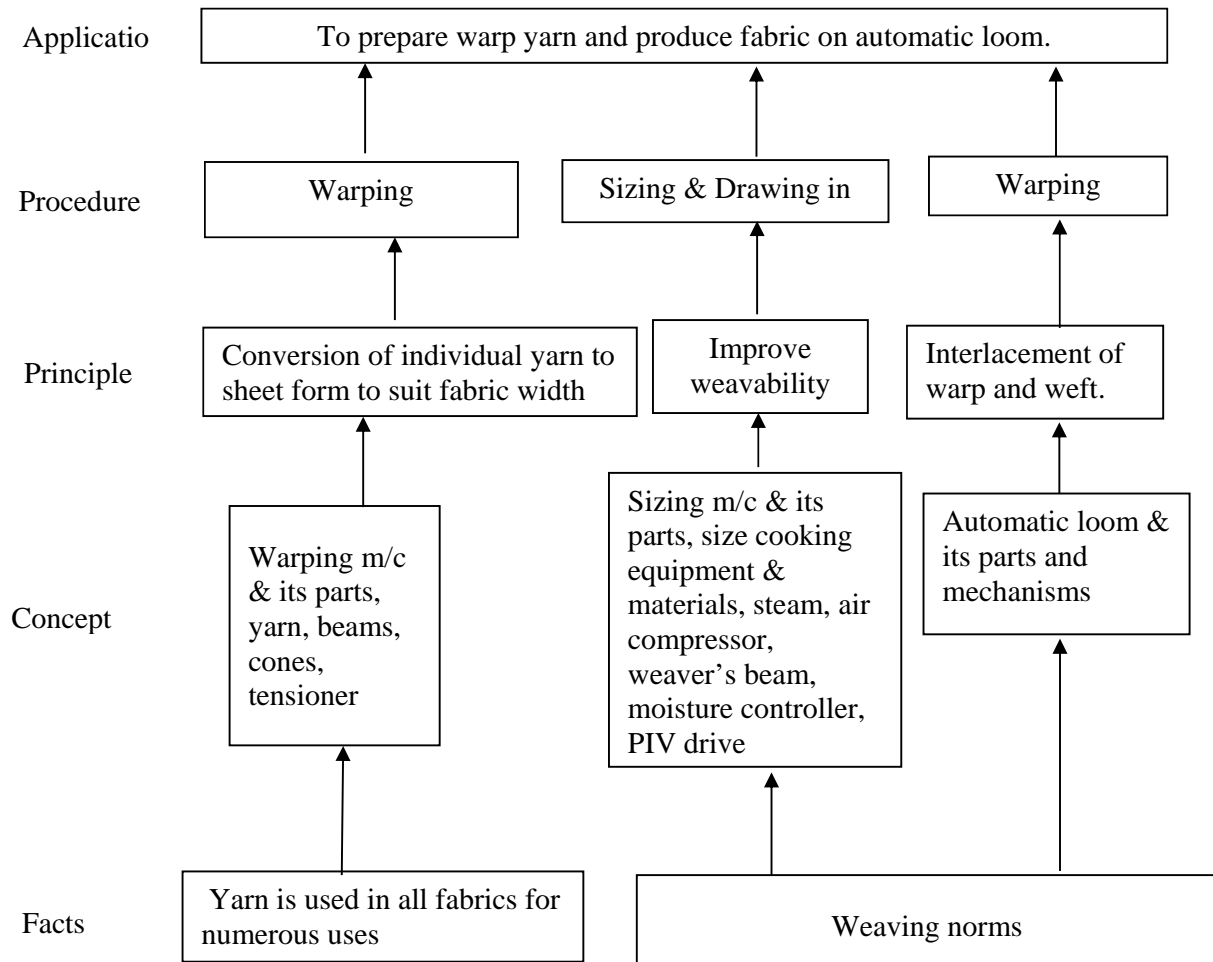
The textile manufacturing is done in various stages. In first year, we have experienced that this subject of fabric manufacture dealt with yarn preparation in winding and ordinary weaving on simple loom. In this second year, this subject deals with subsequent steps of yarn preparation and automatic weaving. 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	Topic	Hours	Marks
1	Sizing 1.1 Objects of Sizing. 1.2 Kinds and functions of Sizing ingredients. 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.	10	16
2	Study of Sizing Machine: 2.1 Creel construction, types, their merits and demerits, braking systems, tension control on warp. 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 & its importance. 2.3 Drying zone: phenomena of multi-cylinder drying, removal of condensed water, Teflon coating, drive to cylinders, temperatures and its control. 2.4 Splitting zone: leasing, splitting, moisture control. Details of headstock, marking and measuring device, comb, sheeting rollers, drag roller. 2.5 Winding zone: drive to the weavers beam. 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.)	10	24
3	Stretch and migration control: 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. 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.	10	16
4	Automatic Weaving 4.1. Introduction, differences between ordinary loom and automatic loom. 4.2. Study of pirn changing mechanism, different types of weft feelers. 4.3. Warp stop motion of different types. 4.4. Various types of positive let off motions: Bartlett, Ruti, CIMMCO, etc. 4.5. Centre weft fork motion, its comparison with side weft fork motion. 4.6. Shuttle changing motion, its comparison with Pirn changing motion. 4.7. Study of colour retaining device on multiple box loom	14	36

	4.8. Study of centre selvedge. 4.9. Study of the warp preparation method for the Automatic looms.		
5	Reaching In and Drawing In 5.1 Different type of Reaching, Drawing-in, denting and knotting: Methods & machines. 5.2 Study of design of healds and types of healds. 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.	04	08
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. No	Name of Author	Title	Publication
1.	Robinson and Marks	Principle of Weaving	The Textile Institute, 10 Black friars Street, Manchester M3 5DR
2.	Bennett	An introduction to automatic weaving	Indo Overseas Trading Co. 280 Carnac Road, Bombay and Columbine Press Co.Ltd., Manchester, London

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

Specific Objectives:

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

Course Name : Diploma in Textile Manufactures

Course Code : TX

Semester : Fourth

Subject Title : Knitting Technology

Subject Code : 17464

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	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.

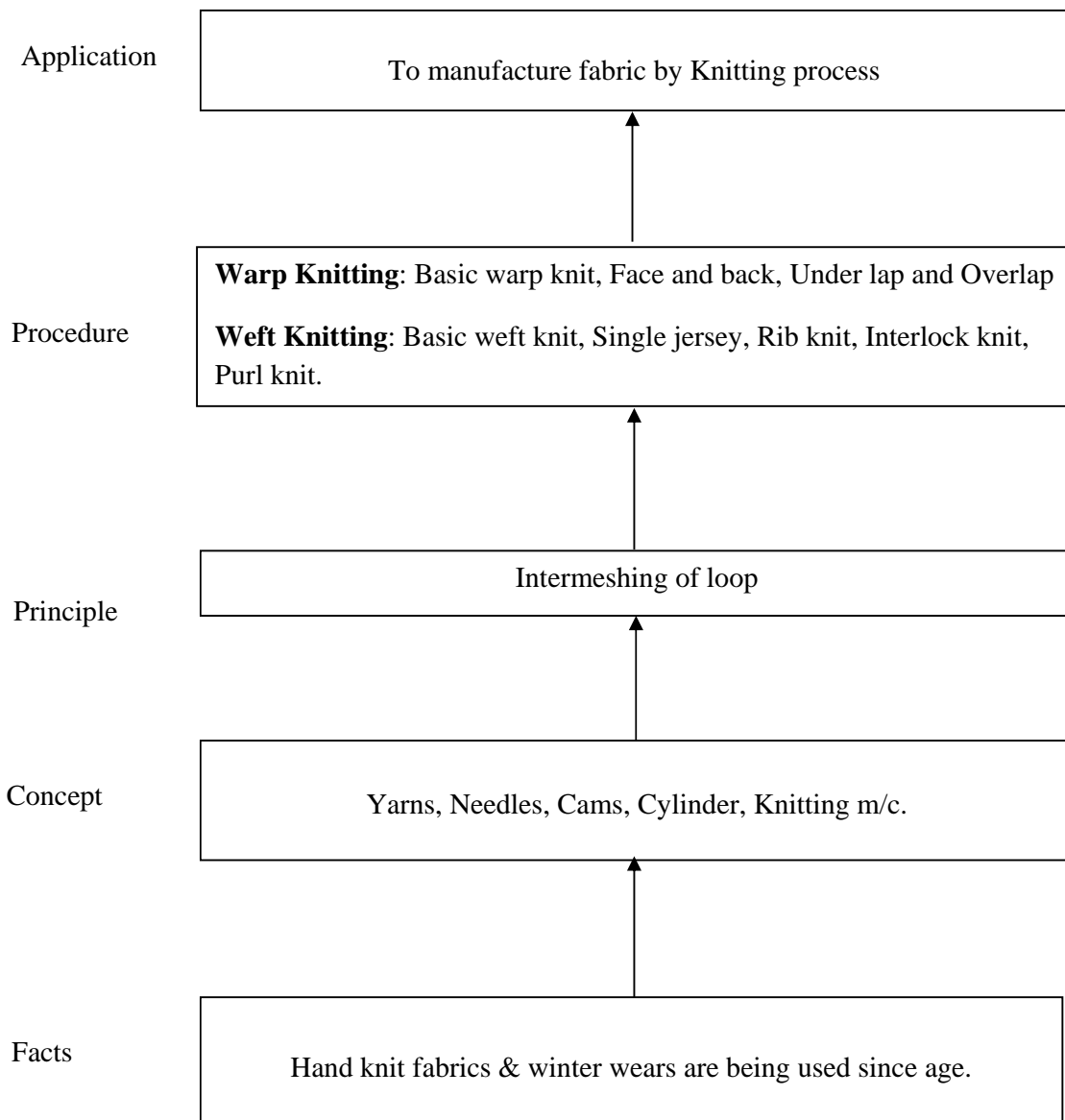
General Objectives:

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
<p>Topic 1. Overview of Knitting Process Specific objective: The student will able to</p> <ul style="list-style-type: none"> To define knitting process To interpret the difference between Woven & Knitted fabric. <p>Content:</p> <ol style="list-style-type: none"> 1.1) Introduction to knitting process. 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. 	02	06
<p>Topic 2. Weft Knitting Specific objective: The student will able to</p> <ul style="list-style-type: none"> Define basic terminology of Knitting. Identify different parts of Knitting and their function Describe intermeshing process for Knitting <p>Content:</p> <ol style="list-style-type: none"> 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 <ul style="list-style-type: none"> - Types of needle & its comparison - Knitting action of different needles - Sinker & its function - Cylinder :Gauge, pitch - Cams - Feeder/stripper - Fabric spreader 2.3 Needles with different butt positions: Use in design 2.4 Positive feeder- its functions, types. 	06	10
<p>Topic.3. Weft knitting Machines Specific objectives: The student will be able to</p> <ul style="list-style-type: none"> Operate knitting machine. Interpret different knitted fabric structure for appropriate use Select the procedure of knitted fabric production. <p>Content:</p> <ol style="list-style-type: none"> 3.1 Passage of yarn through Single jersey machine 3.2 Single jersey machine -Structure, loop diagram, knitting elements, knitting action. 3.3 Rib 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 jersey, rib, interlock, purl fabrics. 	08	16
<p>Topic 4. Weft knitted fabrics Specific objective:-The student will able to</p> <ul style="list-style-type: none"> Represent the knitted fabric on paper. Draw different knitted fabric structure. 	06	12

<ul style="list-style-type: none"> • Differentiate the knitted fabrics <p>Content:</p> <ol style="list-style-type: none"> 4.1) Principle stitches in weft knitting-knit, tuck, miss. 4.2) Notations in weft knitting 4.3) Ornamentation of plain knit fabrics <ul style="list-style-type: none"> - La-coste, According, Thick Fleece, Jersey blister 4.4) Ornamentation of Rib Structure <ul style="list-style-type: none"> - Half cardigan, Full cardigan 4.5) Ornamentation of Interlock <ul style="list-style-type: none"> - Eight lock structure 4.6) Double knit structures-Milan Rib, Double pique, pique poplin, punto di roma, ottoman rib, texi pique 		
<p>Topic 5. Knitting Calculations</p> <p>Specific objective: The student will able to</p> <ul style="list-style-type: none"> • Calculate knitting production in Kg/Day or Meters/day • Estimate yarn requirement for a particular production • Calculate no. of machine required for designed output <p>Content :</p> <ol style="list-style-type: none"> 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 	06	12
<p>Topic 6 : Warp knitting</p> <p>Specific objective : The student will able to</p> <ul style="list-style-type: none"> • Describe the process of warp knitting • Compare different knitting technologies. <p>Content:-</p> <ol style="list-style-type: none"> 6.1) Introduction of warp knitting 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 	03	08

<p>Topic 7 :Warp Knitting machine-----12 Marks Specific objective: The student will able to</p> <ul style="list-style-type: none"> • Identify different parts of warp knitting machine. • Represent the warp knitted fabric on paper. • Understand mechanism of patterning. • Prepare the chain links. <p>Content:- 7.1) Comparison of tricot And Rachel machine 7.2) Elements of Tricot knitting machine 7.3) Knitting cycles of Tricot m/c 7.4) Elements of Rachel knitting machine 7.5) Knitting action of Rachel machine 7.6) Notation for warp knit structures</p> <p>Sub topic 7.1 :Patterning in warp knitting----- 8 Marks 7.1.1) Introduction of patterning. 7.1.2) Pattern wheel, pattern drum and chain links 7.1.3) Notation 7.1.4) Principle stitches in warp knitting</p>	11	20
<p>Topic 8 :Flat Bed knitting Specific objective: The student will able to</p> <ul style="list-style-type: none"> • To differentiates flat knitting and circular knitting. • To understand mechanism of flat knitting. <p>Content:- 8.1) Introduction of flat knitting 8.2) Types and classification 8.3) Knitting elements 8.4) Yarn path in flat knitting machine Knitting cycle.</p>	03	08
<p>Topic 9 :Quality aspects of knitting Specific objective:- The student will able to</p> <ul style="list-style-type: none"> • Understand quality parameters of knitted fabric. • Define the knitted fabric defects. <p>Content:- 9.1) Basic properties of yarns used for knitting 9.2) Defects and their remedies in knitted fabrics. 9.3) Quality tests for weft knitted fabrics.</p>	03	08
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.

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 Rib 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. No.	Author	Title	Publisher
1	David Spencer.	Knitting Technology:	Woodhead Publishing India Pvt. Ltd.
2	S. Raz.	Warp Knitting Production	Verlag meliand textile berichte, 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 ray	Fundamentals and advances in knitting technology	Woodhead Publishing India 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 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.

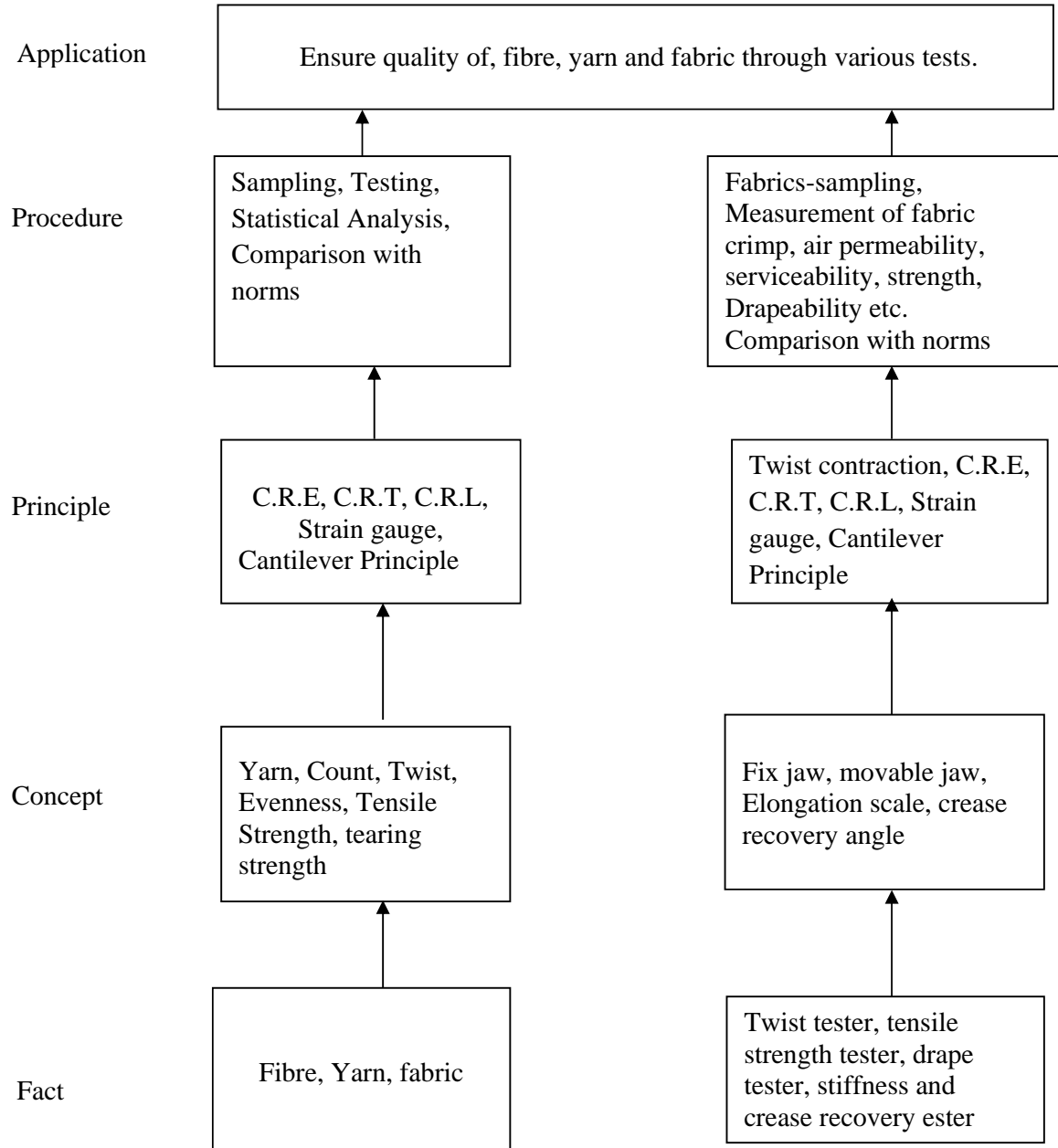
Since textile is system of mass production and contains lots of variations, lot of experimentation is required. Results obtained from specific number of observations are to be analyzed, interpreted and used for best outcomes. Therefore, students are equipped with the methods to analyze the testing results 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
1	Fabric Testing: Specific Objectives <ul style="list-style-type: none"> ➤ 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
	1.2 Fabric dimensional Properties: Fabric Length, Width, Thickness, Weight measurement. Warp Count, Weft Count, and Threads/Unit length, Crimp in Warp and weft. Effect of crimp on fabric properties. Method of determination of crimp percentage (Crimp Tester). Cloth covers (IS 1963:1981 SP-15 Part-II 2000). Mathematical relation between Cover Factor, yarn count and diameter.		
	1.3 Stiffness & Drape of fabric: <ul style="list-style-type: none"> • Terms and Definitions • Measurement of stiffness of fabric by tester based on cantilever principle (IS 6490-1971). • Determination of drape coefficient by drape meter (IS 8357-1977). 	04	14
	1.4 Crease Recovery: <ul style="list-style-type: none"> • Measurement by crease recovery angle (IS 4687:1981 SP-15 Part-II 2000). 		
	1.5 Serviceability of fabric <ul style="list-style-type: none"> • Definition: serviceability, wear, and abrasion. • 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) 	06	12
	1.6 Water and Air relation to fabric <ul style="list-style-type: none"> • Definitions : Waterproof, shower proof fabrics, water Repellent fabrics. Measurement: <ul style="list-style-type: none"> • Spray test, • Hydrostatic water head test. • Definition : Air-permeability, Air resistance, Air Porosity • Measurements of air permeability. • Factors affecting air-permeability. 	08	14
2	Tensile Testing Specific Objectives <ul style="list-style-type: none"> ➤ Describe the process of tensile, tearing strength testing of fabric ➤ Use appropriate method of fabric strength testing. Fabric strength:	06	14

	<ul style="list-style-type: none"> • 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), 		
3	Modern Testing Instruments Specific Objective <ul style="list-style-type: none"> ➤ Describe Modern Fibre and yarn testing Instruments 3.1 Principle, working, parameters in brief. <ul style="list-style-type: none"> • High Volume Instruments (HVI) • AFIS testing. • Tenso-Jet • Tenso-Rapid yarn testing, 	08	16
4	Garment Testing <ul style="list-style-type: none"> ➤ Describe the testing methods for garments 4.1 Colour Fastness : <ul style="list-style-type: none"> • Grey Scale for Colour Change and Staining • Test Procedure for fastness of colour & Staining Fastness to Washing, Dry-cleaning, & Light, Rubbing & Perspiration. 4.2 Dimensional Stability: Expansion, Shrinkage, Swelling, 4.3 Seam: strength, slippage.	08	14
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. No.	Author	Title	Publisher
1	Angappan	Textile Testing	SS Textile Inst, 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
Course Code : TX
Semester : Fourth
Subject Title : Textile Chemistry - II
Subject Code : 17466

Teaching & Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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

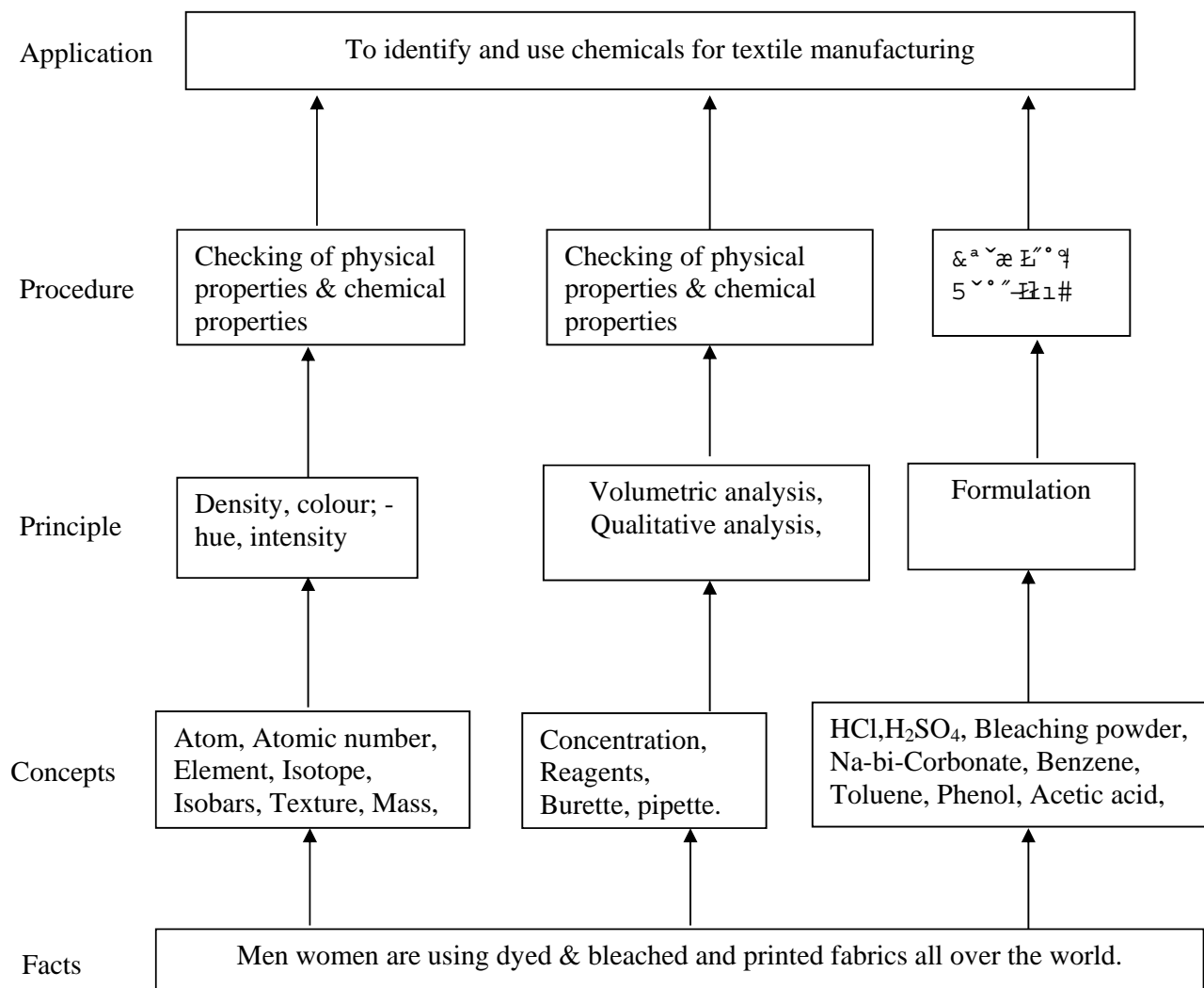
1. Dyeing of yarns and fabrics.
2. Printing of fabrics.
3. Finishing of fabrics like mercerizing, sanforising, etc.

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	Topic	Marks	Hours
1	Dyeing Specific Objectives; Student will be able to list the type of dyes used for various types of fibres Explain dyeing process for various textile fibres. 1.1 Dyeing of cellulose materials with Direct, Sulphur, Vat, Reactive and Azoic dyes. 1.2 Dyeing of Polyester with disperse dyes. 1.3 Dyeing of Nylon with disperse and reactive dyes. 1.4 Dyeing of acrylic with cationic dyes. 1.5 Study of dyeing of blends (Polyester and cotton or viscose)	28	14
2	Dyeing Machinery Specific Objectives; Student will be able to, Identify machinery used for dyeing of fibre, yarn and fabrics. Understand method for blend dyeing. 2.1. Construction and working of machinery used for dyeing yarn and fabric: Package Dyeing, Jigger Winch, Padding Mangle And Jet Dyeing Machine.	20	10
3	Printing Specific Objectives; Student will be able to , List the various chemicals used in printing Understand different styles of printing 3.1 Printing of cellulosic fabrics with dyes direct, reactive, vat, and pigment colours. 3.2 Study of direct, discharge and resist styles of printing. 3.3 Brief study of flat bed printing machine, Roller printing machine and Rotary printing machine	24	12
4	Finishing 4.1 Object and classification of Finishing processes. 4.2 Finishes applied on cellulose and synthetic fabrics: resin finishing, water proofing, flame retarding, soil release finish heat setting, optical brightening agent treatment. 4.3 Construction and working of Drying, Stenter, Calendaring, Mercerisation, Sanforising Machine	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. 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 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 No.	Activities	Hours
1	<p>Industrial Visits</p> <p>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.</p> <p>The industrial visits may be arranged in the following areas / industries : Spinning /Weaving / wet processing/ garment/Knitting</p>	16
2	<p>Lectures by Professional / Industrial Expert Lectures to be organized from any two of the following areas:</p> <ol style="list-style-type: none"> 1) Interview Techniques. 2) Modern Ring frame 3) Applications of Sensors and Transducers in Textiles 4) Different methods of Yarn manufacturing other than ring spinning 5) Latest developments in weaving machines 6) Other related topics 	08
3	<p>Information Search:</p> <p>Information search can be done through manufacturer's catalogue, websites, magazines, books etc. and submit a report any one topic.</p> <p>Following topics are suggested :</p> <ol style="list-style-type: none"> 1) Lubricants & additives 2) Humidification and air conditioning in textile mills 3) Illumination in textile mill 4) Technical features of Spinning preparatory and spinning machineries 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 	12
4	<p>Seminar:</p> <p>Seminar topic shall 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)</p>	12
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:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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 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.

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 handling.
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.

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 for 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.

1) Spinning Organization (Hank & Draft)

Mixing -----I-----II-----III-----

Machine Hank Draft

Mixing (Detailed Organisation)

Machine Sequence	Hank Count	Ends Doubled	Draft	Speed	Product spindles per 8 hrs hank/labs kg.
			TPI		

Similar information should be tabulated for other mixing and counts.

Labour Organisation

Deptt	I Shift	II Shift	III Shift	
	Productive Ancillary	Productive Ancillary	Productive Ancillary	Grand Total
Mixing & Blow Room to Ring Frame				
Total				
Maintenance Staff				
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. Their 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

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-loom 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 Ancillary	P.A.	P.A.	Total

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.

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.

 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										WITH EFFECT FROM 2012-13							
SEMESTER : FOURTH										DURATION : 16 WEEKS							
PATTERN : FULL TIME - SEMESTER										SCHEME : G							
SR. NO	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME										SW (17400)
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)			
								Max	Min	Max	Min	Max	Min	Max	Min		
1	Environmental Studies \$	EST	17401	01	--	02	01	50#*	20	--	--	--	--	25@	10	50	
2	Automobile Manufacturing 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		
5	Automobile Systems and Body 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 5th Semester Professional Practices-III													
<p>Student Contact Hours Per Week: 32 Hrs.</p> <p>THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.</p> <p>Total Marks : 900</p> <p>@ - Internal Assessment, # - External Assessment, No Theory Examination, \$ - Common to all branches, #* - Online Examination, β - Common to ME, PG, PT, MH, MI</p> <p>Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work</p> <p>** Industrial Training (Optional) - Student can undergo Industrial Training of four weeks after fourth semester examination during summer vacation.</p> <p>Assessment will be done in Fifth semester under Professional Practices-III. They will be exempted from activities of Professional Practices-III of 5th Semester.</p> <ul style="list-style-type: none"> ➤ 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:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

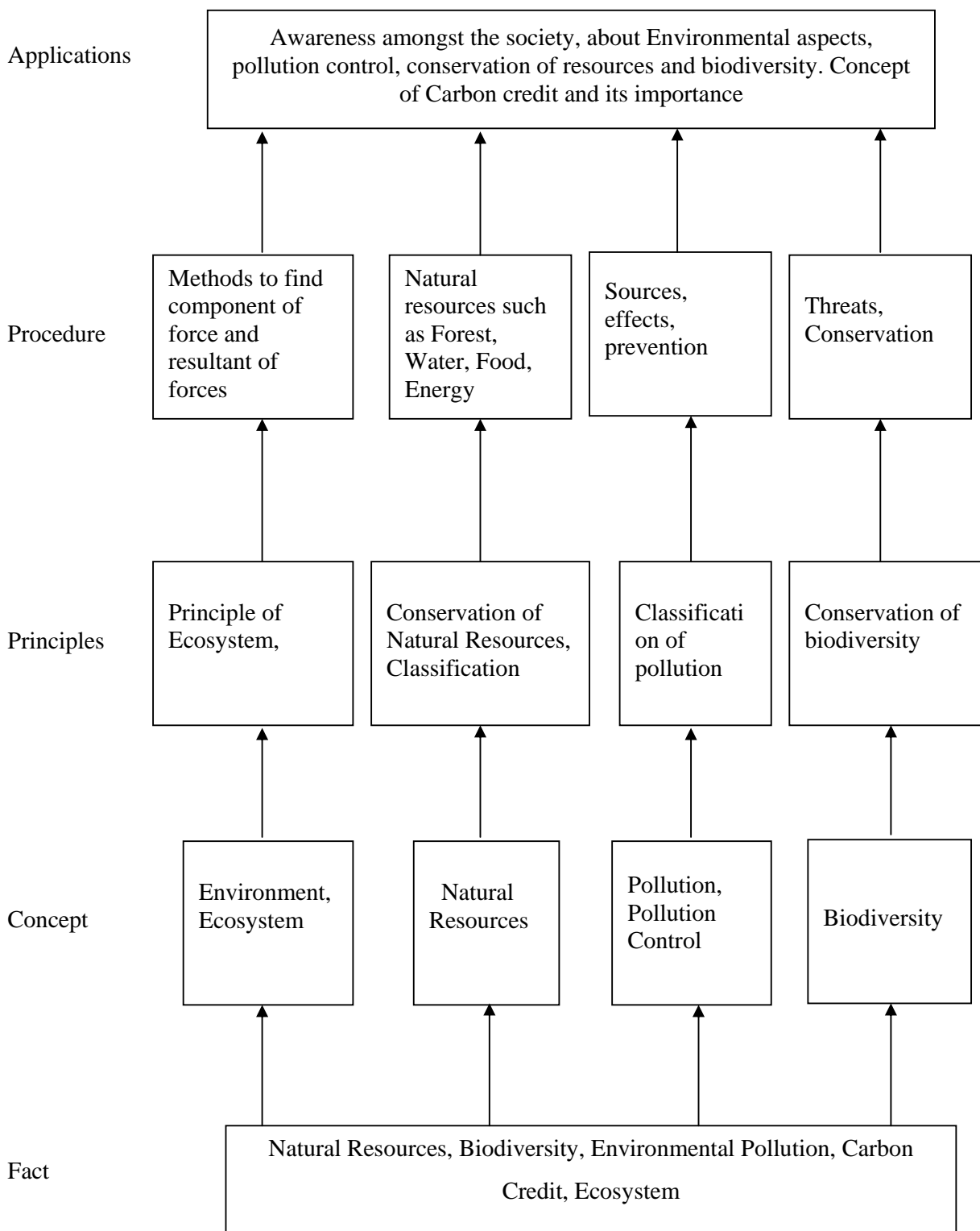
It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

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
<p>Topic 1: Nature of Environmental Studies</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define the terms related to Environmental Studies ➤ State importance of awareness about environment in general public <p>Contents:</p> <ul style="list-style-type: none"> • Definition, Scope and Importance of the environmental studies • Importance of the studies irrespective of course • Need for creating public awareness about environmental issues 	01	04
<p>Topic 2: Natural Resources and Associated Problems</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define natural resources and identify problems associated with them ➤ Identify uses and their overexploitation ➤ Identify alternate resources and their importance for environment <p>Contents:</p> <p>2.1 Renewable and Non renewable resources</p> <ul style="list-style-type: none"> • Definition • Associated problems <p>2.2 Forest Resources</p> <ul style="list-style-type: none"> • General description of forest resources • Functions and benefits of forest resources • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc. <p>2.3 Water Resources</p> <ul style="list-style-type: none"> • Hydrosphere: Different sources of water • Use and overexploitation of surface and ground water • Effect of floods, draught, dams etc. on water resources and community <p>2.4 Mineral Resources:</p> <ul style="list-style-type: none"> • Categories of mineral resources • Basics of mining activities • Mine safety • Effect of mining on environment <p>2.5 Food Resources:</p> <ul style="list-style-type: none"> • Food for all • Effects of modern agriculture • World food problem 	04	10
<p>Topic 3. Ecosystems</p> <ul style="list-style-type: none"> • Concept of Ecosystem • Structure and functions of ecosystem • Energy flow in ecosystem • Major ecosystems in the world 	01	04
<p>Topic 4. Biodiversity and Its Conservation</p> <ul style="list-style-type: none"> • Definition of Biodiversity • Levels of biodiversity 	02	06

<ul style="list-style-type: none"> • Value of biodiversity • Threats to biodiversity • Conservation of biodiversity 		
Topic 5. Environmental Pollution <ul style="list-style-type: none"> • Definition • Air pollution: Definition, Classification, sources, effects, prevention • Water Pollution: Definition, Classification, sources, effects, prevention • Soil Pollution: Definition, sources, effects, prevention • Noise Pollution: Definition, sources, effects, prevention 	03	08
Topic 6. Social Issues and Environment <ul style="list-style-type: none"> • Concept of development, sustainable development • Water conservation, Watershed management, Rain water 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 	03	10
Topic 7. Environmental Protection Brief description of the following acts and their provisions: <ul style="list-style-type: none"> • Environmental Protection Act • Air (Prevention and Control of Pollution) Act • Water (Prevention and Control of Pollution) Act • Wildlife Protection Act • Forest Conservation Act Population Growth: Aspects, importance and effect on environment <ul style="list-style-type: none"> • Human Health and Human Rights 	02	08
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. No.	Author	Title	Publisher
01	Anindita Basak	Environmental Studies	Pearson Education
02	R. Rajgopalan	Environmental Studies from Crises to Cure	Oxford University Press
03	Dr. R. J. Ranjit Daniels, Dr. 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			Examination Scheme					
TH	TU	PR	PAPER 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:

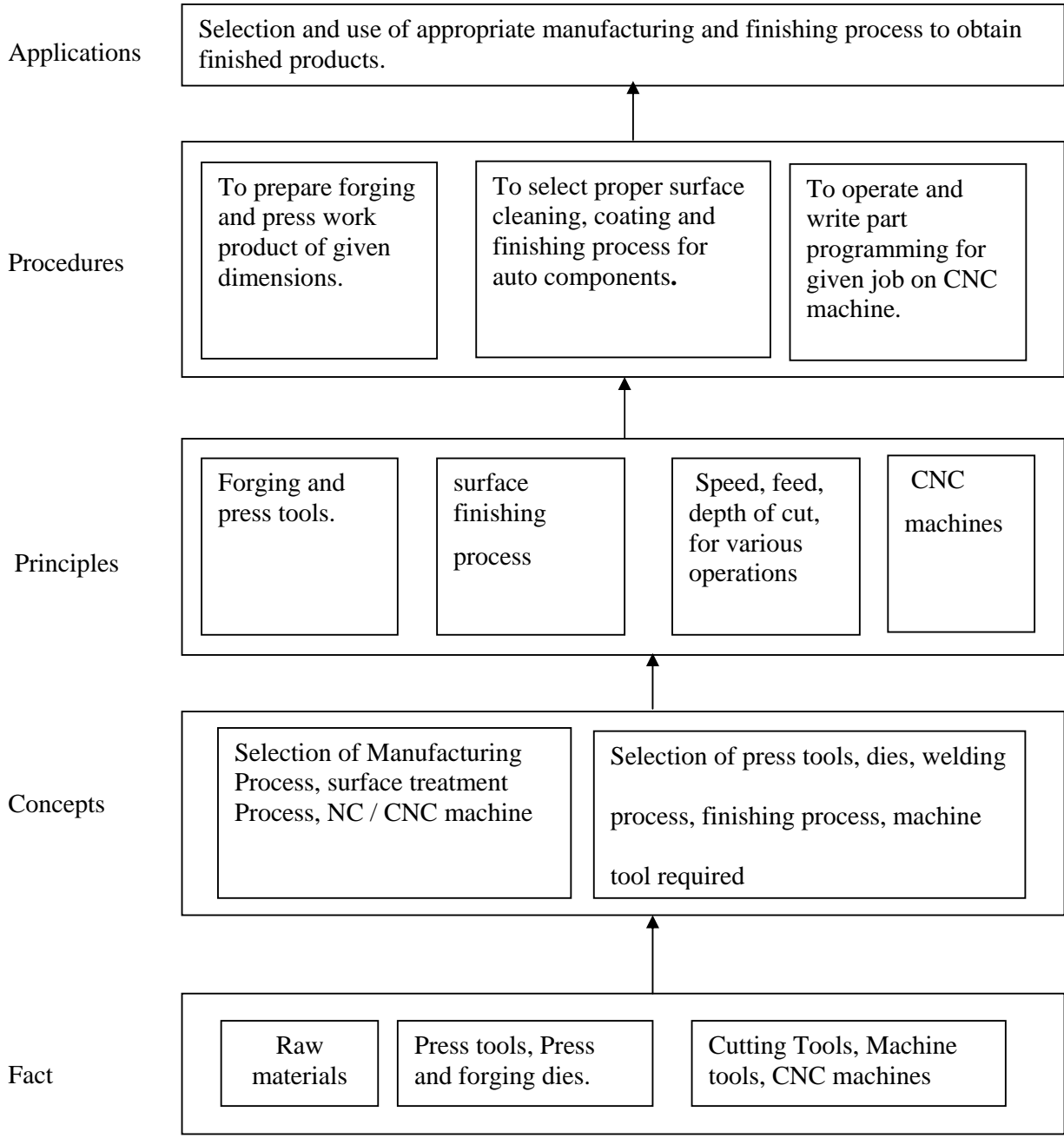
Automobile manufacturing processes is a core technological subject. With advent of technology there are many advances in manufacturing processes and equipments. The knowledge of these advances is essential for a diploma student engaged in manufacturing organizations. Students should be able to write 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: 1.1 Introduction: 08 Marks <ul style="list-style-type: none"> • Forgeable materials and forgeability • Classification of forging processes • Advantages and limitations of forging processes 1.2 Forging sequences for Auto components- 08 Marks Connecting rods, Crankshafts, Camshafts and Spanners	06	16
2: Press and press work 24 Marks Specific Objectives: ➤ Know the press operations and their applications Contents: 2.1 Introduction 08 Marks <ul style="list-style-type: none"> • Materials used in press work for automobile applications. • Classifications of presses and terminology used in presses • Major parts of Fly press 2.2 Press tools 12 Marks <ul style="list-style-type: none"> • Parts of standard die set • Die accessories- Pilots, Stops, Strippers, Pressure pads and Knock outs • Types and construction of dies—Simple, progressive, compound and combination die 2.3 Press operations- 04 Marks Blanking, piercing, bending, drawing.	12	24
3: Welding processes 16 Marks Specific Objectives: ➤ Know various welding operations and their applications Contents: 3.1 Introduction 04 Marks <ul style="list-style-type: none"> • Classification and selection of welding process. • Working principle of Gas welding and types of flames. 3.2 Arc welding process 08 Marks <ul style="list-style-type: none"> • Metal arc, TIG and MIG 3.3 Resistance welding, Brazing and soldering 04 Marks	08	16
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 <ul style="list-style-type: none"> • Surface cleaning processes- acid, alkaline, electrolytic cleaning, blasting and tumbling • Metallic surface coating- Electroplating, Galvanizing and metal spraying 4.2 Surface finishing processes 04 Marks	04	10

<ul style="list-style-type: none"> Lapping, honing, super finishing, buffing, burnishing and their applications, advantages and limitations. 		
5: Introduction to CNC machines 16 Marks Specific Objectives: ➤ Know the basic components of CNC machines and tools. Contents: <ul style="list-style-type: none"> NC and CNC Machines. Difference between conventional machines and CNCs. Working principle of CNC machines. Classification of CNC machines. Advantages and disadvantages of CNC machines. Type of tools used on turning center and VMC. Absolute and Incremental Co-ordinate system. 	08	16
6. CNC Part programming 18 Marks Specific Objectives: ➤ Understand and write CNC part programming Content : <ul style="list-style-type: none"> Axes configuration- X, Y and Z axes. Procedure for developing the Part program ISO Codes used in programming Simple Part programming as per ISO codes on CNC and VMC for operations like turning, drilling and Milling. 	10	18
Total	48	100

Practical:

Skills to be developed:

Intellectual Skills:

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

Motor Skills:

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

List of Practicals:

- One job involving different milling machine operations such as key way cutting, gear cutting by indexing in a batch of 2 students.
- One press work job involving operations like blanking, piercing and drawing. (Job should be selected from market utility).
- One resistance welding job to show the working principle of resistance welding. Calculate current and time required for completion of a resistance welding job.
- 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)

- 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:

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

Learning Resources:

1. Books:

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

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**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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:

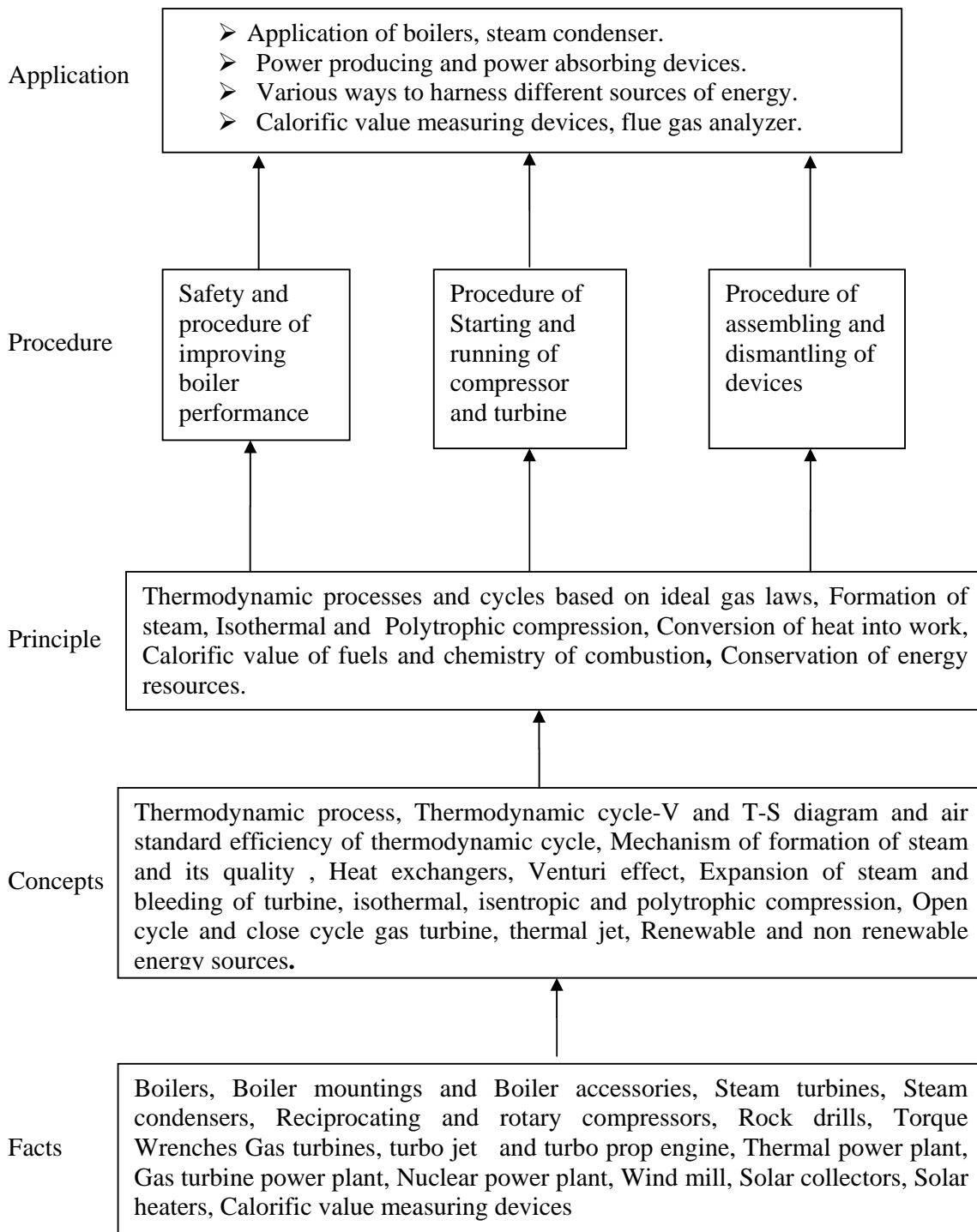
Heat energy is the basis for most of the power producing and power absorbing devices. In order to understand the principles and working of these devices it is essential to understand the basic laws and concepts of thermodynamic processes and gas cycles, properties of steam, generation of steam with modern 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
<p>1. Fundamentals of thermodynamics. 18 marks</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Understand the concepts of thermodynamic processes and air cycles. ➤ Know applications of thermodynamic principles and processes in various heat engines and power absorbing devices. <p>Contents:</p> <p>1.1 Study of thermodynamic processes for ideal gases</p> <ul style="list-style-type: none"> • Represent Isobaric, Isochoric, Isothermal, Adiabatic and polytropic processes on P-V and T-S diagram, formulae of work done, change in internal energy and change in enthalpy. • Relation between P,V and T (Derivations only for adiabatic process, No mathematical calculations for any process) <p>1.2 Air cycles:</p> <ul style="list-style-type: none"> • P-V and T-S diagram and equations for air standard efficiency of Carnot, Otto, Diesel and Dual combustion cycle. <p>1.3 Fundamental of Heat transfer</p> <ul style="list-style-type: none"> • Modes of heat transfer – conduction, convection and radiation • Application of heat transfer in automobiles 	09	18
<p>2. Properties of Steam and Steam Power 18 Marks</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Know the process of formation of steam and efficient use of heat energy stored in the steam into mechanical work <p>Content:</p> <p>2.1 Formation of steam, various phases like wet steam, dry saturated steam, superheated steam. 4 Marks</p> <ul style="list-style-type: none"> • Dryness fraction, degree of superheat, sensible heat, Latent heat , calculation of enthalpy of wet, dry saturated and superheated steam using Steam table. <p>2.2 Steam boilers- 8 Marks</p> <p>construction and working of i) Three pass packaged type boiler ii) La Mont Boiler</p> <p>2.3 Steam condenser: 6 Marks</p> <ul style="list-style-type: none"> • 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 	09	18
<p>3. Air Compressors 18 Marks</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Know the working of reciprocating and rotary air compressor and it's application. ➤ Understand working of different pneumatic tools. <p>Content:</p> <p>3.1 Classification of air compressor - Construction and working of 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</p> <p>3.2 Air compressor terminology like i) Free air delivered, ii) Capacity of</p>	08	18

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. 4 Marks • Classification of gas turbines. 4.2 Construction and working of gas turbines i) open cycle, ii) closed cycle gas Turbines, P.V. and T.S diagrams. 10 Marks • Turbojet and turboprop engine. (no numerical)	06	14
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 energy. Construction and working of power plants based on conventional energy sources like : a) Thermal power plant b) Gas turbine power plant c) Nuclear power plant - Pressurized water reactor. • Parameters for the site selection of conventional power plants. 5.2 Power plants based on non-conventional energy sources. i) Solar, ii) Biomass, iii) Wind energy • Concepts of Geothermal and tidal power plant.	08	16
6. Fuels and Combustion 16 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 minimum air required for combustion of fuel. Content: 6.1 Types of fuels – 4 Marks Definition, classification, properties, Calorific value of fuels. • Ultimate analysis and proximate analysis of solid fuels. • 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 its 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	08	16
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. No.	Author	Title	Publisher
1	R. S. Khurmi and J. K. Gupta	A Text book of Thermal Engineering	S. Chand and Co. Ltd.
2	Patel, Karamchandani	Elements of Heat Engines (Vol. I, II and III)	Acharya Book Depot.

3	A course in Thermal Engineering	S. Domkundwar, Dr C.P. Kothandaramanand A.V. DOMkundwar	Dhanpat Rai and Co.(P)Ltd, New Delhi
4	Engineering Thermodynamics	Jones and Dugan	Prentice hall of India Publication.
5	Thermodynamics	Yunus Cegeland Mike Boles	Tata McGraw Hill Publication
6	Engineering Thermodynamics Work and Heat Transfer	Gordon Rogers 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			Examination Scheme					
TH	TU	PR	PAPER 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:

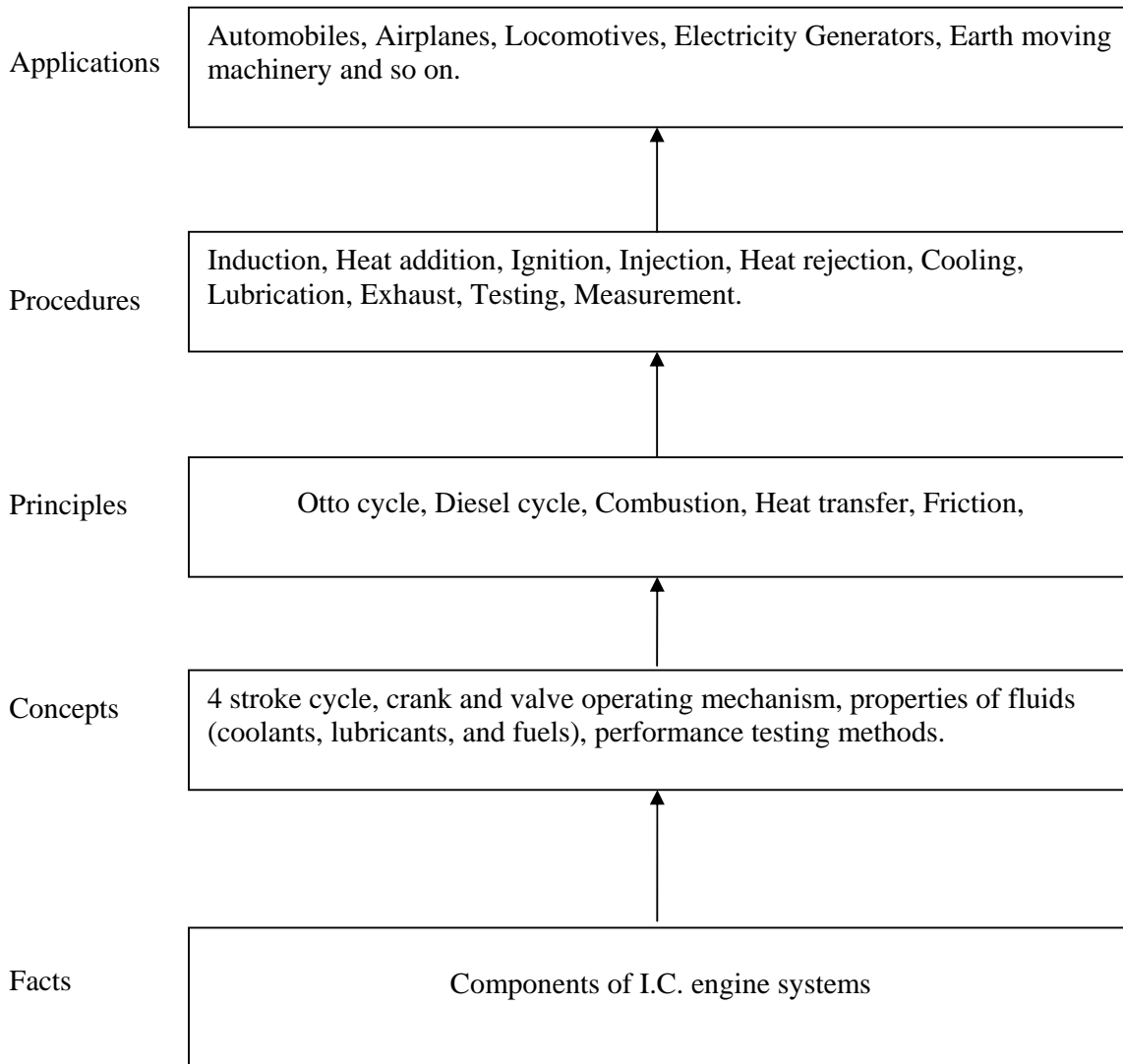
This is a core technology subject. I C engines are required to run the vehicles. The basic principles of Thermodynamics are applied in I C engine. This subject forms the basis for the Advanced Automobile Engine and vehicle maintenance. Knowledge of various engine systems will be helpful in finding and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



Theory:

Topics and Contents	Hours	Marks
<p>01. Fundamentals of I.C. Engine 16 marks</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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. <p>Content</p> <p>1.1 Introduction 4 Marks</p> <ul style="list-style-type: none"> • Definition of I C engine. • Engine nomenclature. <p>1.2 The working principle of Engine 6 Marks</p> <ul style="list-style-type: none"> • Four-Stroke Spark Ignition Engine. • Four-Stroke Compression Ignition Engine. • Comparison of Four-Stroke SI and CI Engine. • Two-Stroke Engines • Scavenging. • Comparison of Four-Stroke and Two-Stroke Engine. <p>1.3 Classification, Specifications and applications 6 Marks</p> <ul style="list-style-type: none"> • 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. 	08	16
<p>02. Construction of I. C. Engine 20 Marks</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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. <p>Content</p> <p>2.1 Function, construction , materials and manufacturing methods of Engine components 16 Marks</p> <ul style="list-style-type: none"> • Cylinder block, Cylinder liners – Dry and Wet, Cylinder head, Inlet and Exhaust manifold, Tappet cover, Timing cover, Crank case. Oil Sump. • 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. <p>2.2 Camshaft Drives and Valve Timing 4 Marks</p> <ul style="list-style-type: none"> • Camshaft drives: Timing Gears, Chain and Belt drive. Relation between speed of camshaft and crank Shaft. • Valve timing Diagram, Port timing Diagram. 	10	20

<p>03. Fuel and Air Feed System 16 Marks</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw layout of fuel and air feed systems. ➤ Understand, describe, and compare the construction and working of components involved in the systems. <p>Content</p> <p>3.1 Petrol fuel supply system. 8 Marks</p> <ul style="list-style-type: none"> • Conventional Petrol Engine: Gravity feed, Pump feed (Layout, Function of Components and location). • Construction and working of components: Fuel Tank, Fuel Filter, S. U. Electrical Fuel Pump, Air cleaners – dry type and Oil wetted types. • Working Principle of Simple Carburettor, Air Fuel ratio requirements, Circuits in Two-wheeler carburettor and Solex carburettor. <p>3.2 Diesel fuel supply system 8 Marks</p> <ul style="list-style-type: none"> • Diesel Engine: Need and requirements of Fuel Injection Systems. • Layout of Fuel Injection systems – Individual pump, Unit injector system, Distributor system and Common rail system. • Fuel Injector and types of nozzles. • Fuel metering in Fuel Injection Pump (Inline pump and Distributor pump) • Working principle of Mechanical Governor in Fuel Injection Pump. 	08	16
<p>04. Ignition and Exhaust system 8 Marks</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Understand ignition systems. ➤ Understand firing order of the engine. ➤ Compare various types of mufflers <p>Content</p> <p>4.1 Introduction to Ignition System 4 Marks</p> <ul style="list-style-type: none"> • Requirements of ignition system. • Magneto and Battery Ignition systems (Working only). • Firing order used in 3,4 and 6 cylinder engines <p>4.2 Types of Exhaust system 4 Marks</p> <ul style="list-style-type: none"> • Function of Exhaust manifold. • Construction, Working and types of silencer / Mufflers. 	04	08
<p>05. Cooling and Lubrication systems 20 Marks</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Identify components and types of cooling and lubrication systems ➤ Compare Cooling and Lubrication systems. <p>Content:</p> <p>5.1 Engine cooling system 4 Marks</p> <ul style="list-style-type: none"> • Need of cooling system. • Limitations of cooling system. • Types: Air, Water/ Liquid cooling system (Layout and Function of Components) • Properties of coolants and coolant additives <p>5.2 Construction and working of cooling system 6 Marks</p> <ul style="list-style-type: none"> • Construction and working of: Thermostat valve, Water expansion tank, Temperature Indicators, Pressure cap, Water pump, Fan and fan belt. • Electrically driven Fan circuit. 	10	20

<ul style="list-style-type: none"> • Radiator: Construction and type of radiator cores. <p>5.3 Introduction to Lubrication system 4 Marks</p> <ul style="list-style-type: none"> • Need of lubrication system. • Properties of lubricating oil, additives of lubricating oil. • Parts to be lubricated. <p>5.4 Types of Lubrication system 6 Marks</p> <ul style="list-style-type: none"> • 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. • Positive crank case ventilation • Classification of Lubricating Oils on the basis of Viscosity (SAE) and Load (API) Severity rating. 		
<p>06. Performance of Engine 20 Marks</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Understand performance parameters, draw engine characteristic graphs. ➤ Perform Engine tests and measure different parameters and analyze the results. <p>Content:</p> <p>6.1 Performance parameters. 04 Marks</p> <ul style="list-style-type: none"> • Definitions: Indicated Power, Brake Power and Frictional Power, Efficiencies - Air standard, Mechanical, Brake Thermal, Indicated Thermal, Volumetric and Relative. <p>6.2 Dynamometers and engine testing: 16 Marks</p> <ul style="list-style-type: none"> • Working Principle and types of Dyanmometers: Rope brake, Hydraulic and Eddy current. • Engine Testing: Morse Test, Willian’s line Method for finding Frictional Power. • Heat balance sheet and Method of calculating Volumetric Efficiency and Fuel Consumption.(Simple Numerical problems) 	08	20
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. No.	Author	Title	Publisher / Edition
1	Dr. Kirpal Singh	Automobile Engg. Vol.-2	Standard Publishers
2	Anil Chhikara	Automobile Engineering 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 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			Examination Scheme					
TH	TU	PR	PAPER 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).

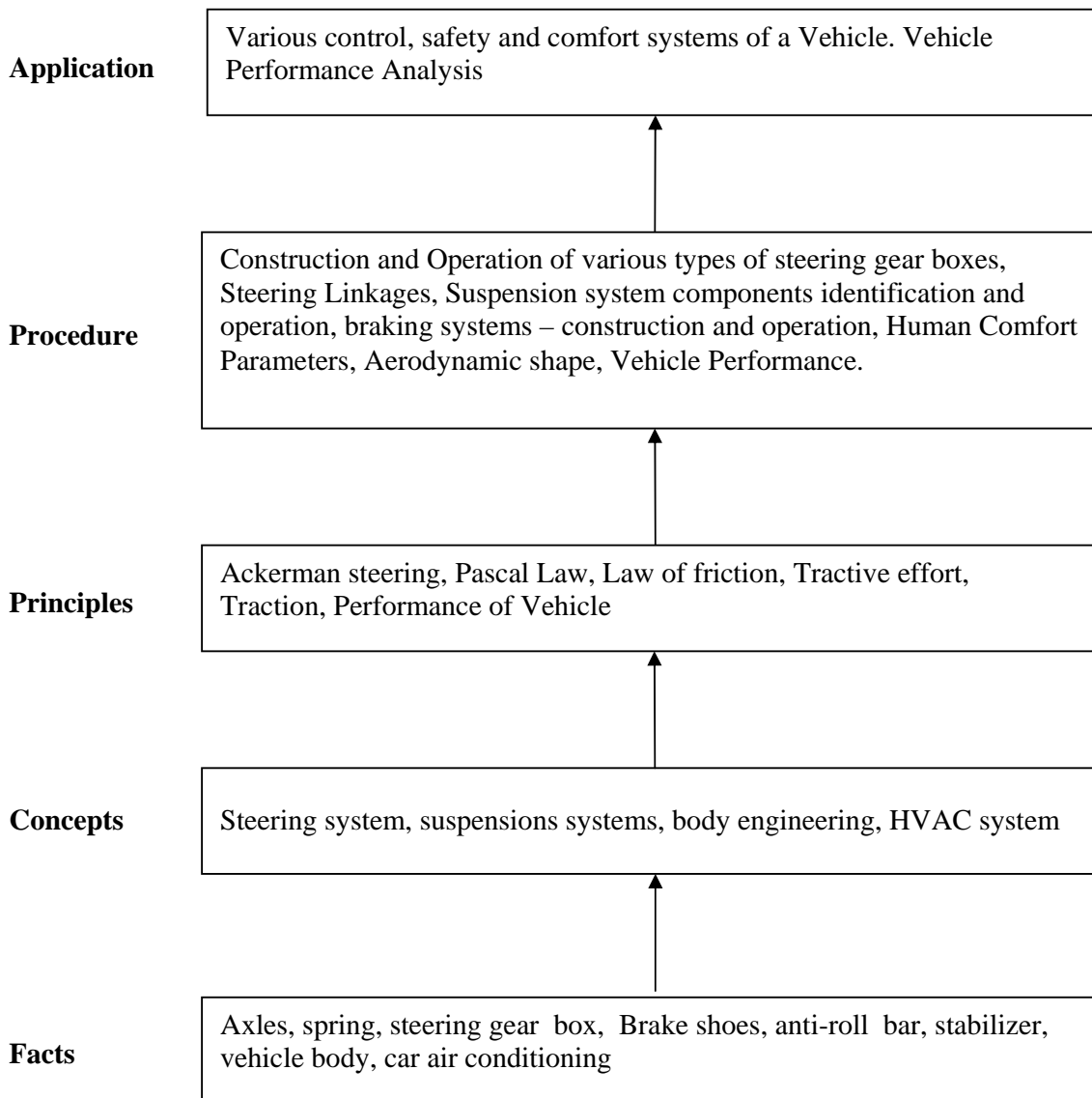
Rationale:

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. Compare the developments in body engineering, control systems and safety equipment

Learning Structure:

Theory Content:

Topic and Contents	Hours	Marks
<p>1: Front Axle and Steering 22 Marks</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Know various types of steering linkages. ➤ Understand working of different steering gear boxes. ➤ Know steering geometry. ➤ Understand concept of power steering. <p>Content:</p> <p>1.1 Front Axle: 8 Marks</p> <ul style="list-style-type: none"> • Types of front axle - Dead axle, live axle. • Type of stub axle arrangements- Elliot, reverse Elliot, Lamoine, reverse Lamoine. • Front wheel assembly. <p>1.2 Steering system. : 14 Marks</p> <ul style="list-style-type: none"> • 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) 	12	22
<p>2: Brakes 20 Marks</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Know various types of braking systems. ➤ Understand construction and working of different braking system components. ➤ Know latest developments in braking system. <p>Content:</p> <p>2.1 Introduction 8 Marks</p> <ul style="list-style-type: none"> • Function and necessity of brakes. • Classification of brakes and braking systems. • Construction and working of -disc brake and drum brake • Friction materials used for brake shoes and pads. Characteristics of friction material- brake fade, coefficient of friction, dry friction and wet friction <p>2.2 Braking systems 12 Marks</p> <ul style="list-style-type: none"> • 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. 	10	20
<p>3: Suspension Systems 18 Marks</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Identify and describe various components of suspension systems. 	10	18

<p>➤ Know latest developments in suspension systems.</p> <p>Content:</p> <p>3.1 suspension systems 10 Marks</p> <ul style="list-style-type: none"> • 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. <p>3.2 Construction and working of- 8 Marks</p> <ul style="list-style-type: none"> • Shock absorbers -Telescopic and Gas filled • Anti roll bar or stabilizer bar. 		
<p>4: Body Engineering and Safety Devices. 16 Marks</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Know various types of materials used for automobile body. ➤ Understand protective treatment of automobile body. ➤ Know latest developments in safety devices. <p>Content:</p> <ul style="list-style-type: none"> • 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. 	06	16
<p>5: Car Heating Ventilation and Air Conditioning System (HVAC)</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Understand the basic principles of HVAC system. ➤ Know the comfort conditions of the occupants. <p>Content:</p> <ul style="list-style-type: none"> • Fundamentals of Refrigeration and air conditioning. • 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. 	06	16
<p>6: Vehicle Performance : 08 Marks</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Know and describe various resistances experienced by a vehicle. ➤ Understand the effects of resistances on a vehicle. <p>Content:</p> <ul style="list-style-type: none"> • Resistance faced by the vehicle- Air resistance , rolling resistance, 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 	04	08
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:

01	Know your Automobile Systems laboratory through, listing the systems, models, and charts in laboratory with their purpose. <ul style="list-style-type: none"> • 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 its type, sketch its components and assemble it.
03	Observe and sketch different types of Front Axles.
04	<ul style="list-style-type: none"> • Observe and draw the layout of hydraulic braking system. Dismantle master cylinder, wheel cylinder and remove brake drum, identify and sketch the components and assemble it. Observe and draw the layout of hydraulically operated air/vacuum assisted braking system
05	<ul style="list-style-type: none"> • Observe and sketch the construction of Mc pherson and wishbone type suspension with labels. • Dismantle semi elliptical leaf spring, sketch its components with labels and 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, air brakes, power steering system and draw layout. Write a report
07	Visit to Automobile Body Building and Body Manufacturing Industry, Prepare a report 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 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. 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 Delhi
4	R.B. Gupta	Automobile Engineering	Satya Prakashan New 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			Examination Scheme					
TH	TU	PR	PAPER 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
<p>1. Fundamentals and type of Mechanisms</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> ➤ Define various terms related to mechanisms. ➤ Explain construction and working of various mechanisms <p>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</p> <p>1.2 Inversion of Kinematic Chain</p> <ul style="list-style-type: none"> • 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 Coupling -----8 Marks 	07	16
<p>2. Velocity and Acceleration in Mechanisms</p> <p>Specific objectives</p> <ul style="list-style-type: none"> ➤ Draw velocity and acceleration diagram for given mechanism <p>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.</p> <p>2.2 Analytical method (No derivation) and Klein's construction to determine velocity and acceleration of different links in single slider crank mechanism. -----8 Marks</p> <p>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 Coriolis component of acceleration) ----- 8 Mark</p>	08	16
<p>3. Cams and Followers</p> <p>Specific objectives</p> <ul style="list-style-type: none"> ➤ Define the terms related to Cam ➤ Classify Cams and Followers ➤ Draw cam profile as per the given applications <p>3.1 Concept, definition and applications of Cams and Followers. Cam terminology</p> <p>3.2 Classification of Cams and Followers.</p> <p>3.3 Different follower motions and their displacement diagrams - Uniform velocity, Simple harmonic motion, uniform acceleration and Retardation. ---- 4 Marks</p> <p>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</p>	06	12
<p>4. Power Transmission</p> <p>Specific objectives</p> <ul style="list-style-type: none"> ➤ Give broad classification of Drives. ➤ Select Suitable Drives and Mechanisms for a particular application 	10	20

<p>➤ Calculate various quantities like velocity ratio, belt tensions, slip, angle of contact, power transmitted in belt drives</p> <p>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</p> <p>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</p> <p>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</p>		
<p>5. Flywheel and Governors ----- 8 Marks</p> <p>Specific objectives</p> <p>➤ Differentiate between flywheel and governor</p> <p>➤ Explain with neat sketch the construction and working of various governors</p> <p>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) Coefficient of fluctuation of energy, coefficient of fluctuation of speed and its significance.</p> <p>5.2 Governors- Types, concept, function and application & Terminology of Governors.</p> <p>5.3 Comparison between Flywheel and Governor.</p>	04	08
<p>6. Brakes and Dynamometers. ----- 10Marks</p> <p>Specific objectives</p> <p>➤ List the differences between brakes and dynamometers</p> <p>➤ Explain with neat sketch the construction and working of various brakes and dynamometers</p> <p>➤ Calculate braking force, braking torque and power lost in friction in shoe and band brake</p> <p>6.1 Function of brakes and Dynamometers, Type of brakes & Dynamometers, comparison between brakes & Dynamometer.</p> <p>6.2 Construction and working i) shoe brake, ii) Band brake iii) Internal expanding shoe brake iv) Disc Brake</p> <p>6.3 Numerical problems to find braking force and braking torque and power for shoe and band brake.</p> <p>6.4 Construction and working of i) Rope brake Dynamometer ii) Hydraulic Dynamometer iii) Eddy current Dynamometer.</p>	05	10
<p>7. Clutches and Bearings.</p> <p>Specific objectives</p> <p>➤ Explain the difference between uniform pressure and uniform wear theories</p> <p>➤ Explain with neat sketch, the construction and working of various clutches</p> <p>➤ Calculate torque required to overcome friction and power lost in friction in clutches and footstep bearings</p> <p>7.1 Clutches- Uniform pressure and Uniform Wear theories. Function of Clutch and its application, Construction and working of i) Single plate clutch, ii)</p>	06	12

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 ➤ Find balancing mass and position of plane, analytically and graphically. 8.1 Concept of balancing. Balancing of single rotating mass. Analytical/Graphical methods for balancing of several masses revolving in same plane.	02	06
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. 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:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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:

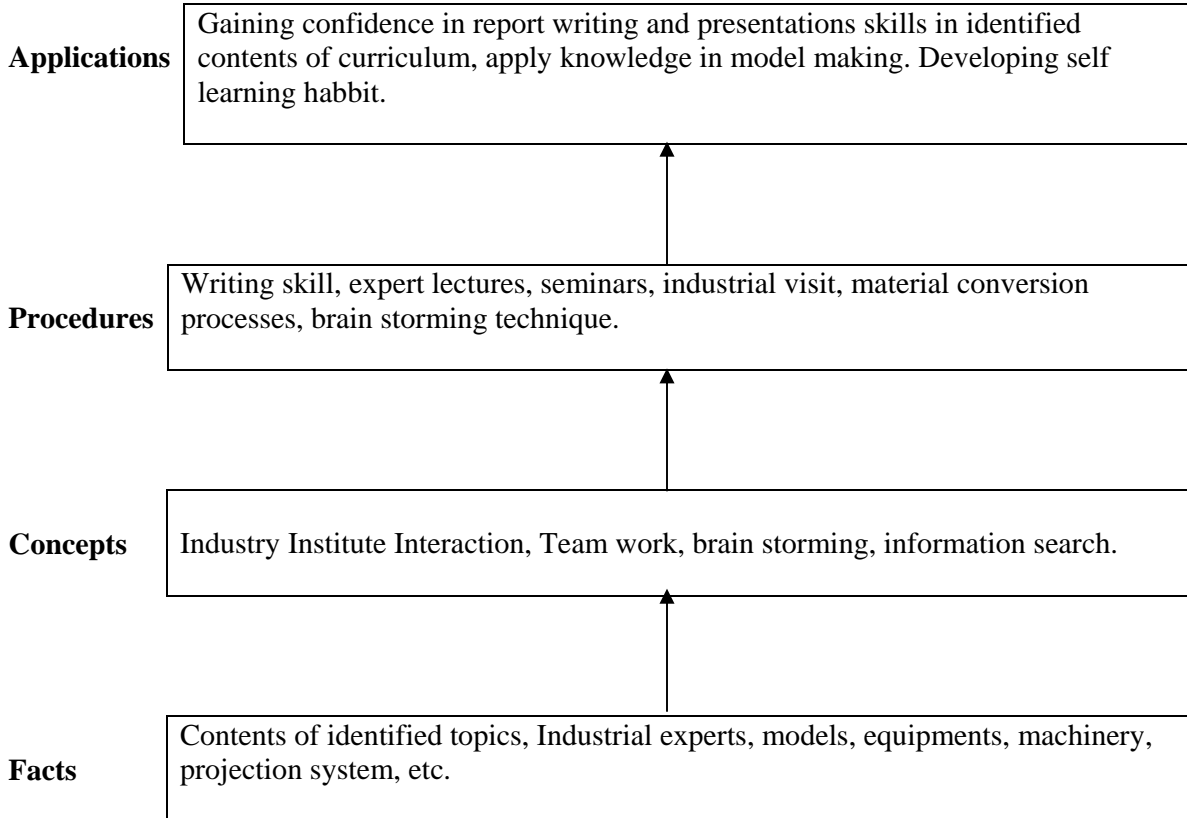
Student will be able to-

- 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	Hours
<p>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.</p> <ol style="list-style-type: none"> 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 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. 	10
<p>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.</p> <ol style="list-style-type: none"> 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. vi) Industrial application of mechatronics. 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 	06
<p>3. Seminars: One seminar be arranged on the subjects related to 4th semester. Or topics beyond curriculum. Each student shall submit a report up to 10 pages and deliver the seminar. batch size – 2-3 students.</p>	06

<p>Source of information – books, magazine , Journals, Website ,surveys, Topics suggested for guidance-</p> <ol style="list-style-type: none"> 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. 	
<p>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 :</p> <ul style="list-style-type: none"> ➤ 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 ➤ To observe Tool room, standards room etc. <p>Following types of industries may be visited in & around the institute.</p> <ol style="list-style-type: none"> 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 	08

<p>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)</p> <ol style="list-style-type: none"> i) Awareness about carbon credit ii) Anticorruption movement 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) 	06
<p>6. Mini Projects Students, in a group of 4, shall perform any one activity listed below.</p> <ol style="list-style-type: none"> i) Model making out of card board paper ,wood ,thermocool, plastics, metal, clay etc <ol style="list-style-type: none"> 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 v) 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. <p>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.</p> <p style="text-align: center;">OR</p> <p>Modular course: Modular courses on any one of the suggested or equivalent topic be undertaken by a group of 15 to 20 students.</p> <ol style="list-style-type: none"> i) Advance features in CAD ii) Meshing of solid model using any suitable software iii) Developing Unfold Sheet or Hyperblank by using Blanking Software iv) CAM Software v) Basics of PLC programming vi) Applications of mechatronics vii) Piping Technology viii) Modern packaging technology ix) Enterprise Resource Planning x) Bio-pneumatic Robots xi) Bio-mimicry 	12
Total	48

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. No.	Author	Title	Publisher
01	NRDC, Publication Bi Monthly Journal	Invention Intelligence Journal	National Research Development 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 for All – Ninth Edition	PHI
05	Apprenticeship Training Scheme:- Compiled By – BOAT (Western Region), Mumbai, 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 4th semester examination.

Note:- Examination in Professional Practices of 5th 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.

 MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI 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										WITH EFFECT FROM 2012-13							
SEMESTER : FOURTH										DURATION : 16 WEEKS							
PATTERN : FULL TIME - SEMESTER										SCHEME : G							
SR. NO	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME										SW (17400)
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)			
								Max	Min	Max	Min	Max	Min	Max	Min		
1	Environmental Studies \$	EST	17401	01	--	02	01	50*#	20	--	--	--	--	25@	10	50	
2	Soil Mechanics	SME	17450	02	--	02	02	50	20	25#	10	--	--	25@	10		
3	Surveying & Levelling	SLE	17451	03	--	04	03	100	40	50#	20	--	--	25@	10		
4	Hydraulics	HYC	17452	03	--	02	03	100	40	50#	20	--	--	25@	10		
5	Farm Power & Tractor Systems	FTS	17453	03	--	02	03	100	40	--	--	--	--	25@	10		
6	Agricultural Economics and Business Management	AEM	17454	03	--	--	03	100	40	--	--	--	--	--	--		
7	Manufacturing Technology	MTG	17047	--	--	04	--	--	--	50#	20	--	--	50@	20		
TOTAL				15	--	16	--	500	--	175	--	--	--	175	--	50	
<p>Student Contact Hours Per Week: 31 Hrs.</p> <p>THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.</p> <p>Total Marks: 900</p> <p>@ - Internal Assessment, # - External Assessment, No Theory Examination, \$ - Common to all branches, β – Common to Mechanical & Chemical Engineering Groups, *# - On Line Theory Examination.</p> <p>Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work</p> <ul style="list-style-type: none"> ➤ 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			Examination Scheme					
TH	TU	PR	PAPER 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.

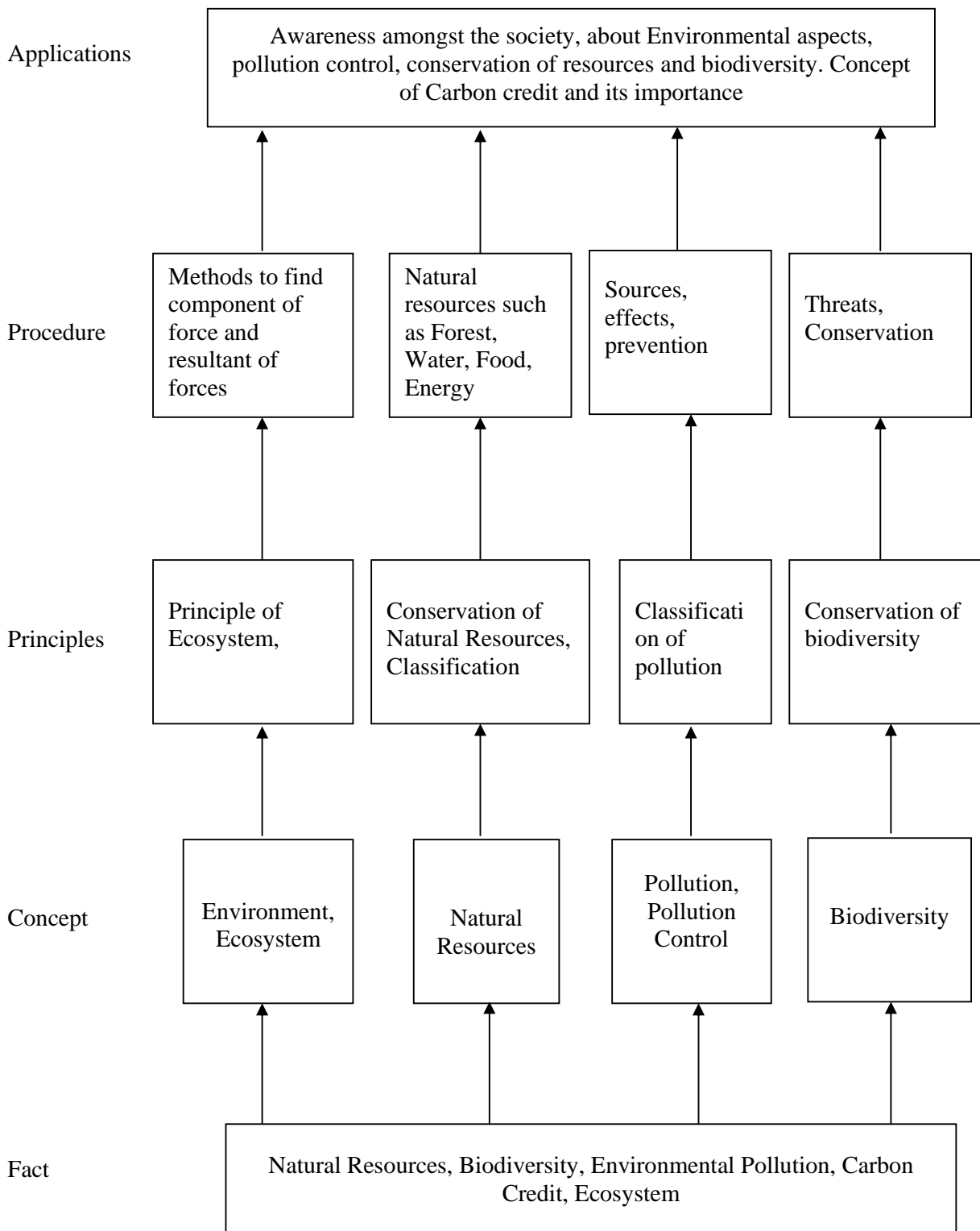
It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

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
<p>Topic 1: Nature of Environmental Studies</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define the terms related to Environmental Studies ➤ State importance of awareness about environment in general public <p>Contents:</p> <ul style="list-style-type: none"> • Definition, Scope and Importance of the environmental studies • Importance of the studies irrespective of course • Need for creating public awareness about environmental issues 	01	04
<p>Topic 2: Natural Resources and Associated Problems</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define natural resources and identify problems associated with them ➤ Identify uses and their overexploitation ➤ Identify alternate resources and their importance for environment <p>Contents:</p> <p>2.1 Renewable and Non renewable resources</p> <ul style="list-style-type: none"> • Definition • Associated problems <p>2.2 Forest Resources</p> <ul style="list-style-type: none"> • General description of forest resources • Functions and benefits of forest resources • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc. <p>2.3 Water Resources</p> <ul style="list-style-type: none"> • Hydrosphere: Different sources of water • Use and overexploitation of surface and ground water • Effect of floods, draught, dams etc. on water resources and community <p>2.4 Mineral Resources:</p> <ul style="list-style-type: none"> • Categories of mineral resources • Basics of mining activities • Mine safety • Effect of mining on environment <p>2.5 Food Resources:</p> <ul style="list-style-type: none"> • Food for all • Effects of modern agriculture • World food problem 	04	10
<p>Topic 3. Ecosystems</p> <ul style="list-style-type: none"> • Concept of Ecosystem • Structure and functions of ecosystem • Energy flow in ecosystem • Major ecosystems in the world 	01	04
<p>Topic 4. Biodiversity and Its Conservation</p> <ul style="list-style-type: none"> • Definition of Biodiversity • Levels of biodiversity • Value of biodiversity 	02	06

<ul style="list-style-type: none"> • Threats to biodiversity • Conservation of biodiversity 		
Topic 5. Environmental Pollution <ul style="list-style-type: none"> • Definition • Air pollution: Definition, Classification, sources, effects, prevention • Water Pollution: Definition, Classification, sources, effects, prevention • Soil Pollution: Definition, sources, effects, prevention • Noise Pollution: Definition, sources, effects, prevention 	03	08
Topic 6. Social Issues and Environment <ul style="list-style-type: none"> • Concept of development, sustainable development • Water conservation, Watershed management, Rain water 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 	03	10
Topic 7. Environmental Protection Brief description of the following acts and their provisions: <ul style="list-style-type: none"> • Environmental Protection Act • Air (Prevention and Control of Pollution) Act • Water (Prevention and Control of Pollution) Act • Wildlife Protection Act • Forest Conservation Act Population Growth: Aspects, importance and effect on environment <ul style="list-style-type: none"> • Human Health and Human Rights 	02	08
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. No.	Author	Title	Publisher
01	Anindita Basak	Environmental Studies	Pearson Education
02	R. Rajgopalan	Environmental Studies from Crises to Cure	Oxford University Press
03	Dr. R. J. Ranjit Daniels, Dr. Jagdish Krishnaswamy	Environmental Studies	Wiley India

Course Name : Diploma in Agriculture Engineering

Course code : AU

Semester : Fourth

Subject Title : Soil Mechanics

Subject Code : 17450

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

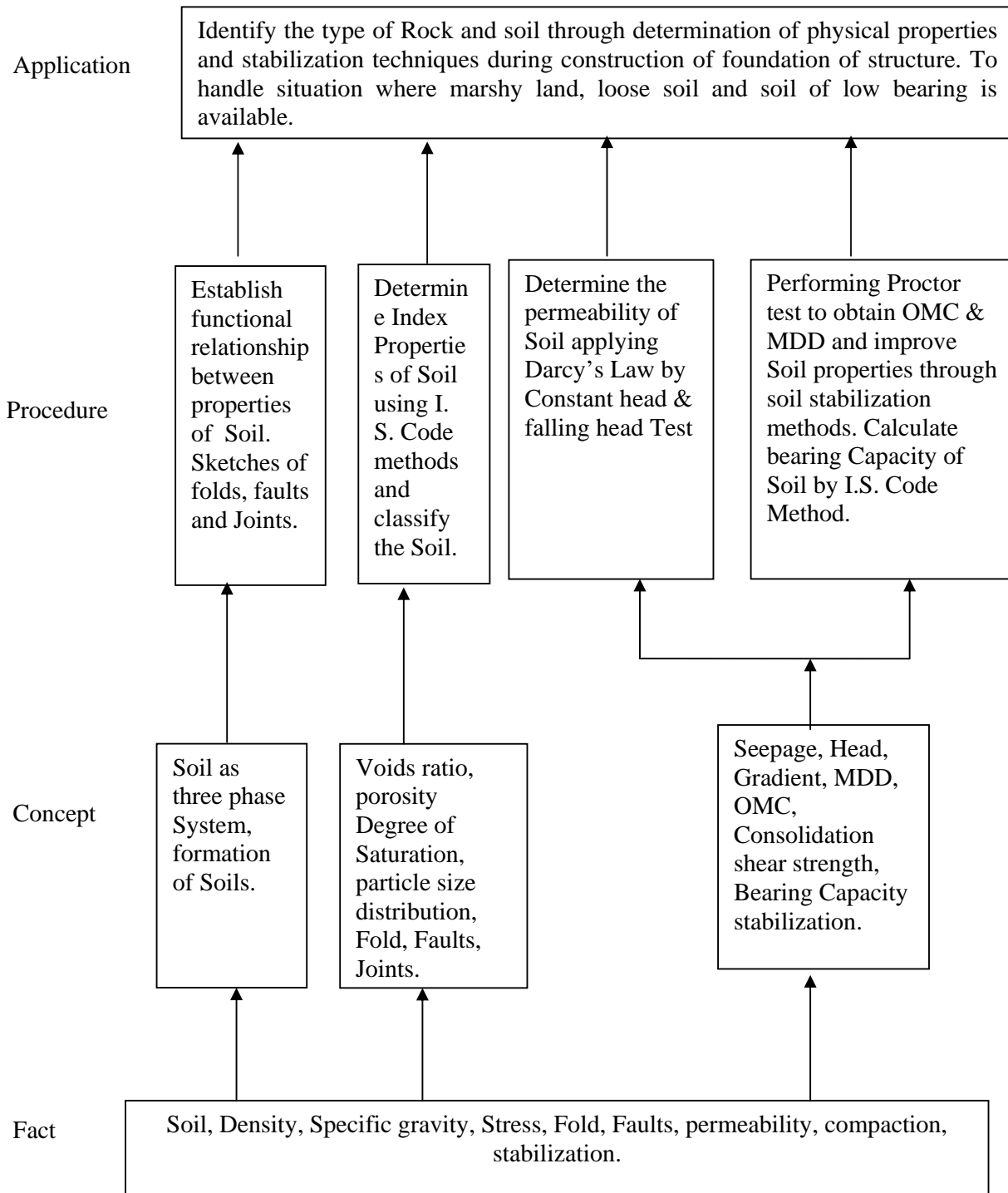
Thus it becomes mandatory to learn this subject which includes knowledge of physical properties, classification of soil, its behavior and various techniques to improve soil properties as well as agricultural structures viz. farm stead's, poultry houses, dairy barns, water supply system and sanitations, 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
01	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. 1.3 Field applications of soil mechanics-for foundation design, 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.	04	06
02	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 and wilting range. Relationships between soil properties. 2.2 Soil moisture content, methods of soil moisture content 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	12	16
03	Soil classification 3.1 Need for soil classification, Criteria for classification, Grain size classification, classification based on plasticity, symbols and graphical representation. 3.2 Textural classification of soils. 3.3 Mechanical analysis, Particle size distribution curve, Effective diameter of soil, Uniformity coefficient, coefficient of curvature.	04	06
04	Permeability, seepage and capillarity 4.1 Soil moisture - Modes of soil moisture occurrence, adsorbed water, capillary water and free water. Darcy's law, Coefficient of permeability, Infiltration and infiltration rate, soil air and aeration. Soil temperature, Soil tilth and its importance. 4.2 Flow of water through soil - permeability, factors affecting permeability, Determination of permeability (Constant head and falling head) test, values of permeability for different soils. 4.3 Capillary phenomenon in soils. 4.4 Shrinkage and swelling in soils. 4.5 Seepage through earthen structures, seepage forces, phreatic line, flow lines, equipotential lines, flow net, characteristics of flow net, quick sand, application of flow net.(no numerical.)	08	14

05	Soil Compaction and stabilization 5.1 Compaction phenomenon, Purpose, field application, standard Proctor test, modified Proctor test, compaction curve and factors affecting compaction, Field methods of compaction. 5.2 Soil stabilization concept, necessity, Introduction to methods of stabilization, CBR test.	04	08
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. No	Title	Author	Publisher
1	Basic and Applied Soil Mechanics	Gopal Ranjan and A.S.R. Rao	New Age International Publisher
2	Geotechnical Engineering	C. Venkatramaiah	New Age International 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

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

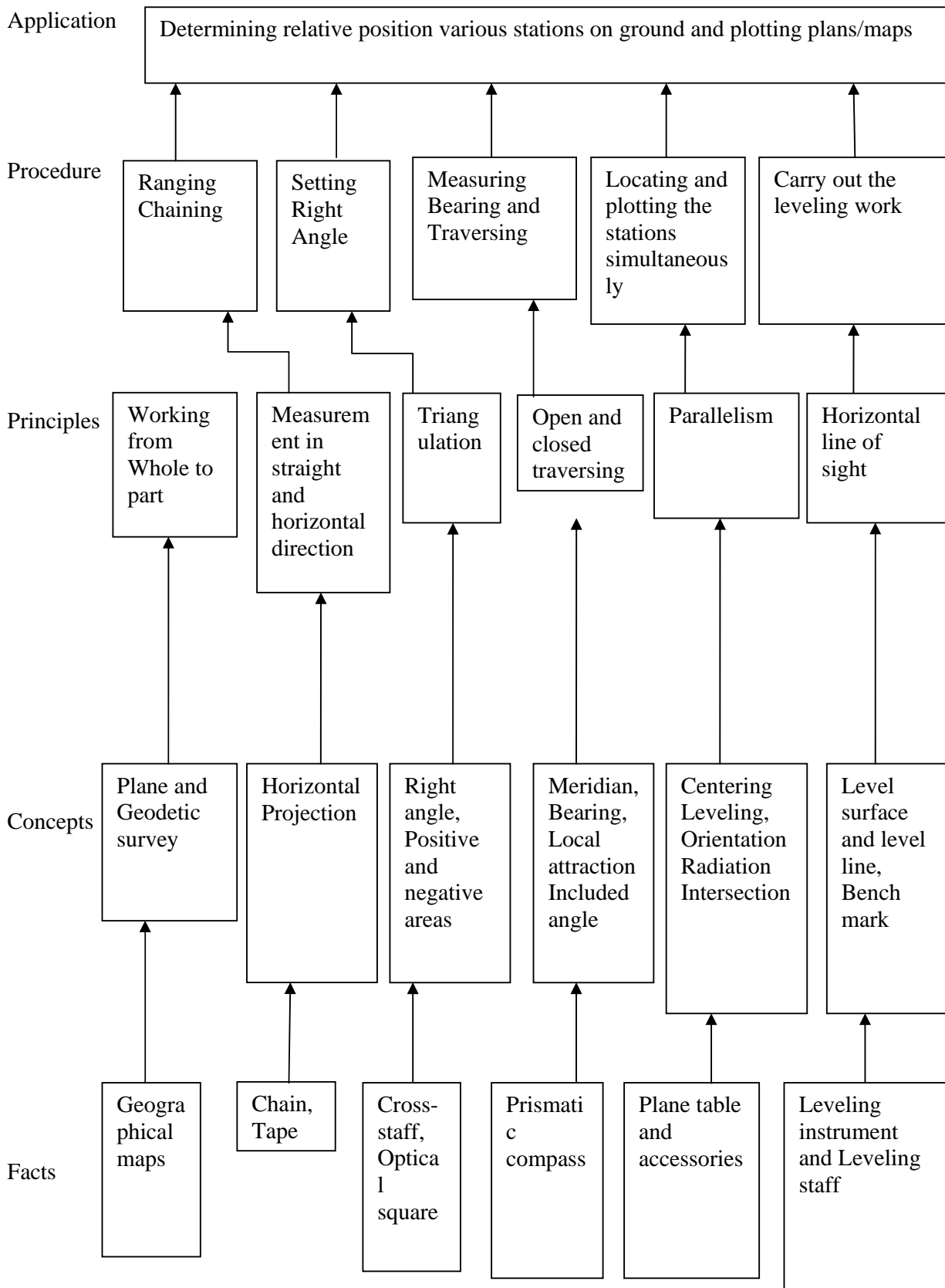
For doing so he should be equipped with the knowledge of handling the surveying equipments and prepare the drawings and reports.

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
01	Basics of Surveying 1.1 Definition of surveying 1.2 Object of surveying 1.3 Types of survey 1.4 Classification of surveying-plane and Geodetic 1.5 Principles of surveying. 1.6 Uses of surveying.	03	08
02	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 viz. specifications, material used for construction and applications. 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.	06	12
03	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 square. 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	06	14
04	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, reduced bearings, fore bearing and back bearing. Conversion of bearings, calculations of included angles from bearings. 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 Bowditch's rule.	08	16
05	Leveling 5.1 Definitions - Level surface, horizontal line, vertical line, datum surface, reduced level, bench mark, and its types-GTS, permanent, arbitrary, and temporary. 5.2 Dumpy level - components, temporary adjustments of level,	12	24

	<p>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.</p> <p>5.3 Study and use of auto level.</p> <p>5.4 Levelling staff-telescope and folding type.</p> <p>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.</p> <p>5.6 Classification of leveling - Simple levelling, differential levelling, fly leveling, profile levelling and cross sectioning, check levelling. Sources of errors in levelling-precautions to be taken to eliminate the same.</p>		
06	<p>Contouring</p> <p>6.1 Definitions – Contour, contour interval, horizontal equivalent.</p> <p>6.2 Characteristics of contour lines.</p> <p>6.3 Interpolation of contours – Direct and Indirect method of locating contours.</p> <p>6.4 Uses of contour map, establishing grade contours.</p>	04	08
07	<p>Plane table survey</p> <p>7.1 Principles of plane table survey, accessories used in plane table survey.</p> <p>7.2 Setting up of plane table- centering, levelling, orientation by magnetic needle and back sighting.</p> <p>7.3 Methods of plane table surveying-radiation, intersection and traversing.</p> <p>7.4 Merits and demerits of plane table surveying, situations where plane table survey is preferred.</p>	05	12
08	<p>Minor Instruments</p> <p>8.1 Polar planimeter- construction and use, Numerical problems on calculation of area.</p> <p>8.2 Digital planimeter, study and use.</p> <p>8.3 Total Station study and Use</p>	04	06
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.
2. 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. No	Title	Author	Publisher
1	Surveying and Levelling Vol. 1 & Vol. 2	T. P. Kanetkar and S.V. Kulkarni	Pune Vidyarthi Griha Prakashan
2	Surveying and Levelling Vol. 1 & Vol. 2	Dr. B.C. Punmia	Laxmi Publication 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 Engineering

Course Code : AU

Semester : Fourth

Subject Title : Hydraulics

Subject Code : 17452

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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).**

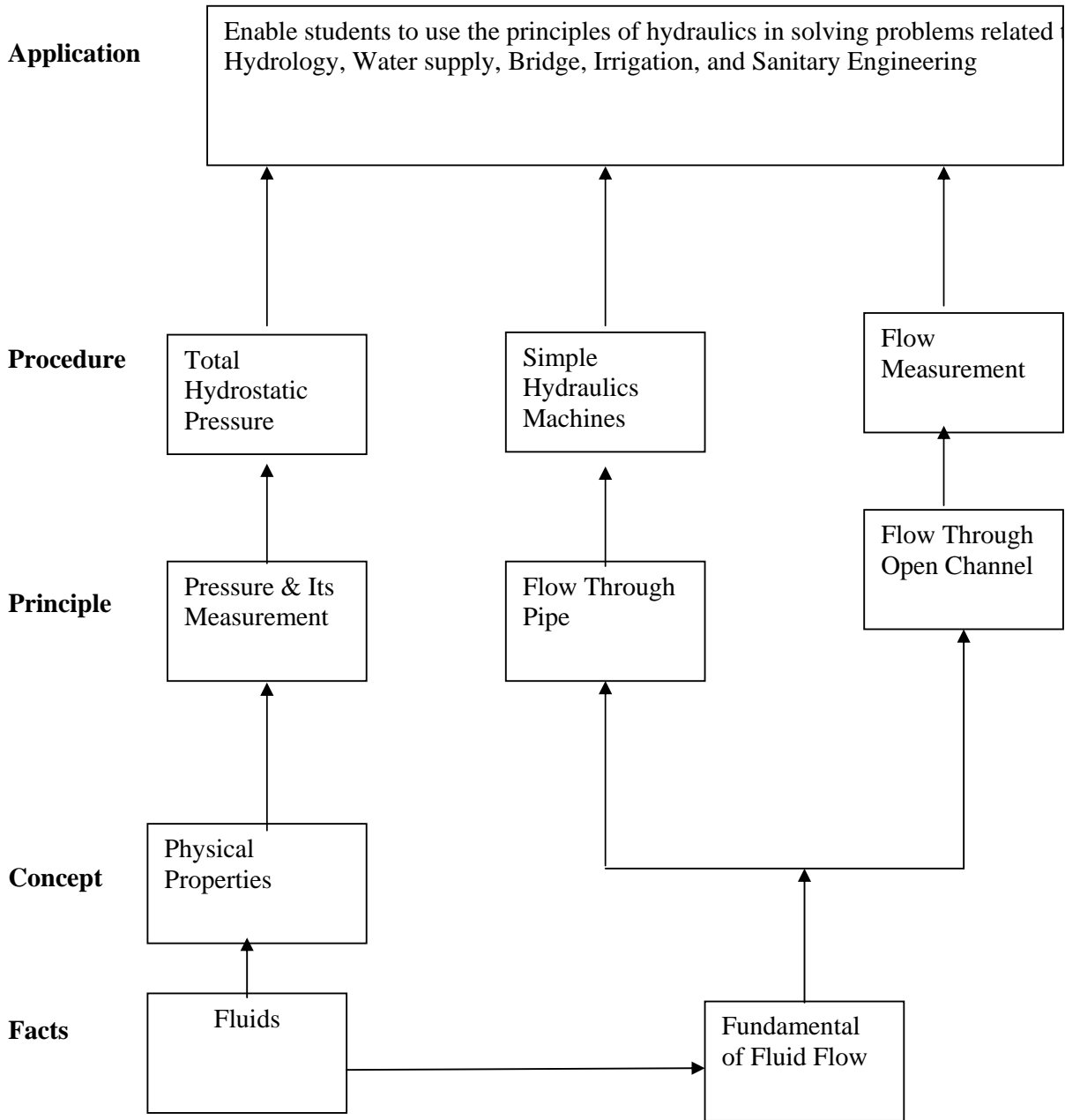
Rationale:

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 and Contents	Hours	Marks
<p>Topic 1: Properties of Fluids</p> <p>1.1 Introduction: Fluid; Real Fluid, Ideal Fluid, Fluid Mechanics, Hydraulics, Hydrostatics, Hydro kinematics and Hydrodynamics</p> <p>1.2 Properties of Fluids 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.</p>	05	10
<p>Topics 2: Pressure and Its Measurement</p> <p>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. 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.</p>	06	14
<p>Topics 3: Flow of Fluids</p> <p>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.</p> <p>2.2 Orifices, Mouth Pieces, Notches & 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 & triangular notches, Advantages of V-notch over rectangular notch, Weir, classification, difference between notch and weir.</p>	10	20
<p>Topics 4: Flow Through Pipes</p> <p>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.</p> <p>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 of pipe in various pipe fittings. Pipes in series and parallel Equivalent pipe – Dupuit's equation</p> <p>4.3 Hydraulic gradient line and Energy gradient line, Siphon pipe. Water hammer in pipes – cause effects and remedial measures Use of Nomograms for design of water distribution system. Numerical Problems.</p>	08	16

<p>Topics 5: Flow Through Open Channels</p> <p>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.</p> <p>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 and Manning's constant of different types of channel surfaces. Most economical channel section, conditions for most economical channel sections.</p> <p>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.</p>	08	16
<p>Topics 6: Agricultural Pumps</p> <p>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.</p> <p>6.2 Reciprocating Pumps 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</p> <p>6.3 Submersible Pumps: description and working , Types of casings and impellers</p>	11	24
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. No.	Author	Title	Publisher
01	Dr. P. N. Modi & Dr. S. M. Seth	Hydraulics & Fluids Mechanics	Standard Book House, Dehli
02	R. S. Khurmi	A Text Book of Hydraulics, Fluids Mechanics Hydraulics Machines	S. Chand & Company Ltd. New Delhi
03	Dr. Jagdish Lal	Fluids Mechanics Hydraulics	Metropolitan Book Co. Private Ltd. New Delhi
04	Dr. R. K. Bansal	Fluids Mechanics & hydraulic structures	Laxmi Publication
05	A.M. Michael & S.D. Khepar	Water wells & pump Engineering	Tata McGraw Hill, Delhi
06	S. K. Likhi	Hydarulics Laboratory 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:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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:

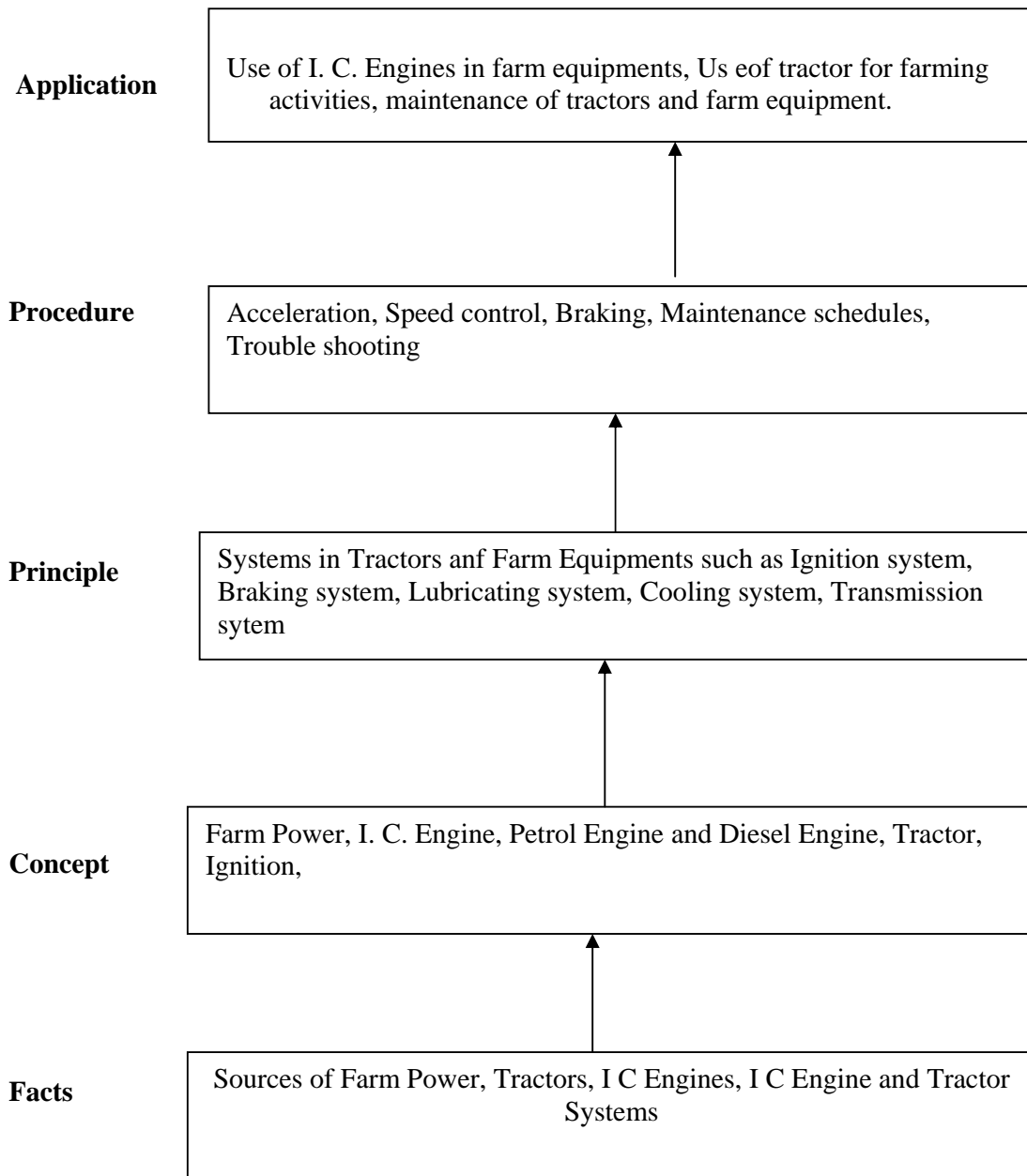
Diploma holders in agricultural Engineering should have the knowledge of different sources of power available at farms for driving the farm machinery and equipment. I.C. Engines and tractors are the primary sources of power available on farms.

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

Learning Structure:



Theory:

Topic	Hours	Marks
<p>1. Sources of Farm Power</p> <p>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 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.</p>	04	08
<p>2. I. C. Engine</p> <p>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 engine, Working of two stroke cycle engine, Difference between two stroke and four stroke engine, Difference between Diesel Engine and Petrol Engine.</p>	06	10
<p>3. I. C. Engine Systems</p> <p>3.1 Valves, Firing Order & Firing Interval</p> <p>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.)</p> <p>3.2 Ignition System of Tractor</p> <p>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, Effect of ignition advance and ignition retard, Need of spark advance and retard mechanism.</p> <p>3.3 Governors & Methods of Governing</p> <p>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.</p>	08	16

<p>4. I. C. ENGINE SUPPORTING SYSTEMS</p> <p>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.</p> <p>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, components of carburetor and their function, Fuel supply system in diesel engine, Turbocharger.</p> <p>4.3 Cooling System Purpose of Cooling, Air cooling, Water cooling its types, components & functions</p> <p>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.</p>	08	18
<p>5. Tractor Introduction, Classification of tractor and adoptability. Factors affecting selection of Tractor. General idea about different makes, models, in different H.P. ranges of tractors.</p>	02	06
<p>6. Study of transmission systems</p> <p>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.</p> <p>6.2 Gear Box Need of gear box in tractors, Principle of gearing, Different types of gear box available on tractors, Sliding mesh gear box, Constant mesh gear box, Synchromesh gear box, Trouble shootings.</p> <p>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.</p>	10	18

<p>7. Study of Supporting systems of tractor</p> <p>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.</p> <p>7.2 Steering Geometry Qualities of steering system, Ackerman steering, Steering geometry, Main parts of steering system, Working of steering system, Steering ratio, Power Steering.</p> <p>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</p>	08	18
<p>8. Tractor Power Outlets</p> <p>Hitching of implements to tractor, Power Take Off (PTO) shaft. Different types of PTO, Belt pulley.</p>	02	06
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. No.	Author	Title	Publisher
1	SC. Jain & CR.Rai	Farm tractor maintenance & repair second Reprint, 1999	Standard Publishers Distributors, New Delhi
2	S. B. Patil	Farm Power, First Reprint, 2011	Aditi Prakashan, At/Po: Bhadole, Dist: Kolhapur-416 112,
3	AM Michael and TP Ojha	Principles of Agril. Engineering Vol-I 2 nd Edn	Jain brothers, 16/873 East Park Road Karol Bagh, New Delhi 110005
4	Jagdiswar Sahay	Elements of Agril. Engineering, - Fourth Edition 2004	Standard publishers Distributors, New Delhi
5	JB Liljedahl & et al.	Tractor and their power unit, 4 authors books (1 st Edition, 1997)	CBS Publishers and Distributors, New Delhi
6	C. P. Nakra	Farm machines & Equipment Edition 1990.	Dhanpat Rai & Sons, 1962, Nai Sarak Delhi.

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

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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
<p>Topic 1: Agribusiness : An Overview</p> <ol style="list-style-type: none"> 1) Meaning and definition 2) System of Agribusiness <ol style="list-style-type: none"> 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 <ol style="list-style-type: none"> a) Farm Supplies <ul style="list-style-type: none"> • Seed • Fertilizer & Chemicals • Machinery & Equipments • Petroleum • Transportation • Feed • Others b) Farming <ul style="list-style-type: none"> • Types of farming: Individual, Contractual and Community Farming, c) Processing <ul style="list-style-type: none"> • Industrial • Food: Supermarkets, Moll, Restaurants, Institutions • Retail • Other 	08	20
<p>Topic 2. Functions of Management :</p> <ul style="list-style-type: none"> ➤ Planning <ol style="list-style-type: none"> 1. Definition of Planning 2. Function of Planning 3. a. Types of Plans <ol style="list-style-type: none"> b. Planning Process <ul style="list-style-type: none"> ➤ Purpose ➤ Objectives ➤ Policies ➤ Procedure ➤ Practices c. Characteristics of Sound Plan d. Steps in Planning <ul style="list-style-type: none"> ➤ Gathering facts ➤ Analyzing the Facts ➤ Forecasting Change ➤ Setting Goals & Results ➤ Organizing <ul style="list-style-type: none"> • Meaning 	20	40

<ul style="list-style-type: none"> • Legal Structure a. The sole Proprietorship <ul style="list-style-type: none"> • Creating a sole Proprietorship • Advantages & disadvantages b. The Partnership <ul style="list-style-type: none"> • Types of Partnerships • Advantages and Disadvantages c. The Corporation <ul style="list-style-type: none"> • Types of Corporation • Characteristics of Corporation (Limited, Liability, Continuity of Operation, Tax Aspects, Estate Planning) d. Co-operative Society e. Govt. Sector ➤ Directing: <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • Meaning • Different Ideas for Managing & Motivating People a) Masllow's Need Hierarchy b) Motivators & Hygienic Factors • Meaning & Concept of Controlling, Ordering, Leading, Supervision, Communication 		
<p>Topic 3 Financial management of Agribusiness</p> <ul style="list-style-type: none"> ➤ Importance of financial statement ➤ Balance sheet and Income statement Meaning, concept ,importance, preparation of balance and income statement, ➤ Preparation of income statement and profit and loss statement 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 	08	16

<p>Topic: 4 Agro - based Industries.</p> <ul style="list-style-type: none"> • 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, • 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. 	12	24
Total	48	100

Learning Resources:**Books:**

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

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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
<p>Topic 1: PATTERN MAKING</p> <p>1.1 Pattern making materials (wood, plastics, rubbers, plasters, waxes)</p> <p>1.2 Types of patterns: Single piece pattern, Split pattern, Match plate pattern, Sweep pattern, Skeleton pattern</p> <p>1.3 Pattern making allowances: Shrinkage, draft, machining, distortion, rapping</p> <p>1.4 Core prints: Horizontal, vertical, hanging, balancing, wing Colour coding for patterns and core boxes.</p>
<p>Topic 2: MOULDING</p> <p>2.1 Moulding Sand</p> <p>2.2 Types: Green, Dry, Loam, Facing, Backing, System, parting, Core sand</p> <p>2.3 Properties of Moulding sand</p> <p>2.4 Moulding Processes: Green sand, Dry sand, Machine and Shell Moulding</p>
<p>Topic 3: CASTING</p> <p>3.1 Casting Principle and operation</p> <p>3.2 Die casting methods: Hot chamber die casting method, Cold chamber die casting method</p> <p>3.3 Melting furnace for ferrous metals: Cupola furnace: Construction and operation, zones, capacity, Temperature range</p> <p>3.3 Melting furnace for non ferrous metals</p> <p>3.4 Electric furnace for steel: Direct arc furnace, High frequency induction furnace</p> <p>3.5 Defects in casting: Causes and remedies, inspection & testing of casting</p>
<p>Topic 4: FABRICATION</p> <p>4.1 Classification.</p> <p>4.2 Arc welding: Principle, Applications, Shielded metal arc welding, Sub-merged arc welding</p> <p>4.3 TIG/MIG Welding</p> <p>4.4 Resistance welding: Spot, Projection, Seam, Percussion</p> <p>4.5 Gas welding: Techniques, Types of flames, Welding defects.</p> <p>1.6 Soldering and Brazing: Types, Principle and Application</p>
<p>Topic 5: METAL TURNING PROCESS (LATHE MACHINE)</p> <p>5.1 Types of lathes: Light duty, Medium duty and Heavy duty geared lathe, CNC lathe</p> <p>5.2 Specifications</p> <p>5.3 Basic parts and their functions</p> <p>5.4 Operations and tools – Turning, parting off, Knurling, facing, Boring, drilling, threading, step turning, taper turning</p>

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:**1. Books:**

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

7. CDs, PPTs Etc.:

- Various PPT's and Transparencies related practical.

8. IS, BIS and International Codes:**9. Websites:**

 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										WITH EFFECT FROM 2012-13						
SEMESTER : FOURTH										DURATION : 16 WEEKS						
PATTERN : FULL TIME - SEMESTER										SCHEME : G						
SR. NO	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME									SW (17400)
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)		
								Max	Min	Max	Min	Max	Min	Max	Min	
1	Physical Chemistry and Materials of Construction	PCM	17423	03	--	02	03	100	40	--	--	--	--	25@	10	50
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	
4	Fluid Flow Operation	FFO	17426	03	--	04	03	100	40	50#	20	--	--	25@	10	
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 5th 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 5th Semester. <ul style="list-style-type: none"> ➤ 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:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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).**

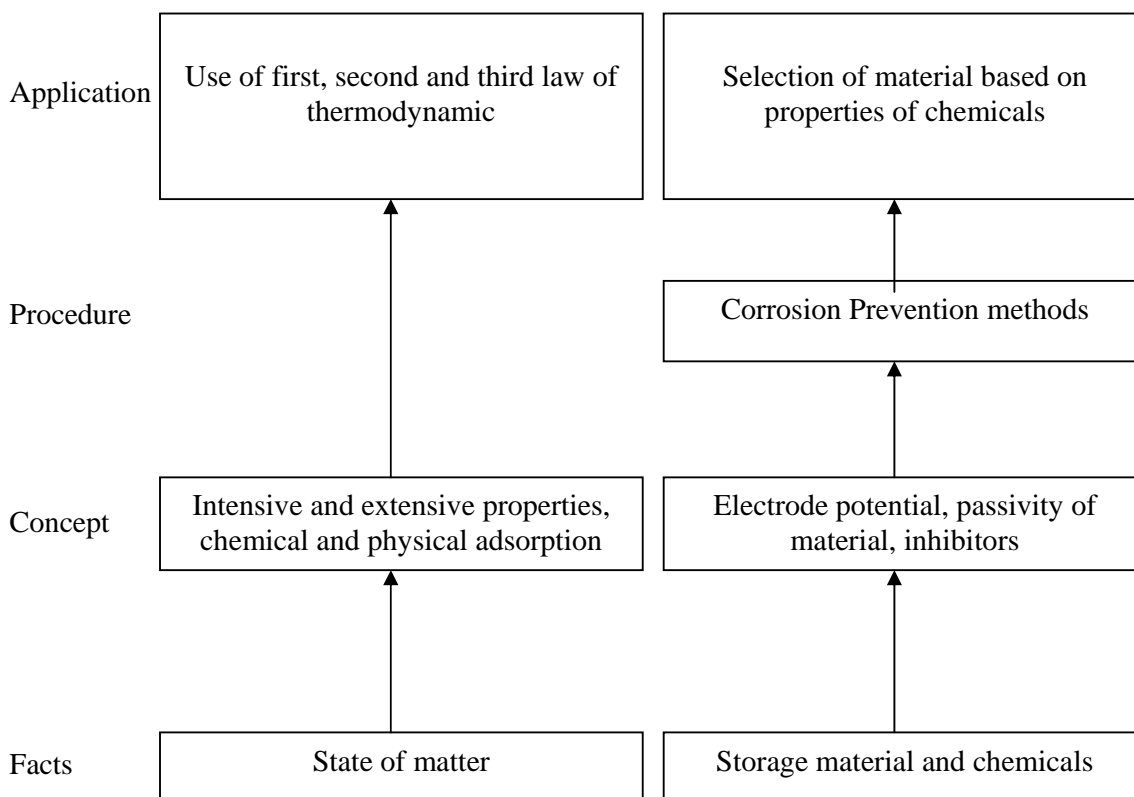
Rationale:

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
1	<p>Topic 1: Thermodynamics</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Differentiate between intensive & extensive properties ➤ State applications of laws of thermodynamics <p>Contents:</p> <p>1.2 Concepts of thermodynamics (08 Definitions) : System, Surroundings, Boundary</p> <ul style="list-style-type: none"> • Homogeneous & Heterogeneous systems • Types of thermodynamic systems - Isolated system, open system, closed system • Intensive & extensive properties • Thermodynamic states Equilibrium state, Non equilibrium state <p>Standard states -solid, liquid & gases</p> <p>1.2 Thermodynamic processes (06 marks)</p> <ul style="list-style-type: none"> • Isothermal process, Adiabatic process, Isobaric process, Isochoric process, Cyclic process. • Reversible & Irreversible process. • Difference between Reversible & irreversible process <p>Internal energy.</p> <p>1.3 Basic laws of thermodynamics - (10 marks)</p> <ul style="list-style-type: none"> • pressure, volume, work and their expressions • Statement of First law of thermodynamics • Definition and Expression of Enthalpy of system, Adiabatic & isothermal expansion of Gasses. • Statement of Second law of thermodynamic • Statement of third law of thermodynamics, , Zeroth law 	10	24
2	<p>Topics 2: Phase Rule</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Determine degree of freedom of given system ➤ State phase rule <p>Contents:</p> <ul style="list-style-type: none"> • Phase rule statement, Phase components • Degree of freedom • Derivation of phase rule • The water system, the sulphur system 	04	10
3	<p>Topics 3: Adsorption & Colloids</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Give example of adsorption ➤ Describe adsorption isotherm <p>Contents:</p> <p>3.1 Adsorption (12 Marks)</p> <ul style="list-style-type: none"> • Definition, example, Mechanism of adsorption • Types of adsorption 	10	20

	<p>Physical adsorption, chemical adsorption, difference between physical & chemical adsorption</p> <ul style="list-style-type: none"> • Adsorption isotherm: Freundlich adsorption isotherm, Langmuir adsorption isotherm • Application of adsorption <p>3.2 Colloids : (08 Marks)</p> <ul style="list-style-type: none"> • Definition • Types of colloidal system - Lyophilic, Lyophobic colloids (solution) its characteristics & comparison • Methods of preparation of colloids (solution) 		
4	<p>Topics 4: Corrosion</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State types of corrosion ➤ Corrosion prevention and control methods <p>Contents:</p> <p>4.1 Types of corrosion (14 Marks)</p> <ul style="list-style-type: none"> • Definition • Types of corrosion <ul style="list-style-type: none"> ➤ Dry corrosion – Formation of protective films, Growth of oxidation film. ➤ Wet corrosion • Meaning of the terms Electrode potential, Electrochemical series, Galvanic cell, Galvanic series, potential difference • Process of corrosion. • Effect of temperature on corrosion • Specific types of corrosion such as Uniform corrosion, pitting corrosion, galvanic corrosion, oxidation corrosion, inter granular corrosion, selective corrosion, erosion corrosion, fretting corrosion <p>4.2 Corrosion prevention and control (10 Marks)</p> <ul style="list-style-type: none"> • Corrosion prevention methods - <ul style="list-style-type: none"> Use of high purity metals Use of alloy additions, Special heat treatment • Corrosion protection methods <ul style="list-style-type: none"> Use of inhibitors, Electro-chemical protection, protective coatings • Effect of pH value on corrosion • Caustic embrittlement 	12	24

5	Topics 5 : Material of construction and their properties Specific Objectives: ➤ Select compatible material for storage of chemicals Contents: 5.1 Common Materials (14 Marks) <ul style="list-style-type: none"> • Classification of engineering materials • Selection of material of construction based on properties of chemicals. • 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 	12	22
	5.2 Special Materials (08 Marks) <ul style="list-style-type: none"> • Lining and its importance • Rubber lining, Glass lining, Lead lining, Plastic lining 		
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 reagents.
- 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. No.	Author	Title	Publisher
01	B. S. Bahal, G. D. Tuli, Arun Bahal	Essential of Physical Chemistry	S. Chand
02	J. M. Coulson & J. F. Richardson	Chemical Engineering Vol. 6	Asian Books Pvt. Ltd.
03	Contributors	Engineering Chemistry	Wiley India
04	B.R.Puri, L.R.Sharma, 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			Examination Scheme					
TH	TU	PR	PAPER 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:

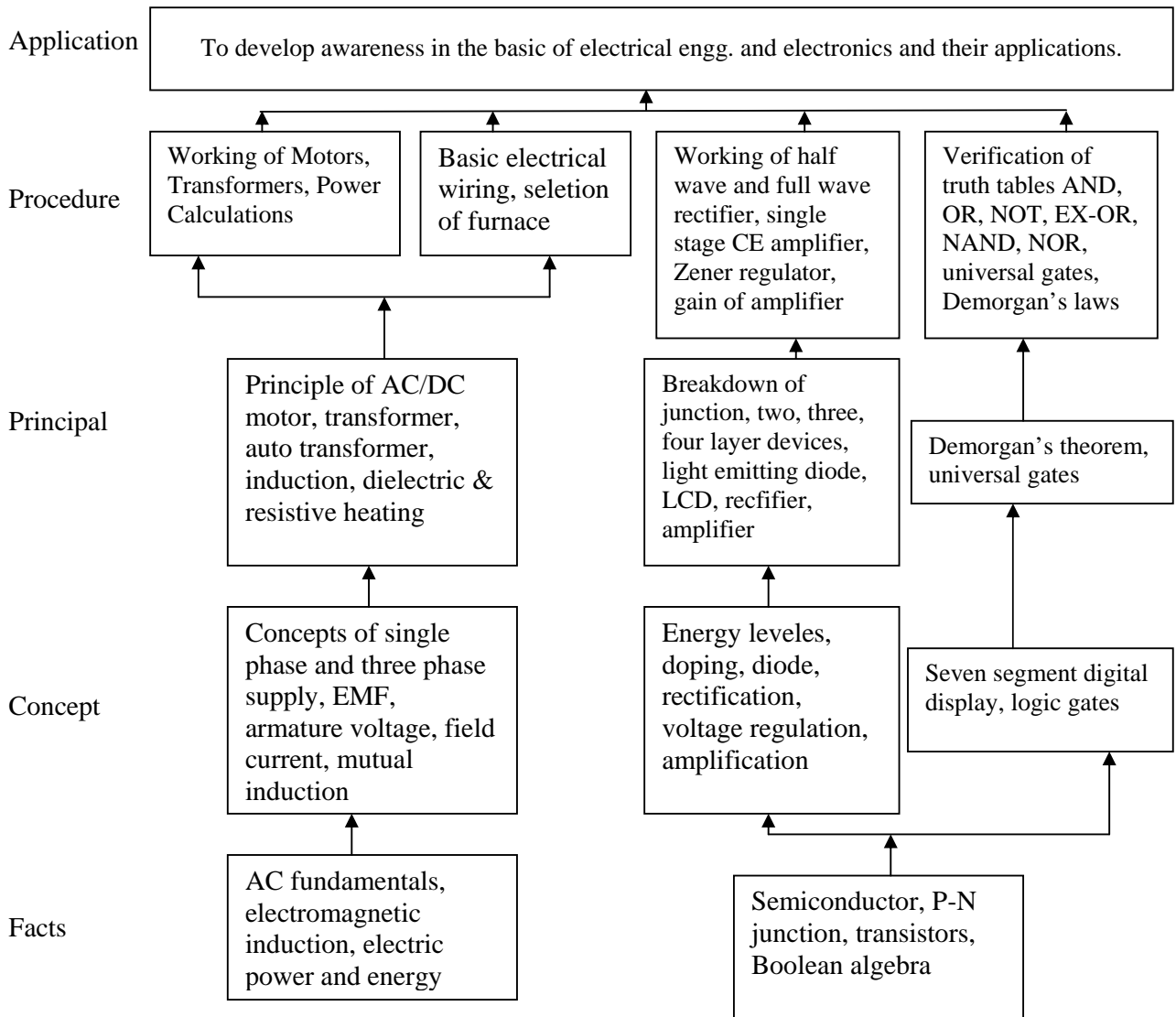
Most of the equipments used in chemical industry are electrically powered. A minor electrical faults can be attended by a shop floor chemical engineer. This subject of electrical engg. addresses the fundamental concepts and operating principles of electrical appliances. It will enable the students in 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
<p>Topic 1: Basic Fundamentals</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State principle of electromagnetic induction. ➤ Calculate electrical power and energy from given data. <p>Contents:</p> <ul style="list-style-type: none"> • Ohm's Law – Simple problems on Ohm's Law • 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 	07	10
<p>Topics 2: D.C. Motor</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw electrical circuit diagram of D.C. shunt motor. ➤ Draw diagram & explain armature voltage speed control method. <p>Contents:</p> <ul style="list-style-type: none"> • Working principle, construction, different parts – their material & 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. 	06	10
<p>Topics 3: A.C. Motor</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw electrical circuit diagram of R – Split single phase induction motor. ➤ State any four parts & their material used for three phase induction motor. <p>Contents:</p> <ul style="list-style-type: none"> • Three phase induction motor – working principle, construction & application. • Construction, working & application of following single phase induction motors. R – Split, C – Split. 	05	08
<p>Topics 4: Transformer</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Compare core type & shell type transformer. ➤ Define voltage ratio, current ratio & transformation ratio of single phase transformer. <p>Contents:</p> <ul style="list-style-type: none"> • Working principle of transformer, Elementary theory of an ideal transformer. 	06	10

<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> ➤ State the necessity of fuse. ➤ State the necessity of earthing. Contents: <ul style="list-style-type: none"> • 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. • 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 	08	12
Total	32	50

Section- II Electronics

Topic and Content	Hours	Marks
Topic 1: Semiconductor Electronic Devices Specific Objectives: <ul style="list-style-type: none"> ➤ Draw V-I characteristics of different devices. ➤ State the symbols of different components. Contents: <p>1.1 ----- 12 Marks</p> <ul style="list-style-type: none"> • Resistor, inductor, capacitor – definition, symbols & applications. • Conductors, semiconductors, Insulators – definition, energy band diagram, examples. • Semiconductors classification – Intrinsic and Extrinsic – N type & P type, definition, charge carrier. • PN junction diode – construction, symbol, working, forward & reverse bias V-I characteristic, applications. • Light emitting diode – Construction, symbol, working principle, applications. • Junction breakdown. • Zener diode - Construction, symbol, working principle, reverse bias V-I characteristic, applications. <p>1.2 Power devices - (08 marks)</p> <p style="padding-left: 40px;">SCR - Construction, symbol, working principle, Applications.</p> <p style="padding-left: 40px;">TRIAC - Construction, symbol, working principle, Applications.</p>	12	20
Topics 2: Bipolar Junction Transistor Specific Objectives:	06	08

<ul style="list-style-type: none"> ➤ Draw output characteristics of CE configuration. ➤ Describe working of transistor amplifier. <p>Contents:</p> <ul style="list-style-type: none"> • 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. 		
<p>Topics 3: Power Supply</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw block diagram of power supply. ➤ Describe working of different rectifier circuits. <p>Contents:</p> <ul style="list-style-type: none"> • Power supply – Necessity, block diagram. • Rectifier – Types, Half wave, Full wave (center tapped & bridge type) - Circuit diagram, working, waveforms & their comparison. • Filter - Need & types – shunt capacitor, series inductor, LC & π type, circuit diagram. • Voltage regulator - Need, principle of zener shunt regulator. 	07	12
<p>Topics 4: Digital circuits</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State symbols of different logic gates. ➤ Use NAND / NOR gate as universal gates. <p>Contents:</p> <ul style="list-style-type: none"> • Digital signal, Negative & positive logic. • 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. <p>Digital display – Types of LED & LCD display</p>	07	10
Total	32	50

Practical:**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. 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, S.C. Gupta	Basic Electronics & Linear N.N. Bhargava, Technical Teachers Circuits	Technical Teachers 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 Costing	R.B. Publications

Course Name : Diploma in Chemical Engineering**Course Code : CH****Semester : Fourth****Subject Title : Plant Utility****Subject Code : 17425****Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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:

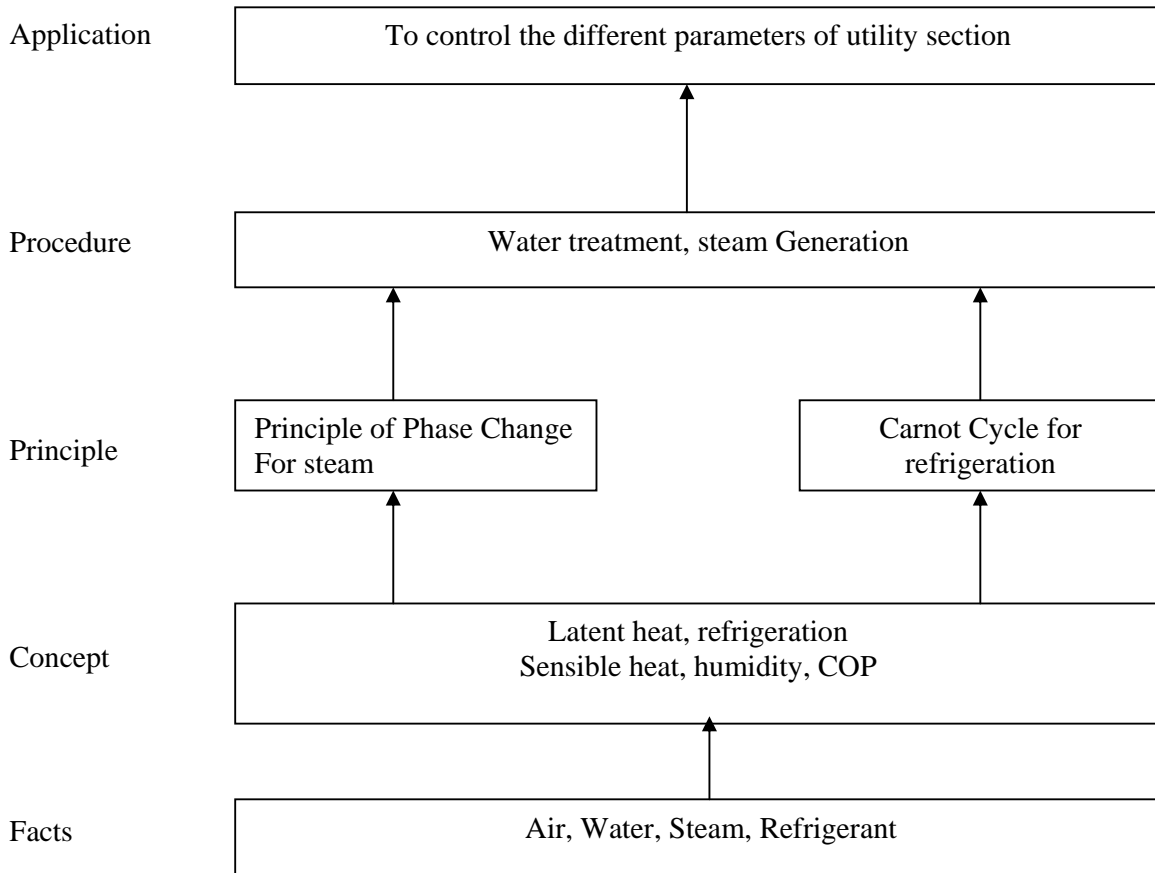
This subject covers the requirement of different utilities for the process plant, along with its generation and its effective utilization. Main utilities required for process plants are water, steam, air & refrigerants. Steam & non- steam heating media are important for conversion of raw material to 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
<p>Chapter 1 : Water</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Describe the methods of water treatment ➤ Explain the problem occurred in Boiler feed water <p>Contents:</p> <p>1.1 (08 Marks)</p> <ul style="list-style-type: none"> • Sources of water, hard and soft water, • Requisites of industrial water and its uses • Methods of water treatment- Chemical softening, Demineralization <p>1.2 (12 Marks)</p> <ul style="list-style-type: none"> • Resins used for water softening • Reverse osmosis and membrane separation • Problems in boiler feed water & its treatments- Scale & sludge formation, Corrosion, Priming & foaming, Caustic embrittlement 	10	20
<p>Chapter 2 : Refrigeration</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State the different properties of Refrigerants ➤ Describe the different Refrigeration system <p>Contents:</p> <p>2.1 (12 Marks)</p> <ul style="list-style-type: none"> • Definition of Ton of refrigeration and coefficient of performance. • Refrigeration cycles • Different methods of refrigeration used in industry- Vapour compression, Vapor absorption, Air refrigeration. <p>2.2 (12 Marks)</p> <ul style="list-style-type: none"> • Different refrigerants- Lithium bromide (eco-Friendly) 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. 	11	24
<p>Chapter 3 : Steam and Steam Generation</p> <ul style="list-style-type: none"> ➤ Calculate Enthalpy of different types of steam ➤ Explain Principle, construction & working of Boiler. <p>Contents:</p> <p>3.1 (12 Marks)</p> <ul style="list-style-type: none"> • Properties of steam • Problems based on enthalpy calculation for wet steam, dry saturated steam, superheated steam <p>3.2 (18 Marks)</p> <ul style="list-style-type: none"> • Types of steam generator / boilers: water tube & fire tube Solid fuel fired boiler, waste gas fired boiler, Waste heat boiler. Fluidized bed boiler • Scaling, trouble shooting, preparing boiler for inspection • Boiler mountings and accessories: principle of operation, construction and working. (water level indicator, pressure gauge, steam trap, pressure reducing valve, economizer, preheater, super heater) • Boiler Act 	14	30
<p>Chaper 4 : Psychrometry</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State properties of air-water system 	08	16

<ul style="list-style-type: none"> ➤ Describe Humidification & Dehumidification process Contents: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> ➤ State the applications of air. ➤ Explain the process of getting instrument air Contents: <ul style="list-style-type: none"> • Use of Compressed air, process air and instrument air • Single, multistage compression, Interstage coolers • Process of getting instrument air. 	03	06
Chapter 6 : Non steam heating system Specific Objectives: <ul style="list-style-type: none"> ➤ State the temperature ranges of Non steam heating system ➤ Explain Principle, Construction & Working of Non steam heating system. Contents: Principle, construction and working of : <ul style="list-style-type: none"> • Thermic fluid heater • Types of thermic fluid and their temperature ranges. 	02	04
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. No.	Author	Title	Publisher
01	P. L. Balleney	Thermal Engineering	Khanna Publisher, New 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 Engineering**Course Code : CH****Semester : Fourth****Subject Title : Fluid Flow Operation****Subject Code : 17426****Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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).

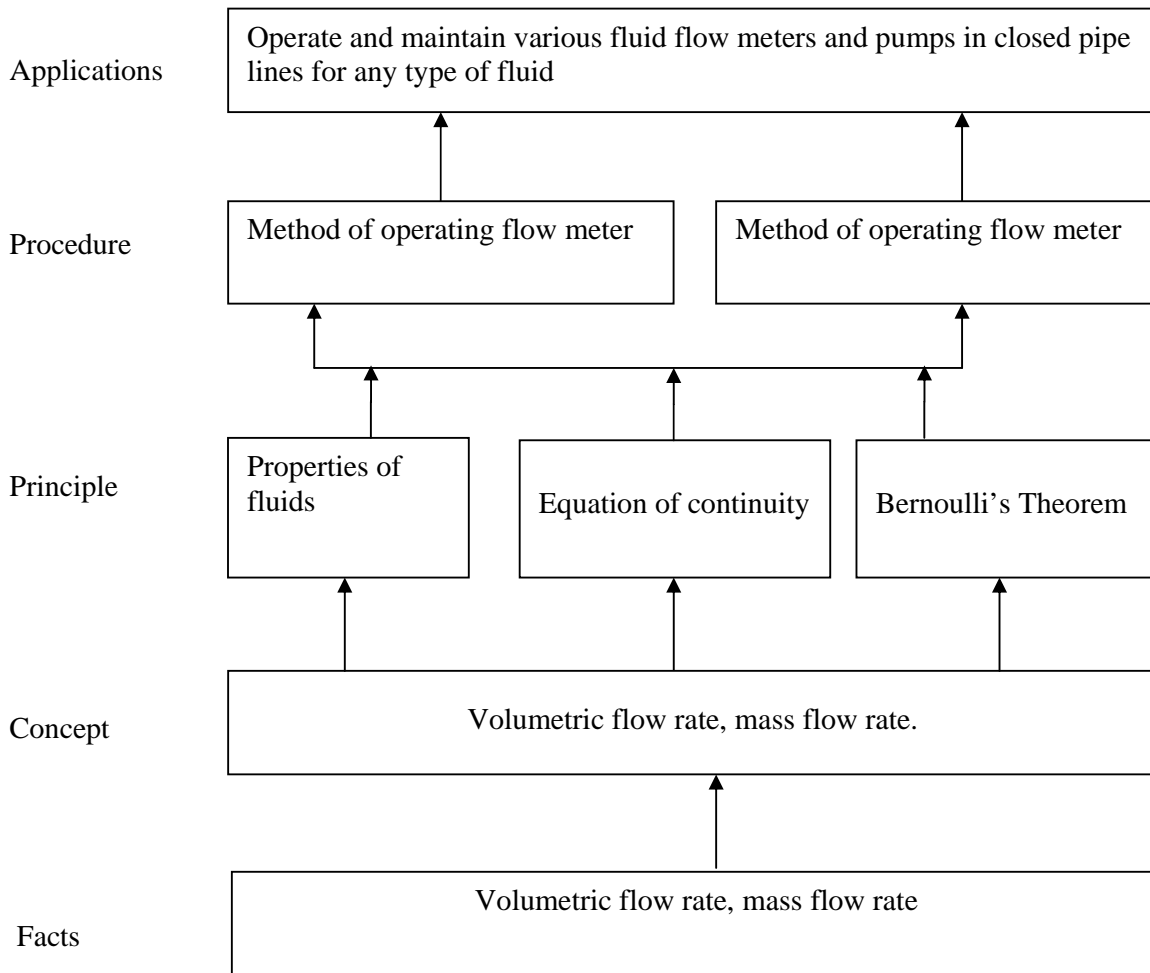
Rationale:

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. Principles 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	Topics and Contents	Hours	Marks
1	<p>Introduction to Fluids :</p> <p>Specific Objective</p> <ul style="list-style-type: none"> • Calculate pressure using U tube manometer. • Compare Newtonian & Non Newtonian fluid. • State Newton's law of Viscosity. <p>1.1 Properties of fluids</p> <ul style="list-style-type: none"> • Density & viscosity (absolute & Kinematic) • Vapor pressure & partial pressure • Atmospheric pressure • Vacuum • Absolute pressure <p>1.2 Principle of Hydrostatic Equilibrium</p> <ul style="list-style-type: none"> • Pressure exerted by a liquid column • Various types of manometers such as U tube, Well type and inclined leg manometer • Pressure measurement by U-tube manometer and problem based on the same. <p>1.3 Types of fluids</p> <ul style="list-style-type: none"> • Ideal and actual fluids • Compressible and incompressible fluids • Newton's law of viscosity • Newtonian and Non-Newtonian fluids with example of each type. 	07	12
2	<p>Flow of Fluids (Incompressible & its measurement)</p> <p>Specific Objectives</p> <ul style="list-style-type: none"> • Calculate the volumetric flow rate using orifice meter and Venturi meter. • Calculate the frictional losses due to expansion and contraction. • State Hagen Poiseulli's equation. <p>2.1 Volumetric and Mass flow rate (16 marks)</p> <ul style="list-style-type: none"> • Concept of volumetric and mass flow rate • Interconversion of the above two • Average velocity • Mass velocity • Point velocity • Equation of continuity • Derivation of equation of continuity • Numericals based on above sub- topics <p>2.2 Reynolds Number</p> <ul style="list-style-type: none"> • Definition • Reynolds experiment • Concept of laminar, turbulent and transition flow • Critical velocity • Formula for Reynolds Number and Numericals. <p>2.3 Bernoulli's equation</p> <ul style="list-style-type: none"> • Various types of energies by liquid 	20	40

	<ul style="list-style-type: none"> • Derivation of Bernoulli's equation • Friction factor correction • Work done by pump • Kinetic Energy correction • Numerical <p>2.4 Friction (12 marks)</p> <ul style="list-style-type: none"> • 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 <p>2.5 Friction in pipes</p> <ul style="list-style-type: none"> • Fanning's friction factor in Laminar and Turbulent flow • Friction factor chart • Friction losses due to sudden expansion and sudden contraction <p>2.6 Measurement of fluid flow (12 Marks)</p> <ul style="list-style-type: none"> • Variable head meter and variable area meter • Construction working principle, discharge coefficient, calibration, relative advantages and disadvantages, problems on- Orifice meter, Venturimeter • Rotameter construction, principle, concept of variation in flow area, calibration • Pitot tube, construction, advantages and formula to calculate point velocity 		
3	<p>Pipe, fittings & valves Specific Objectives</p> <ul style="list-style-type: none"> • List the different types of fittings & valves. • State equivalent length of pipe fitting, frictional losses in pipe fittings. <p>3.1 Pipe & Pipe Fittings</p> <ul style="list-style-type: none"> • Standard sizes of pipes, wall thickness, Schedule number & Material of construction • Various types of fittings • Equivalent length of pipe fittings <p>3.2 Classification of valves</p> <ul style="list-style-type: none"> • Construction, working, advantages of Globe, Gate, Plug, Ball ,Diaphragm, Needle, Control valve, Non return valve, Safety valve <p>3.3 Construction, working and application of Rupture disc.</p>	07	16
4	<p>Transportation of Fluids Specific Objectives</p> <ul style="list-style-type: none"> • Calculate the NPSH of the centrifugal pump. 	14	32

	<ul style="list-style-type: none"> • Compare centrifugal pump and positive displacement pump. • State the range of pressure developed by fan, blower and compressor. <p>4.1 Pumps (12 marks)</p> <ul style="list-style-type: none"> • Classification • Positive displacement pumps, their types, Reciprocating pump (single acting, double acting, duplex, triplex piston, plunger), gear pump, Diaphragm pump, Screw pump, Characteristics curves. <p>4.2 Centrifugal pump (10 Marks)</p> <ul style="list-style-type: none"> • Construction, various parts, development of pressure, air binding, priming, suction head, and discharge head, cavitation, NPSH etc. • Characteristics curve of Centrifugal pump <p>4.3 Fans, blowers & compressors: (10 marks)</p> <ul style="list-style-type: none"> • Specific applications of each equipment • Range of pressure developed by each type • Centrifugal blower • Reciprocating Compressor <p>Vacuum generating equipment Principle , construction and working of Vacuum pump, Jet ejectors</p>		
	Total	48	100

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 pump by using centrifugal pump test rig.

Assignments: Any Four

Sr. 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 Engineering	McGraw Hill
3	Richardson & Coulson	Chemical Engineering 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:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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).

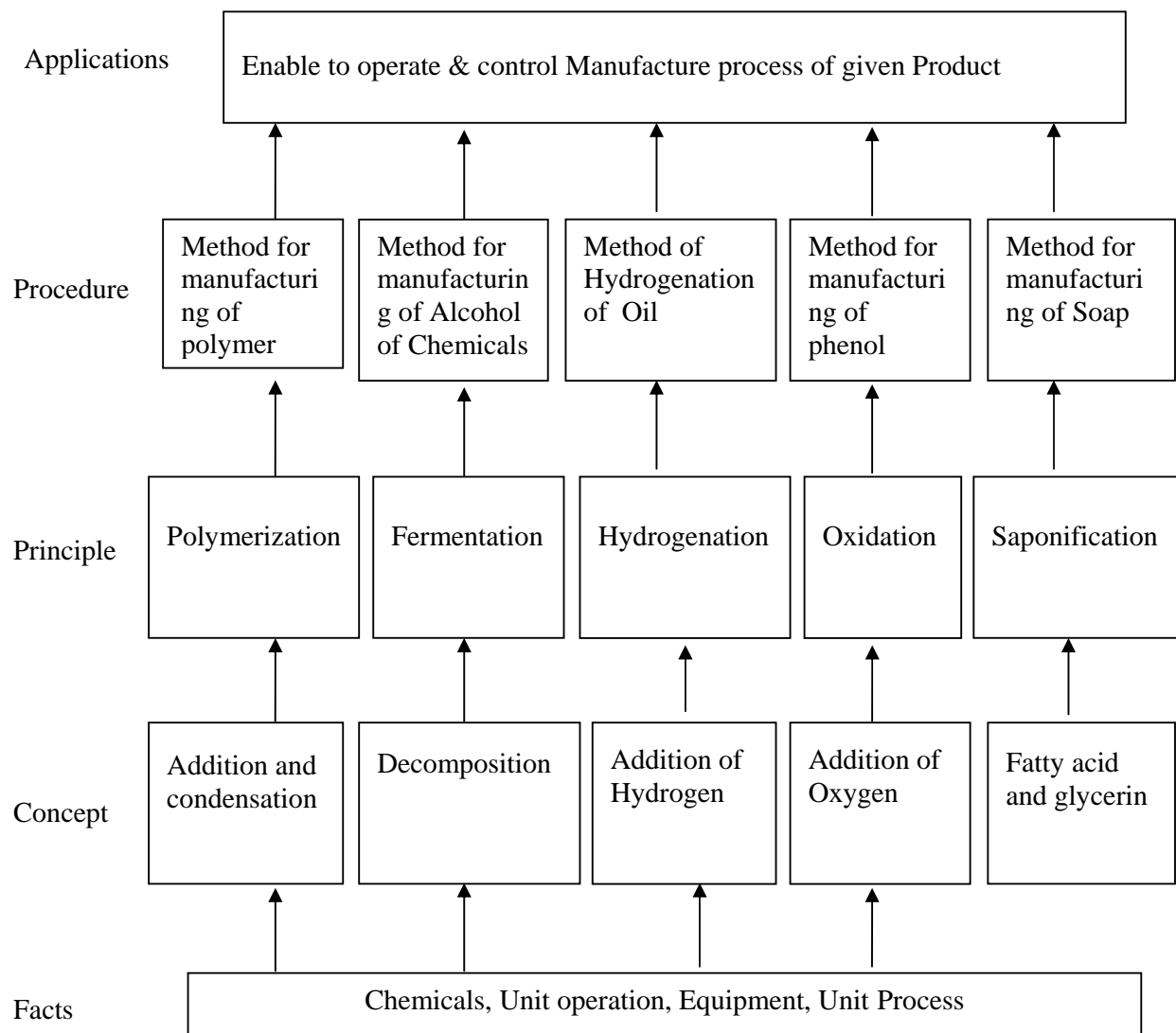
Rationale:

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	<p>Alcohol</p> <p>Specific Objectives :</p> <ul style="list-style-type: none"> ➤ Describe manufacturing processes of alcohol with reaction ➤ Draw flow sheet/ block diagram <p>Content:</p> <p>Raw Materials , Reactions, Flow sheet/Block diagram, manufacturing process of products & their uses</p> <ul style="list-style-type: none"> • Ethyl alcohol by Corn & Molasses • Acetic Acid by Oxidation of Acetaldehyde • Butanol by Oxo process from Propylene 	06	16
2	<p>Paint</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State constituents of paint with function ➤ Describe manufacturing processes of paint ➤ State uses of Varnishes & Lacquers <p>Content:</p> <ul style="list-style-type: none"> • Properties of raw materials of paint & their functions • Manufacturing of paint • Constituent of Pigments <ul style="list-style-type: none"> - White pigment - Black pigment - Blue pigment - Red pigment • Varnishes - Oil & Spirit and their Uses • Lacquers - Definition & Uses 	05	12
3	<p>Oil, Soap & Detergent</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State Extraction process of oil ➤ State Hydrogenation of oil ➤ Describe manufacturing processes of soap & Detergent ➤ Explain cleansing action of soap <p>Content:</p> <p>3.1 Oil 08 Marks</p> <ul style="list-style-type: none"> • Definitions - Acid value , Iodine value, Saponification value of oil • Extraction of Oil by solvent process • Hydrogenation of Oil <p>3.2 Soap 06 Marks</p> <ul style="list-style-type: none"> • Classification of Cleansing Compounds • Manufacturing of Soap by <ul style="list-style-type: none"> - Batch Saponification Process - Continuous Hydrolysis & Saponification • Cleansing action of Soap 	08	20

	3.3 Detergents 06 Marks <ul style="list-style-type: none"> Manufacturing of detergents by <ul style="list-style-type: none"> Sulfated Fatty Alcohols Alkyl-Aryl Sulfonates 		
4	Pulp and Papers Specific Objectives: <ul style="list-style-type: none"> Describe manufacturing processes of Pulp & paper with reaction To draw flow sheet Content: <p>Raw Materials , Reactions, Flow sheet/Block diagram, manufacturing process of product & their uses</p> <ul style="list-style-type: none"> Pulp by Sulfate (Kraft) process & Sulphite process recovery of Chemicals Paper from pulp Rayon (viscous rayon) form cellulose 	05	12
5	Polymer Specific Objectives: <ul style="list-style-type: none"> State meaning of polymerization Describe manufacturing processes of polymer with reactions Content: <ul style="list-style-type: none"> Polymerization - Definition of (08 Marks) Polymerization, Methods of Polymerization – Addition & Condensation Raw Materials, Reactions, Flow sheet / Block diagram, manufacturing process of product & their uses (16 Marks) <ul style="list-style-type: none"> Poly Vinyl Chloride(PVC) by Emulsion polymerization Polyethylene by Ziegler process Low high medium pressure Polystyrene from Benzene & Ethylene Styrene Polyester Polyester by polymerization of DMT PTA & ethylene glycol 	15	24
6	Phenol Specific Objectives: <ul style="list-style-type: none"> Describe manufacturing processes of Phenol with reaction To draw flow sheet Content: <p>Raw Materials, Reactions, Flow sheet/Block diagram, manufacturing process of phenol & their uses</p> <ol style="list-style-type: none"> Cumene Peroxidation Process Toluene Oxidation Process Rasching Process Chlorobenzene-Caustic hydrolysis 	09	16
Total		48	100

Practical's:

Skills to be developed:

Intellectual Skills:

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

Motor Skills:

- Work on manufacturing plant
- Set proper temperature and pressure condition
- Set controlling steps in manufacturing process

List of Practical's:

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

Mini Project (any Three):

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

Learning Resources:**Books:**

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

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
--	--	02	--	--	--	--	25#	25

Rationale:

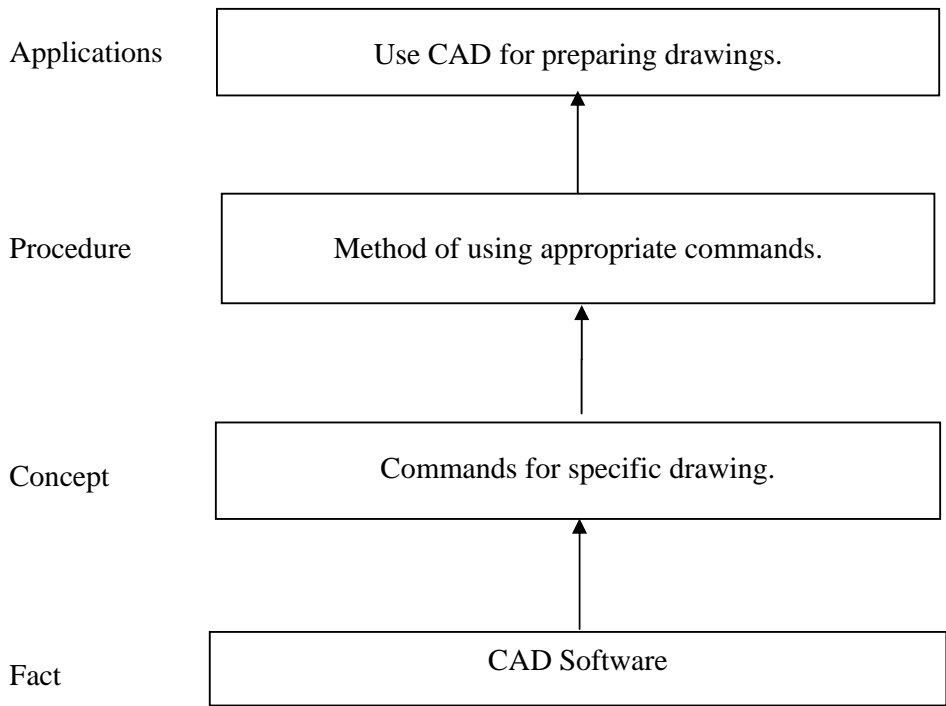
Drawing is the language of engineers. It conveys the meaning for construction and erection of Chemical Plant. Now a days computer has become an effective tool for preparing drawing through the software CAD. This subject provides sufficient practice to make use of CAD and draw required drawings.

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 V.V Mahajan	Process Equipment Design	1997 Mac Milan India Ltd.
03	M Gopala Rao	Dryden Outline of Chemical Technology	East West Publishers 1997, 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:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
--	--	03	--	--	--	--	50@	50

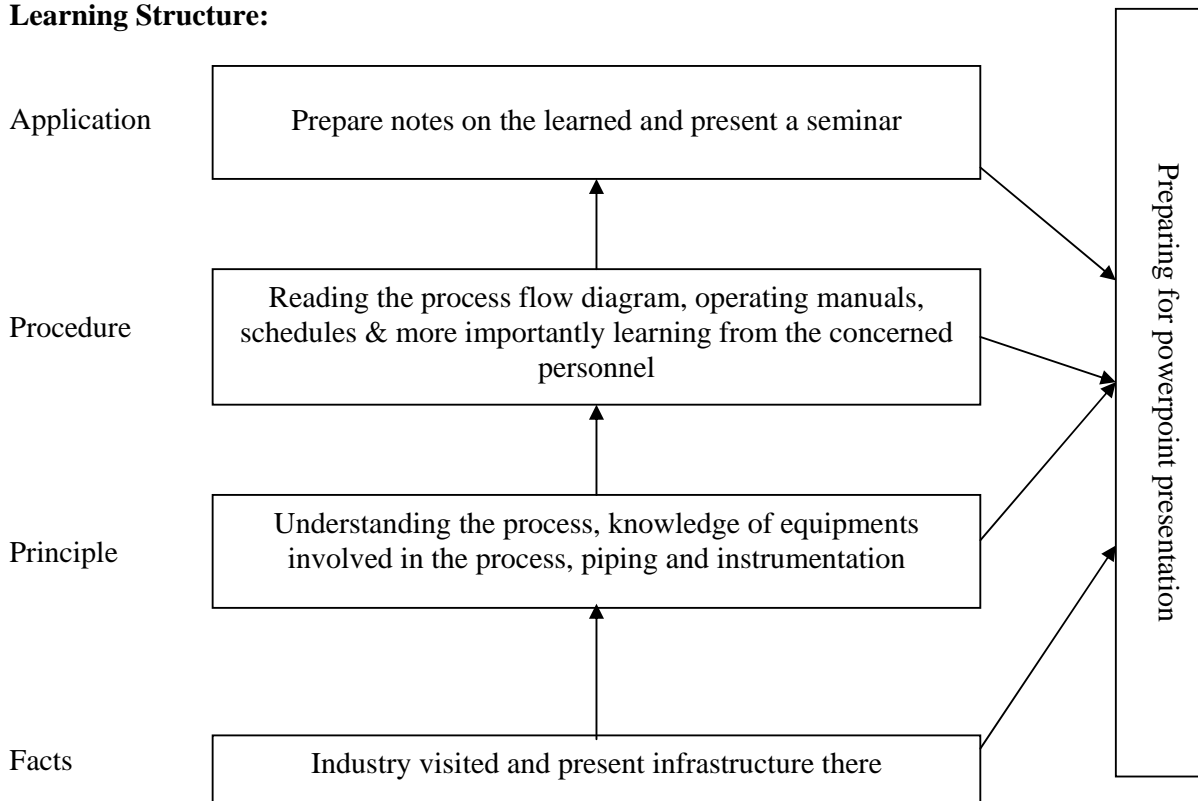
Rationale:

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
<p>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</p> <ol style="list-style-type: none"> 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 g. Various equipments, unit operations and unit processes involved h. Storage and handling of material i. General layout of the plant <p>Visits to any two of the following.</p> <ol style="list-style-type: none"> 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 	12
<p>2. Lectures Lectures by professionals / industrial experts / academicians Two sessions to be held on the following topics</p> <ol style="list-style-type: none"> a. Industrial filtration b. Mixing and agitation c. Fluid transportation and handling d. Cooling and refrigeration e. Steam generation f. Introduction to Apprenticeship Training Scheme 	06
<p>3. Seminars Seminar based on information search to be organized from any three of the following areas</p> <ol style="list-style-type: none"> a. Protection of environment b. Safety practices in chemical industries c. General maintenance in chemical plant d. Water purification e. Non conventional energy sources 	10
<p>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</p> <ol style="list-style-type: none"> a. Selection of pumping devices b. Treatment of boiler feed water c. Selection of filtration equipments d. Fine chemicals and their applications 	12
<p>5. Student Activities The group of 3 – 4 students will perform any one of the following activities</p> <ol style="list-style-type: none"> a. Comparative statement of prices and specifications b. Information regarding specifications of different pumps and motors c. Create data base of past students 	08

d. Collect information regarding material of construction for pipe fittings, pumps and its components	
e. Collect information regarding various chemical industries in the vicinity of the institute.	
f. Collect information regarding specifications of common engineering materials	
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 4th semester examination.

Note:- Examination in Professional Practices of 5th 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.

 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) WITH EFFECT FROM 2012-13																	
SEMESTER : FOURTH DURATION : 16 WEEKS																	
PATTERN : FULL TIME - SEMESTER SCHEME : G																	
SR. NO.	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME										SW (17400)
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)			
								Max	Min	Max	Min	Max	Min	Max	Min		
1	Environmental Studies \$	EST	17401	01	--	02	01	50#*	20	--	--	--	--	25@	10	50	
2	Computer Hardware & Maintenance β	CHM	17428	03	--	02	03	100	40	25#	10	--	--	25@	10		
3	Computer Network	CNE	17429	03	--	04	03	100	40	50#	20	--	--	25@	10		
4	Microprocessor and Programming β	MAP	17431	03	--	02	03	100	40	25#	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		
TOTAL				14	--	19	--	450	--	200	--	--	--	200	--	50	
**	Industrial Training (Optional)			Examination in 5th Semester Professional Practices-III													
<p>Student Contact Hours Per Week: 33 Hrs.</p> <p>THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.</p> <p>Total Marks : 900</p> <p>@ - Internal Assessment, # - External Assessment, No Theory Examination, \$ - Common to all branches, #* - Online Examination, β - Common to IF</p> <p>Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work.</p> <p>** Industrial Training (Optional) - Student can undergo Industrial Training of four weeks after fourth semester examination during summer vacation.</p> <p>Assessment will be done in Fifth semester under Professional Practices-III. They will be exempted from activities of Professional Practices-III of 5th Semester.</p> <ul style="list-style-type: none"> ➤ 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/AU**

Semester : Fourth

Subject Title : Environmental Studies

Subject Code : 17401

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

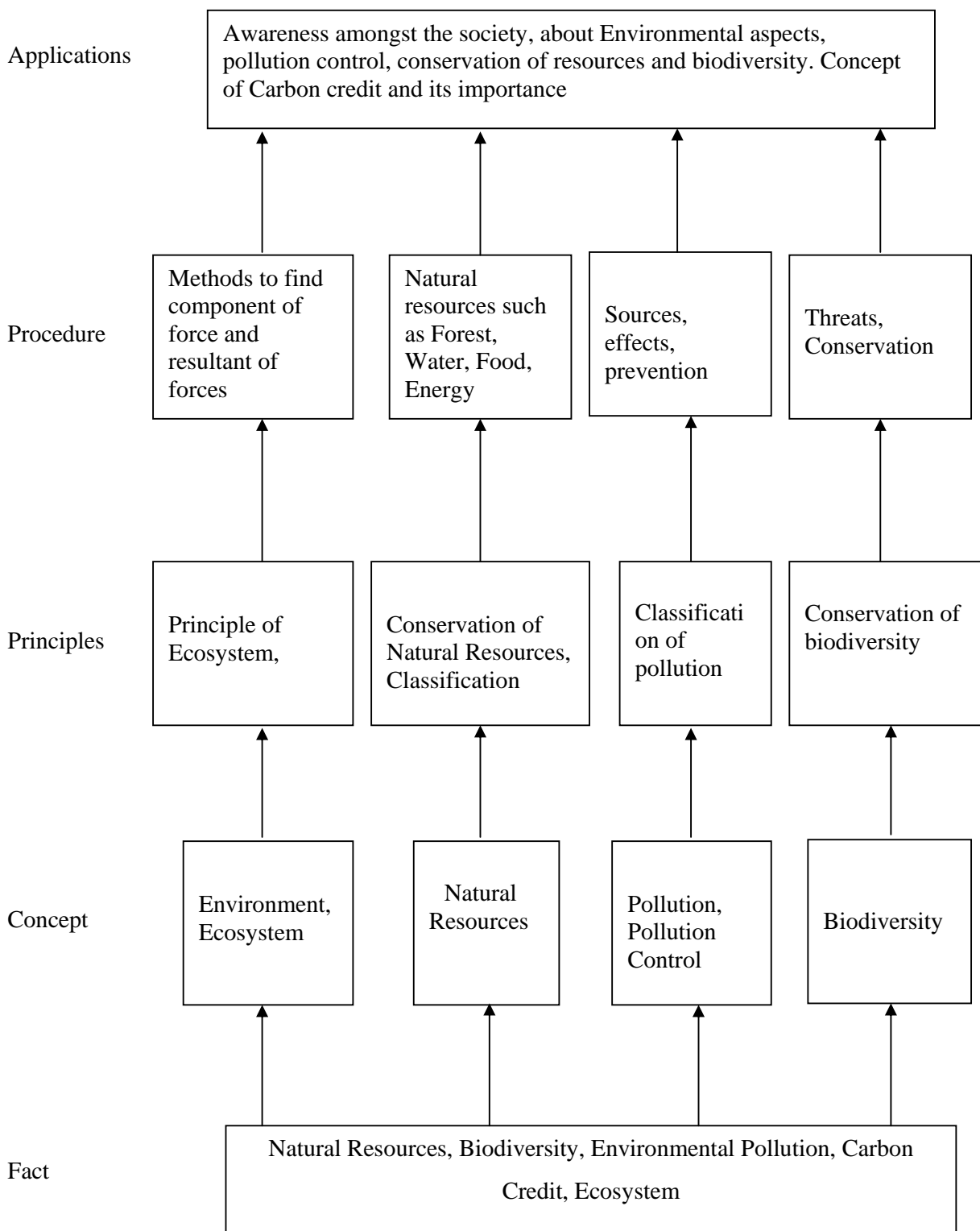
It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

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
<p>Topic 1: Nature of Environmental Studies</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define the terms related to Environmental Studies ➤ State importance of awareness about environment in general public <p>Contents:</p> <ul style="list-style-type: none"> • Definition, Scope and Importance of the environmental studies • Importance of the studies irrespective of course • Need for creating public awareness about environmental issues 	01	04
<p>Topic 2: Natural Resources and Associated Problems</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define natural resources and identify problems associated with them ➤ Identify uses and their overexploitation ➤ Identify alternate resources and their importance for environment <p>Contents:</p> <p>2.1 Renewable and Non renewable resources</p> <ul style="list-style-type: none"> • Definition • Associated problems <p>2.2 Forest Resources</p> <ul style="list-style-type: none"> • General description of forest resources • Functions and benefits of forest resources • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc. <p>2.3 Water Resources</p> <ul style="list-style-type: none"> • Hydrosphere: Different sources of water • Use and overexploitation of surface and ground water • Effect of floods, draught, dams etc. on water resources and community <p>2.4 Mineral Resources:</p> <ul style="list-style-type: none"> • Categories of mineral resources • Basics of mining activities • Mine safety • Effect of mining on environment <p>2.5 Food Resources:</p> <ul style="list-style-type: none"> • Food for all • Effects of modern agriculture • World food problem 	04	10
<p>Topic 3. Ecosystems</p> <ul style="list-style-type: none"> • Concept of Ecosystem • Structure and functions of ecosystem • Energy flow in ecosystem • Major ecosystems in the world 	01	04
<p>Topic 4. Biodiversity and Its Conservation</p> <ul style="list-style-type: none"> • Definition of Biodiversity • Levels of biodiversity 	02	06

<ul style="list-style-type: none"> • Value of biodiversity • Threats to biodiversity • Conservation of biodiversity 		
Topic 5. Environmental Pollution <ul style="list-style-type: none"> • Definition • Air pollution: Definition, Classification, sources, effects, prevention • Water Pollution: Definition, Classification, sources, effects, prevention • Soil Pollution: Definition, sources, effects, prevention • Noise Pollution: Definition, sources, effects, prevention 	03	08
Topic 6. Social Issues and Environment <ul style="list-style-type: none"> • Concept of development, sustainable development • Water conservation, Watershed management, Rain water 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 	03	10
Topic 7. Environmental Protection Brief description of the following acts and their provisions: <ul style="list-style-type: none"> • Environmental Protection Act • Air (Prevention and Control of Pollution) Act • Water (Prevention and Control of Pollution) Act • Wildlife Protection Act • Forest Conservation Act Population Growth: Aspects, importance and effect on environment <ul style="list-style-type: none"> • Human Health and Human Rights 	02	08
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. No.	Author	Title	Publisher
01	Anindita Basak	Environmental Studies	Pearson Education
02	R. Rajgopalan	Environmental Studies from Crises to Cure	Oxford University Press
03	Dr. R. J. Ranjit Daniels, Dr. 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			Examination Scheme					
TH	TU	PR	PAPER 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:

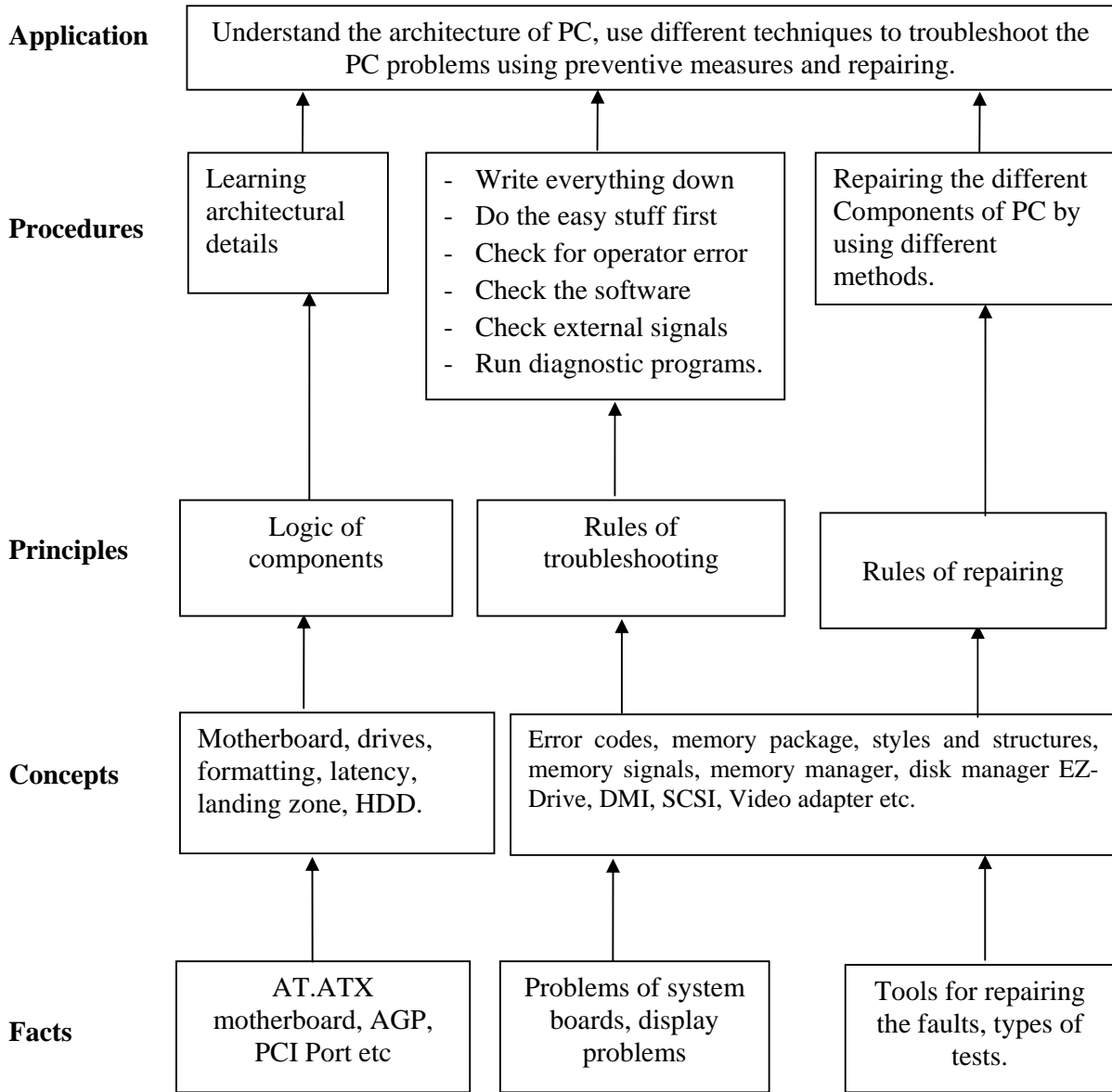
The aim of the subject is to teach the basic working of the computer motherboard, peripherals and add-on cards. The subject helps the students to do the maintenance of the Computer, peripherals and its add-on cards. The students will be able to select the proper peripheral as per their specification 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. No	Theory	Hrs.	Marks
1	<p>Motherboard & Its Component Specific Objectives</p> <ul style="list-style-type: none"> ➤ To Understand the various components of Motherboard. ➤ To Know about the different memories in PC & their usage. ➤ To Understand the selection of different components of PC. <p>1.1 CPU – Concept like address lines, data lines, internal registers. 1.2 Modes of operation of CPU – Real mode, IA-32 mode, IA-32 Virtual Real Mode. 1.3 Process Technologies, Dual Independent Bus Architecture, Hyper Threading Technologies & its requirement. 1.4 Processor socket & slots. 1.5 Chipset basic, chipset Architecture, North / South bridge & Hub Architecture. 1.6 Latest chipset for PC 1.7 Overview & features of PCI, PCI –X, PCI express, AGP bus. 1.8 Logical memory organization conventional memory, extended memory, expanded memory. 1.9 Overview & features of SDRAM, DDR, DDR2, DDR3. 1.10 Concept of Cache memory: 1.11 L1 Cache, L2 Cache, L3 Cache, Cache Hit & Cache Miss. 1.13 BIOS – Basics & CMOS Set Up. 1.14 Motherboard Selection Criteria.</p>	12	24
2	<p>Storage Devices & Interfacing. Objective</p> <ul style="list-style-type: none"> ➤ To understand the Recording techniques in storage devices. ➤ To understand the working of storage devices. <p>2.1 Recording Techniques: FM, MFM , RLL, perpendicular recording 2.2 Hard Disk construction and working. 2.3 Terms related to Hard Disk. Track, sector, cylinder, cluster, landing zone, MBR, zone recording, write pre-compensation. 2.4 Formatting: Low level, High level & partitioning. 2.5 FAT Basics: Introduction to file system, FAT 16, FAT 32, NTFS, 2.6 Hard Disk Interface: Features of IDE, SCSI, PATA, SATA, Cables & Jumpers. 2.7 CD ROM Drive: Construction, recording.(Block diagram) 2.8 DVD: Construction, Recording. (Block Diagram) 2.9 Blue-ray Disc specification.</p>	08	24

3	<p>Display Devices & Interfacing Objective</p> <ul style="list-style-type: none"> ➤ To understand the construction and working of display devices like CRT, LCD. ➤ To understand the Interfacing of above devices to PC. <p>3.1 CRT: - Block diagram & working of monochrome & colour Monitor 3.2 Characteristics of CRT Monitor :- DOT Pitch, Resolution, Horizontal Scanning frequency, Vertical 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</p>	06	12
4	<p>Input and Output Devices Objective</p> <ul style="list-style-type: none"> ➤ To understand the construction and working of Input /Output Devices. ➤ To understand the Interfacing of the above peripherals. <p>4.1 Keyboard: Types of key switches: Membrane, Mechanical, Rubber dome, Capacitive, optoelectronic and interfacing. 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 diagram and specifications.</p>	06	12
5	<p>Power Supplies Objective</p> <ul style="list-style-type: none"> ➤ To understand the working of SMPS. ➤ To understand the power problems. <p>5.1 Block diagram and working of SMPS. 5.2 Signal description and pin-out diagram of AT and ATX connectors 5.3 Power supply characteristics: Rated wattage, Efficiency, Regulation, 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</p>	04	08
6	<p>Interfaces Objective</p> <ul style="list-style-type: none"> ➤ To understand the ports of PC. ➤ To understand interfacing techniques of devices to ports <p>6.1 SCSI, SCSI cables and connectors, SCSI drive configuration. 6.2 USB features. 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</p>	06	12

7	PC Troubleshooting, Maintenance and Tools.	06	08
	Objective		
	➤ To understand the preventive maintenance of PC		
	➤ To understand the diagnostic tools of PC		
	7.1 POST: POST sequence, Beep codes, visual display codes.		
7.2 Preventive maintenance: Active, Passive, periodic maintenance 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 P67 chipset.
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. No.	Author	Title	Publisher
01	Scott Muller	Upgrading & Repairing PCs	Pearson
02	Mark Minasi	The Complete PC Upgrade & Maintenance guide	Wiley India
03	Barry Press and Maricia Press	PC Upgrade and Repair	Wiley India
04	Begelow	Bigelow's Troubleshooting, Maintaining & Repairing PCs	Tata McGraw Hill
05	Mike Meyers Scott Jernigan	Managing & Troubleshooting PCs	Tata McGraw Hill
06	D.Balasubramanian	Computer Installation & Servicing	Tata McGraw Hill

Course Name : Computer Engineering Group
Course Code : CO/CD/CM/CW
Semester : Fourth
Subject Title : Computer Network
Subject Code : 17429

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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:

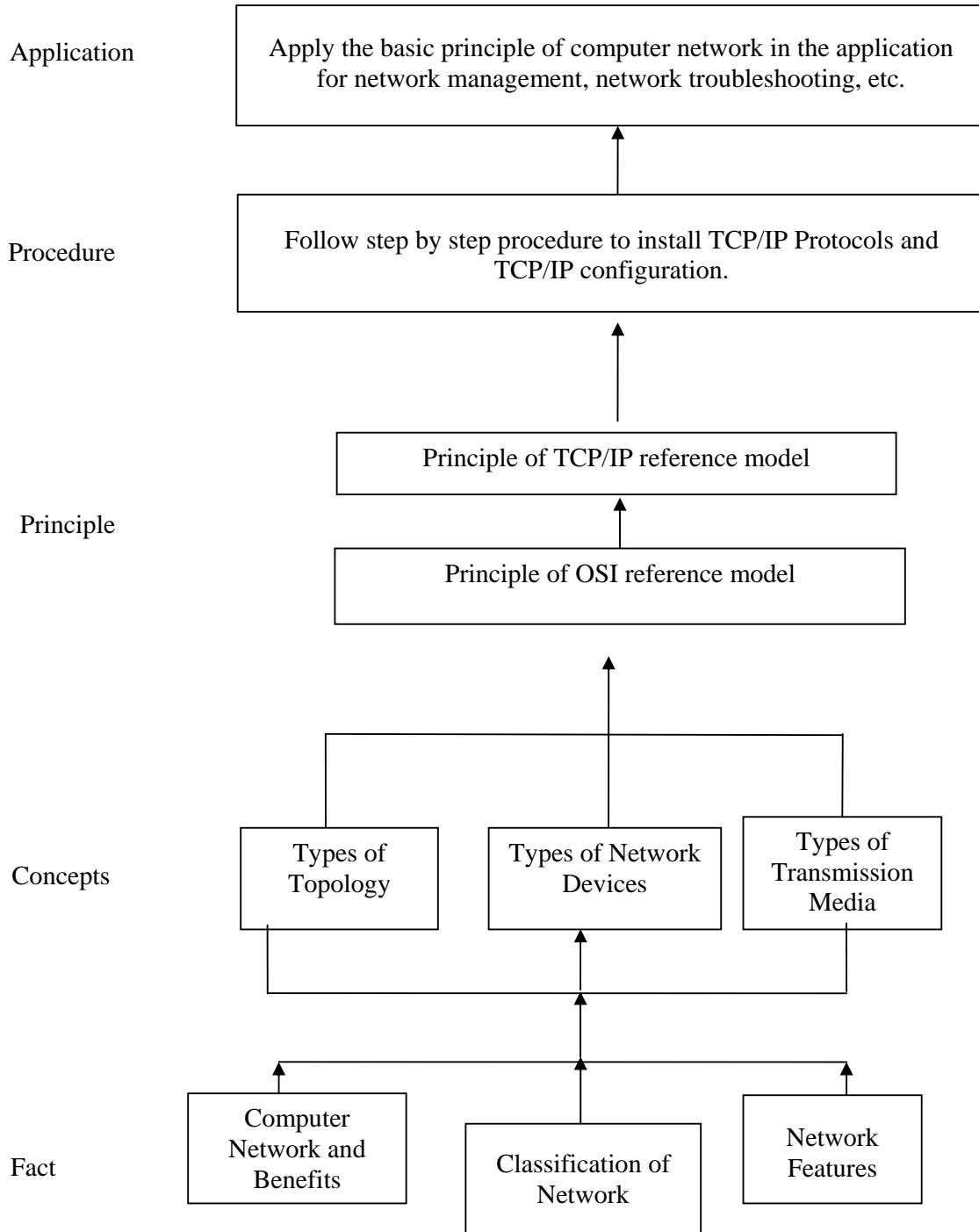
Intellectual Skills:

- 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.

Learning Structure:



Contents: Theory

Topic	Content	Hours	Marks
1	<p>BASIC NETWORK CONCEPTS</p> <p>Objectives:-</p> <ul style="list-style-type: none"> ➤ Basic Concept of Network. ➤ Classification of Network. ➤ Benefits of Network. <p>1.1 Fundamentals of Computer Network- Definition Need of Computer Network, Applications, Component of Computer Network.</p> <p>1.2 Network Benefits- Sharing Information(File Sharing, E-mail) - Sharing Resources (Printer Sharing, Application Services) - Facilitating Centralized Management-Managing Software, Maintaining the Network, Backing up data</p> <p>1.3 Computer Network Classifications- Classification of Network by their Geography.-PAN, CAN, LAN, MAN, WAN</p> <p>1.4 Classification of Network by their Component Role--Peer-to-Peer Network, Server-Based Network, Types of server</p>	08	20
2	<p>NETWORK TOPOLOGIES AND NETWORKING DEVICES</p> <p>Objectives:-</p> <ul style="list-style-type: none"> ➤ Topology Concepts. ➤ Different types of Topology. ➤ Network Control Devices. <p>2.1 Network Topologies - Introduction, Definition, Selection Criteria, Types of Topology- i) Bus ii) Ring iii) Star iv) Mesh v) Tree vi) Hybrid.</p> <p>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.</p> <p>2.3 Network software: NIC Device Driver, client-server software eg. telnet, ftp</p>	10	20
3	<p>TRANSMISSION MEDIA</p> <p>Objectives:-</p> <ul style="list-style-type: none"> ➤ Concept of Guided and Unguided Transmission Media. ➤ Types of Guided Media. ➤ Types of Unguided Media. <p>3.1 Introduction – Need of Transmission Media, Selection Criteria.</p> <p>3.2 Types of Transmission Media- 1) Guided Media: Cable Characteristics, Types of Cable-Twisted Pair Cable, Co-axial Cable, Fiber Optic Cable. 2) Unguided media: Types of Communication Band-Microwave Communication, Radio wave Communication, Satellite Communication, Infrared Communication.</p> <p>3.3 Latest Technologies in Wireless Network-Bluetooth Architecture, Wi-Fi, Wi- Max.</p> <p>3.4 Cellular (Mobile) Telephone – Band in Cellular Telephony, Calls using Mobile Phones, Transmitting receiving / Handoff operations.</p>	10	20

4	OSI Reference Model Objectives:- <ul style="list-style-type: none"> ➤ Concept of Reference Model. ➤ OSI Reference Model Concept. ➤ Layers of OSI Reference Model. 4.1 Introduction– Layered Architecture , Peer-to- Peer Processes- Interfaces between Layer, Protocols, Organization of the Layers, Encapsulation. 4.2 Layers of the OSI Reference Model (Functions of each Layer & Protocols used) – Physical Layer, Data-Link Layer, Network Layer, Transport Layer, Session Layer, Presentation Layer, Application Layer.	08	18
5	TCP / IP SUITE Objectives:- <ul style="list-style-type: none"> ➤ TCP/ IP Model Concept. ➤ Defining/functioning of different Layers of TCP / IP suite. 5.1 Introduction –Addressing mechanism in the Internet 5.2 IP Addressing – IP Address classes, classless IP addressing, Subnetting, supernetting, Masking, 5.3 Layered Structure of the TCP / IP Model – Host-to-Network, Internet, Transport, Application 5.4 TCP / IP Protocol Suite : Host-to-Network-SLIP and PPP, Internet Layer-ARP,RARP and IP: Introduction, IPv4, IPv6 (Header Format), Difference between IPv4 & IPv6. Transport Layer- TCP and UDP (Frame Format,port addresses), Application Layer- FTP, SMTP, DNS. 5.5 Comparison between OSI and TCP / IP Network Model.	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 Lab. (To know your Network Lab.)	04
2	To understand network features	04
3	To connect and understand different Transmission Media and 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 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 capture Ethernet packet. Verify Ethernet frame structure and its 48 bit address.	06
12	To Run Basic TCP/IP Utilities and Network Commands with all options.(Ping, Ping ::1, ipconfig, Tracert, Netstat, Wireshark, ARP, NBTSTAT.EXE, WINIPCFG.EXE),capture TCP, UDP,IP, ARP, ICMP, Telnet, FTP packets using Wireshark packet sniffer software	06
13	To understand Subnet Masking and create two subnets	04
14	To visit server room and prepare report on <ol style="list-style-type: none"> 1. Proxy Server 2. Server Configuration 3. Router Configuration 4. Firewall Configuration 5. Network setup details (Topology, Back up, IP range, network software, UPS) 	04
TOTAL		64

Learning Resources:**Books:**

Sr. No.	Title	Author	Publisher
1	Data Communications and Networks	Achyut S. Godbole	Tata McGraw Hill
2	Data Communications and 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 Press
5	Networking + Certification (Second Edition)	Microsoft Press	PHI(Prentice-Hall of India 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			Examination Scheme					
TH	TU	PR	PAPER 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.

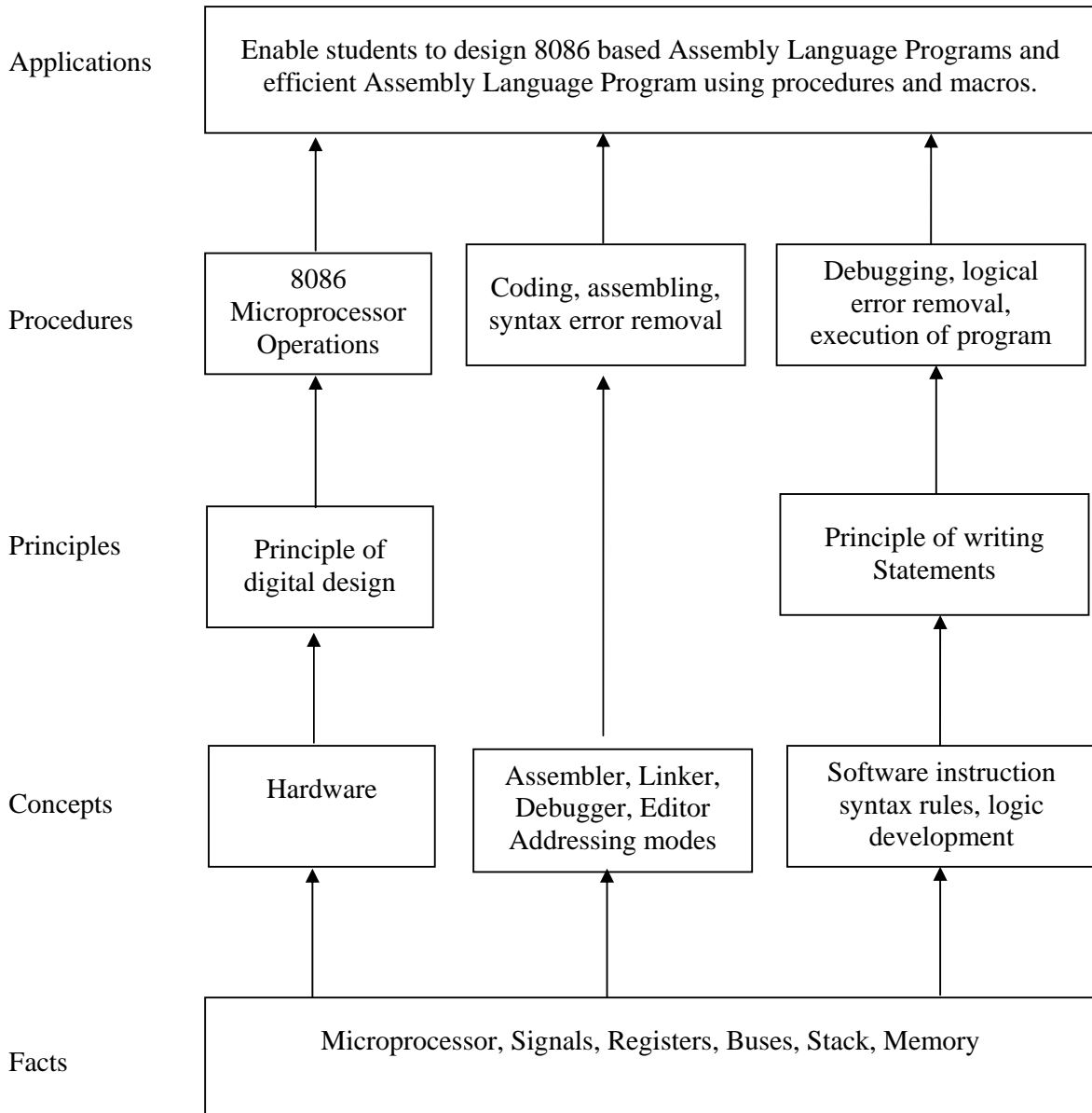
This subject covers Basics of 8085, architecture of 8086 along instruction set. It also covers assembly language programming with effective use of procedure and macros. This will act as base for the advanced assembly language programming for next generation microprocessors.

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
<p>Topic 1: Basics of Microprocessor Specific Objective: Students will be able to</p> <ul style="list-style-type: none"> ➤ Draw the architecture of 8085 ➤ Define the functions of different pins of 8085 ➤ Identify status of different flags <p>1.1 Evolution of Microprocessor and types 1.2 8085 Microprocessor,</p> <ul style="list-style-type: none"> • Salient features • Pin description, • Architecture of 8085 - Functional Block diagram, • Register organization, 	04	08
<p>Topic 2 :16 Bit Microprocessor: 8086 Specific Objective: Students will be able to</p> <ul style="list-style-type: none"> ➤ Define the functions of different pins ➤ Draw functional block diagram of 8086 ➤ Understand the operating modes of 8086 <p>2.1 8086 Microprocessor,</p> <ul style="list-style-type: none"> • Salient features • Pin descriptions • Architecture of 8086 - Functional Block diagram • Register organization, • Concepts of pipelining, • Memory segmentation • Physical memory addresses generation. <p>2.2 Operating Modes of 8086</p> <ul style="list-style-type: none"> • 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 	12	24
<p>Topic 3 : Instruction Set of 8086 Microprocessor Specific Objective: Students will be able to</p> <ul style="list-style-type: none"> ➤ Understand the different types of instructions ➤ Identify the addressing modes of instructions ➤ State the operation of an instructions <p>3.1 Machine Language Instruction format, addressing modes 3.2 Instruction set, Groups of Instructions</p> <ul style="list-style-type: none"> • Arithmetic Instructions • Logical Instructions • Data transfer instructions • Bit manipulation instructions • String Operation Instructions, • Program control transfer or branching Instructions • Process control Instructions 	10	20
Topic 4 :The Art of Assembly Language Programming	04	08

<p>Specific Objective: Students will be able to</p> <ul style="list-style-type: none"> ➤ Know the program development steps ➤ Use the different program development tools ➤ Illustrate the functions of assembler directive and operators <p>4.1 Program development steps</p> <ul style="list-style-type: none"> • Defining problem, • Writing Algorithms • Flowchart • Initialization checklist • Choosing instructions • Converting algorithms to assembly language programs. <p>4.2 Assembly Language Programming Tools</p> <ul style="list-style-type: none"> • Editors • Assembler • Linker • Debugger. <p>4.3 Assembler directives and Operators</p>		
<p>Topic 5: 8086 Assembly Language Programming.</p> <p>Specific Objective: Students will be able to</p> <ul style="list-style-type: none"> ➤ Write a appropriate programs using editor ➤ Run program using assembler and linker ➤ Debug program using debugger <p>5.1 Model of 8086 assembly language programs</p> <p>5.2 Programming using assembler -</p> <ul style="list-style-type: none"> • Arithmetic operations on Hex and BCD numbers - Addition, Subtraction, Multiplication and Division • Sum of Series • Smallest and Largest numbers from array • Sorting numbers in Ascending and Descending order • Finding ODD/EVEN numbers in the array • Finding Positive and Negative Numbers in array • 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 	12	24
<p>Topic 6 : Procedure and Macro in Assembly Language Program</p> <p>Specific Objective: Students will be able to</p> <ul style="list-style-type: none"> ➤ Understand the purpose of procedure and macros ➤ Use procedure and macros <p>6.1 Procedure</p> <ul style="list-style-type: none"> • Defining Procedure - Directives used, FAR and NEAR • CALL and RET instructions. • Reentrant and Recursive procedures. • Assembly Language Programs using Procedure <p>6.2 Defining Macros.</p> <ul style="list-style-type: none"> • Assembly Language Programs using Macros. 	06	16
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. No.	Name of Book	Author	Publication
1.	Microprocessor & interfacing (programming & hardware) Revised Second Edition	Douglas V. Hall	Tata McGraw Hill

2.	Microprocessor Architecture, Programming and Applications with the 8085	Ramesh S. Gaonkar	Penram International Publishing (India)
3.	The 8088 and 8086 Microprocessors	Walter A. Triebel, Avtar Singh	Pearson Publications
4.	The 8086.8088 Family, Design, Programming, and Interfacing	John Uffenback	PHI

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 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:

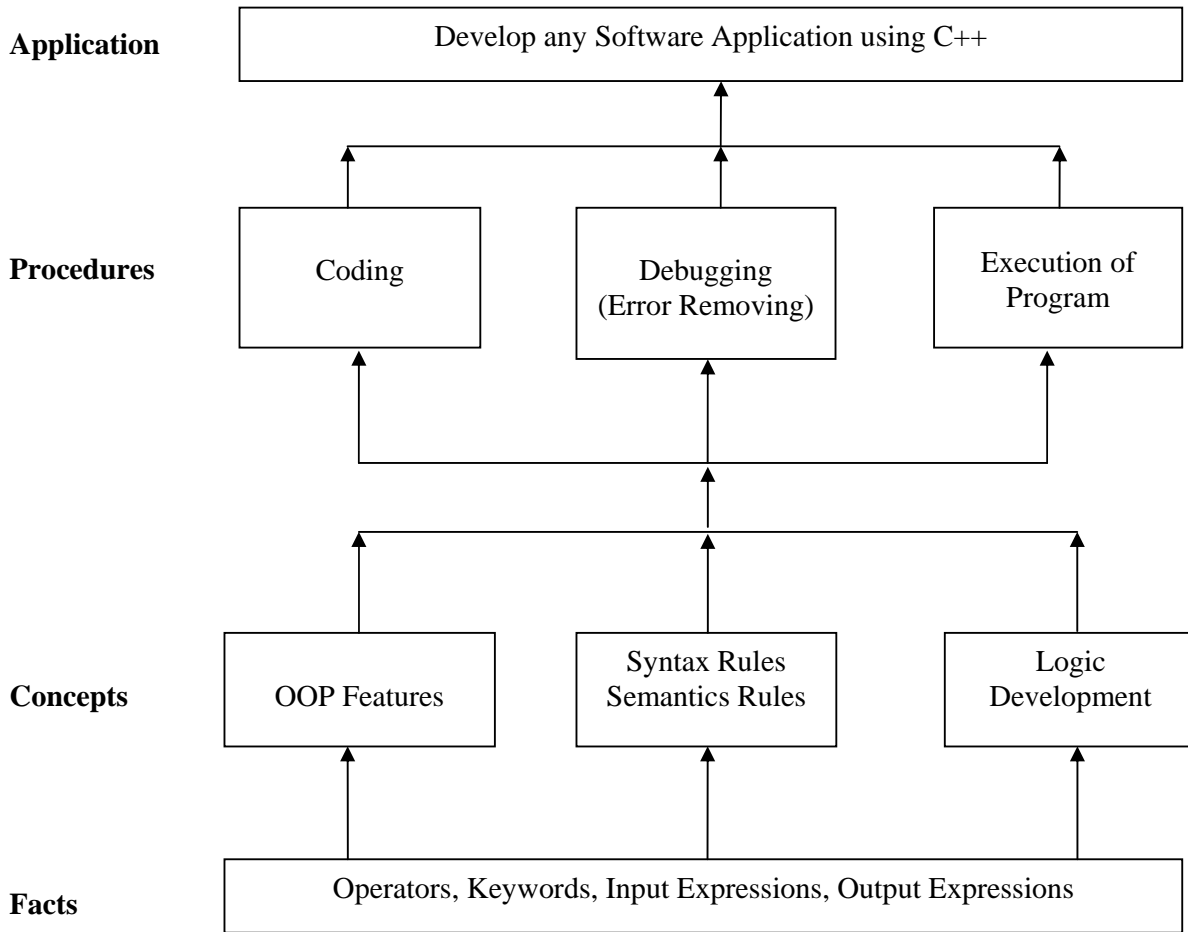
Intellectual Skills:

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.

Learning Structure:



Theory:

Topic No	Contents	Hours	Marks
1	<p>Principles of Object Oriented Programming</p> <p>Objectives:</p> <ul style="list-style-type: none"> ➤ State OOP's basic Concepts. ➤ Difference between OOP & POP. ➤ C++ Programming structure. <p>1.1 Its need & requirement, Procedure Oriented Programming (POP) verses Object Oriented Programming (OOP), Basic concepts of Object Oriented Programming, Object Oriented Languages, Applications of OOP.</p> <p>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.</p>	06	12
2	<p>Classes & Objects:</p> <p>Objectives:</p> <ul style="list-style-type: none"> ➤ Defining classes & objects. ➤ Declaring & using static data member & static member function, friend function. ➤ Programs based on classes & objects. <p>2.1 Structures in C++.</p> <p>2.2 Class & Object: Introduction, specifying a class, access specifiers, defining member functions, creating Objects, memory allocations for objects.</p> <p>2.3 Array of Objects, Object as function arguments.</p> <p>2.4 Static data members, static member function, friend Function</p>	08	20
3	<p>Constructors & Destructors</p> <p>Objectives:</p> <ul style="list-style-type: none"> ➤ State Concepts of constructor & destructor, types of constructor. ➤ Programs based on constructor & destructors <p>3.1 Concepts of Constructors, Types of constructors: Default, Parameterized, Copy.</p> <p>3.2 Overloaded Constructors :Multiple Constructors in a Class, Constructors with default arguments.</p> <p>3.3 Destructors.</p>	08	14
4	<p>Inheritance: Concept of Reusability</p> <p>Objectives:</p> <ul style="list-style-type: none"> ➤ Concept of Inheritance & its types. ➤ Types of Visibility modes. ➤ Programs based on Inheritance. <p>4.1 Introduction, defining a derived class, visibility modes & effects.</p> <p>4.2 Types of Inheritance : Single, multilevel, multiple, hierarchical, hybrid</p> <p>4.3 Virtual base class, abstract class, constructors in derived class.</p>	08	20
5	<p>Pointers in C++</p> <p>Objectives:</p> <ul style="list-style-type: none"> ➤ Declare Pointer & Pointer arithmetic. 	10	18

	<ul style="list-style-type: none"> ➤ Pointer to Arrays, string & Object. ➤ "this" pointer concept. <p>5.1 Concepts of Pointer: Pointer declaration, Pointer operator, address operator, Pointer arithmetic.</p> <p>5.2 Pointer to Array: Searching, Insertion, deletion</p> <p>5.3 Pointer to String: Searching, finding length, comparisons, concatenation, reverse</p> <p>5.4 Pointer to Object: Pointer to Object, this pointer, Pointer to derived class.</p>		
6	<p>Polymorphism Objectives:</p> <ul style="list-style-type: none"> ➤ Polymorphism concept & its types. ➤ Program for overloading operators & functions. <p>6.1 Introduction, Types of polymorphism: Compile time, Run time</p> <p>6.2 Compile time Polymorphism: Function overloading, operator overloading: Overloading unary and binary operators, Rules for operator overloading.</p> <p>6.3 Run time polymorphism: Virtual functions, rules for virtual functions, pure virtual function.</p>	08	16
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. Accept and display this data for one object.
3	Write a program to declare a class 'employee' having data members name and age. 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	A. Write a program to find student details using multiple inheritance. B. Write a program to compute total marks of student using virtual base class.
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. 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 th 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.softteam.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 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:

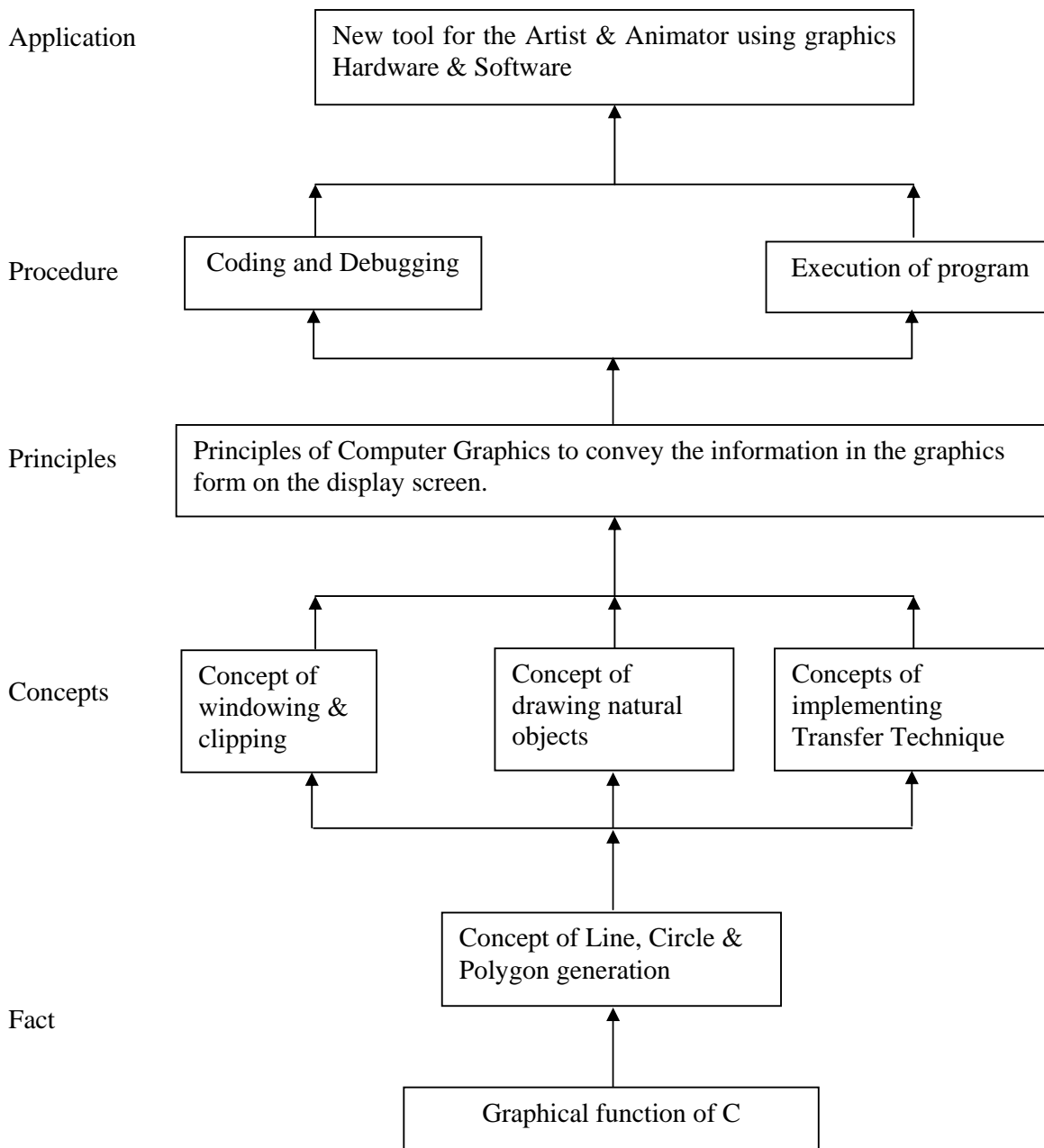
Intellectual Skills:

- 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
 - Analysis
 - Design of logic
 - 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 No.	Contents	Hours
01	Basics of Computer Graphics Objectives : Demonstrate text mode and graphics mode. 1.1 Raster scan display: 1.2 Primitive operations: - moveto, lineto 1.3 Graphics file formats: Basics, advantages, disadvantages – BMP – GIF – JPEG – TIFF – PCX 1.4 Graphics Mode Functions- Text mode, Graphic mode Shapes, colors,	02
02	Line, circle, and polygon. Objectives: Draw Lines using various algorithms. Generate circle with various algorithms. Draw polygons and demonstrate their filling procedures 2.1 Basic concepts in line drawing, Line drawing algorithms: DDA algorithms, Bresenham's algorithm 2.2 Circle generating algorithms: Symmetry of circle, DDA circle drawing algorithm, Bresenham's circle drawing algorithm, 2.3 Polygons – Types of polygons, inside –outside test, Polygon filling: Flood fill, Scanline algorithm.	04
03	Transformations Objectives: Demonstrate 2D transformation techniques Demonstrate 3D transformation techniques. 3.1 2D Transformation: Scaling, Reflection, Shearing, Rotation, Translation, Rotation about an arbitrary point 3.2 3D Transformation: Scaling, Rotation, Translation, Rotation about arbitrary axis	04
04	Windowing & clipping Objectives: Operate on various clipping algorithms. Summarize the different transformations. 4.1 Line clipping: Cohen-Sutherland Line clipping algorithm, Midpoint subdivision algorithm (06 Marks) 4.2 Polygon clipping: Sutherland – Hodgeman Polygon clipping algorithm.	03
05	Curves and Fractals Objectives: Draw various curves Predict various fractal types. 5.1 Curve generation: Arc generation using DDA algorithm, Interpolation, Approximation, B-Spline, Bezier curves: 5.2 Curves Fractals: Hilbert's Curve, Koch curve, Fractal lines, Fractal Surfaces.	03
Total		16

List of Practical:

Sr. No.	Title of Experiment	No. of 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 Graphics- 3rd Edition	Peter Shirley	SPD – AK Peters
03	Computer Graphics (With CD)	Rajesh Maurya	Wiley India
04	Computer Graphics	Apurva Desai	PHI

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 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.

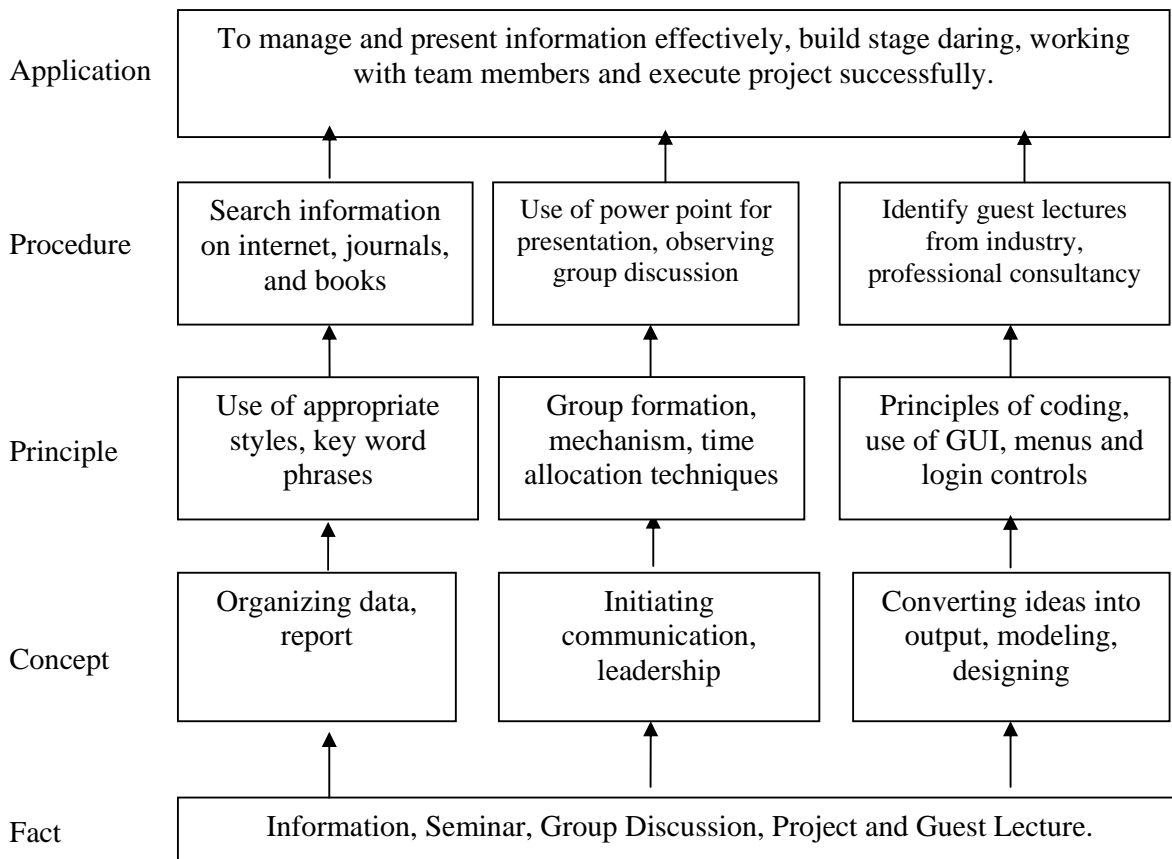
Objectives:

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
1	<p>Lectures by professional, industrial experts to be organized from following or any other suitable technical areas. [Any two]: -</p> <ol style="list-style-type: none"> 1. Advanced technical writing skill 2. SAP modules and career. 3. Career trends in computer / IT field 4. Intelligent computer system. 5. Advanced trends in hardware technology. 6. Advanced programming languages in IT field. 7. Introduction to Apprenticeship Training Scheme 	04
2	<p>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.</p> <ol style="list-style-type: none"> 1. Human machine interface 2. Dynamic languages 3. Robotic surgery 4. Virtual keyboard 5. Wireless USB 6. Concept of cloud computing 7. Bubble sensing 8. Blu – ray disc 9. Or any other suitable topic 	06
3	<p>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.</p> <ol style="list-style-type: none"> 1. Trouble shooting methods for various computer peripherals. 2. Viruses / antivirus and firewalls [checkpoints] 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. 	16
4	<p>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.</p> <ol style="list-style-type: none"> 1. Is china a threat to the Indian software industry? 2. Education is only business in these days. 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? 	12

	7. Or any other topic.	
5	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. <ol style="list-style-type: none"> 1. Web site development system. 2. Database management system project 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. 	10
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 4th semester examination.

Note:- Examination in Professional Practices of 5th 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.


MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI
TEACHING AND EXAMINATION SCHEME
COURSE NAME : DIP IN FASHIONION & CLOTHING TECHNOLOGY
COURSE CODE : DC
DURATION OF COURSE : SIX SEMESTERS
WITH EFFECT FROM
SEMESTER : FOURTH
DURATION : 16 WEEKS
PATTERN : FULL TIME - SEMESTER
SCHEME : G

SR. NO.	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME									SW (17400)
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)		
								Max	Min	Max	Min	Max	Min	Max	Min	
1	Environmental Studies \$	EST	17401	01	--	02	01	50#*	20	--	--	--	--	25@	10	50
2	Colouration of Textiles	COT	17458	03	--	04	03	100	40	50#	20	--	--	25@	10	
3	Knitted Fabric Design & Technology	KFD	17459	03	--	02	03	100	40	--	--	25#	10	25@	10	
4	Clothing Production Machinery & Equipment	CPM	17460	04	--	04	03	100	40	50#	20	--	--	25@	10	
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

 Student Contact Hours Per Week: **32 Hrs.**
THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.

 Total Marks: **800**

 @ 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

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:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

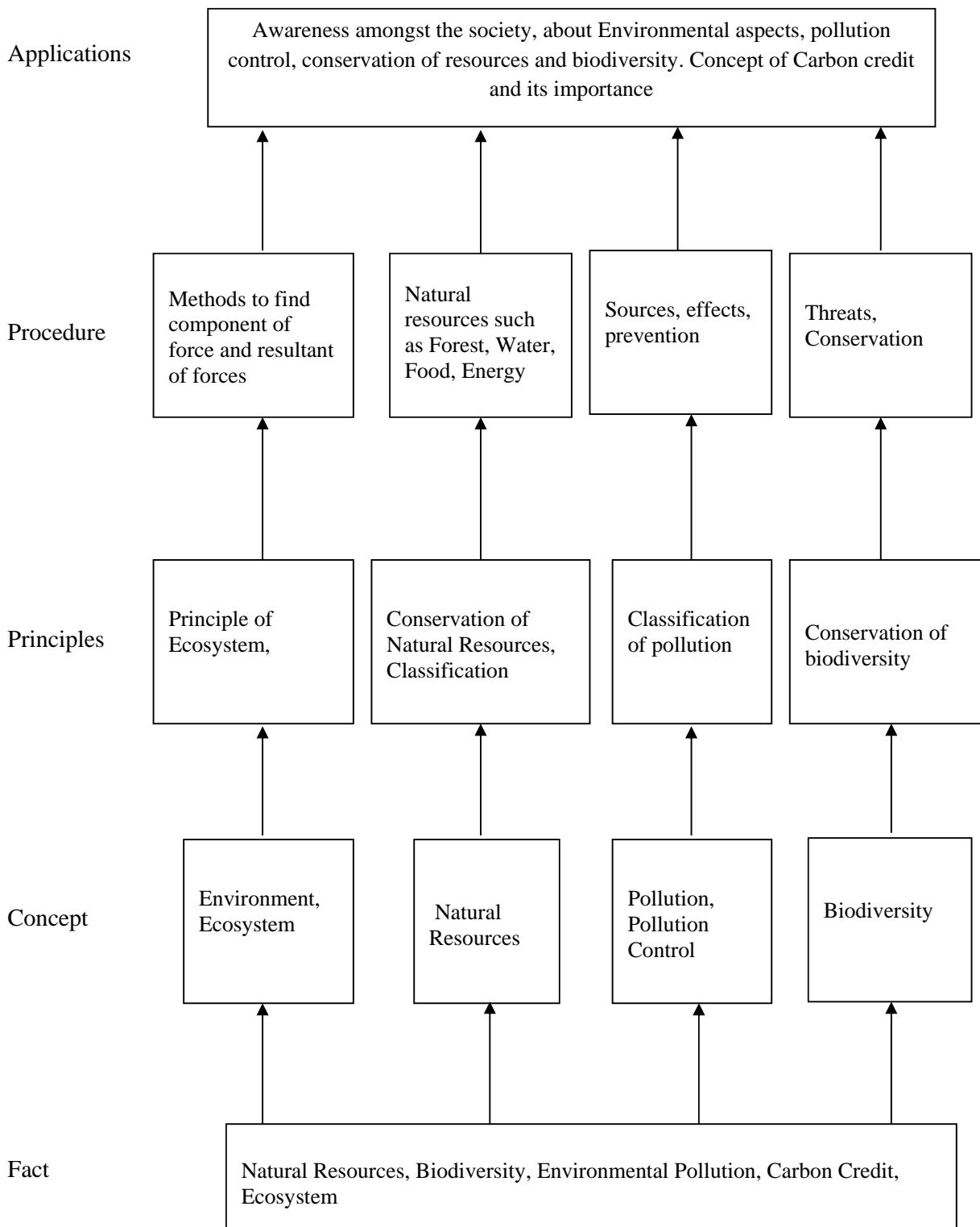
It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

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
<p>Topic 1: Nature of Environmental Studies</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define the terms related to Environmental Studies ➤ State importance of awareness about environment in general public <p>Contents:</p> <ul style="list-style-type: none"> • Definition, Scope and Importance of the environmental studies • Importance of the studies irrespective of course • Need for creating public awareness about environmental issues 	01	04
<p>Topic 2: Natural Resources and Associated Problems</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define natural resources and identify problems associated with them ➤ Identify uses and their overexploitation ➤ Identify alternate resources and their importance for environment <p>Contents:</p> <p>2.1 Renewable and Non renewable resources</p> <ul style="list-style-type: none"> • Definition • Associated problems <p>2.2 Forest Resources</p> <ul style="list-style-type: none"> • General description of forest resources • Functions and benefits of forest resources • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc. <p>2.3 Water Resources</p> <ul style="list-style-type: none"> • Hydrosphere: Different sources of water • Use and overexploitation of surface and ground water • Effect of floods, draught, dams etc. on water resources and community <p>2.4 Mineral Resources:</p> <ul style="list-style-type: none"> • Categories of mineral resources • Basics of mining activities • Mine safety • Effect of mining on environment <p>2.5 Food Resources:</p> <ul style="list-style-type: none"> • Food for all • Effects of modern agriculture • World food problem 	04	10
<p>Topic 3. Ecosystems</p> <ul style="list-style-type: none"> • Concept of Ecosystem • Structure and functions of ecosystem • Energy flow in ecosystem • Major ecosystems in the world 	01	04
<p>Topic 4. Biodiversity and Its Conservation</p> <ul style="list-style-type: none"> • Definition of Biodiversity • Levels of biodiversity • Value of biodiversity 	02	06

<ul style="list-style-type: none"> • Threats to biodiversity • Conservation of biodiversity 		
Topic 5. Environmental Pollution <ul style="list-style-type: none"> • Definition • Air pollution: Definition, Classification, sources, effects, prevention • Water Pollution: Definition, Classification, sources, effects, prevention • Soil Pollution: Definition, sources, effects, prevention • Noise Pollution: Definition, sources, effects, prevention 	03	08
Topic 6. Social Issues and Environment <ul style="list-style-type: none"> • Concept of development, sustainable development • Water conservation, Watershed management, Rain water 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 	03	10
Topic 7. Environmental Protection Brief description of the following acts and their provisions: <ul style="list-style-type: none"> • Environmental Protection Act • Air (Prevention and Control of Pollution) Act • Water (Prevention and Control of Pollution) Act • Wildlife Protection Act • Forest Conservation Act Population Growth: Aspects, importance and effect on environment <ul style="list-style-type: none"> • Human Health and Human Rights 	02	08
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. No.	Author	Title	Publisher
01	Anindita Basak	Environmental Studies	Pearson Education
02	R. Rajgopalan	Environmental Studies from Crises to Cure	Oxford University Press
03	Dr. R. J. Ranjit Daniels, Dr. 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			Examination Scheme					
TH	TU	PR	PAPER 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
1	<p>Preparation of fabrics: Specific objectives: Students will be able to understand</p> <ul style="list-style-type: none"> ➤ Importance and Objects of preparatory processes before textile colouration. ➤ Method of evaluation for preparatory processes. <p>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, - Objects of shearing & cropping and singeing. - 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.</p>	12	24
2	<p>Dyeing process & machinery: Specific objectives: Students will be able to understand</p> <ul style="list-style-type: none"> ➤ Procedure for dyeing different textile substrates. ➤ Working of important dyeing machinery. <p>2.1 Definition of dye, pigment, percentage shade, exhaustion, expression. 2.2 Dye selection for various textile substrates, 2.3 Important steps involved in dyeing of cellulose 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 cotton with natural dyes, 2.7 Working of Jigger, Winch and Padding Mangle.</p>	12	24
3	<p>Printing Methods: Specific objectives: Students will be able to understand</p> <ul style="list-style-type: none"> ➤ Difference between dyeing and printing. ➤ Various styles and methods of printing. ➤ Procedure for printing different textile substrates <p>3.1 Objects, 3.2 Difference between dyeing & printing, 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,</p>	10	20

	- Batik, - Block printing, - Screen printing.		
4	Printing Machines Specific objectives: Students will be able to understand <ul style="list-style-type: none"> ➤ Working of printing machinery. ➤ Modern print effects used in garment industry. 4.1 Working of table printing, <ul style="list-style-type: none"> - Flat bed printing, - Rotary printing, 4.2 Advantages & limitations. 4.3 Specialty prints: <ul style="list-style-type: none"> - Flock printing, - Pearl printing, - Foam prints, - Foil printing. 4.4 Concept of Ink jet printing technique.	10	20
5	Evaluation of fastness properties Specific objectives: Students will be able to understand <ul style="list-style-type: none"> ➤ Method for evaluation of fastness properties. ➤ Norms for fastness properties. 5.1 Importance of evaluating fastness properties of dyed and printed textiles, 5.2 General method for evaluating <ul style="list-style-type: none"> - Wash fastness - Rubbing fastness, - Perspiration fastness, - Light fastness and - Sublimation fastness. 	04	12
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.

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 Publication	Place of Publication & Publisher
V. A. Shenai	Textile Fibres	1996	Sevak Publications , 306, Shree Hanuman Industrial Estate, G. D. Ambedkar Road, Wadala, Mumba-31
V. A. Shenai	Technology of Dyeing	1996	---Do----
V. A. Shenai	Technology of Printing	1996	---Do----
V. A. Shenai	Technology of Finishing	1996	---Do----
J. T. Marsh	Textile Finishing	1986	B.I. Publication, New Delhi.
Nalankilli	Textile Finishing	1998	Digital Impressions, 288-N, Salem, Main 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 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:

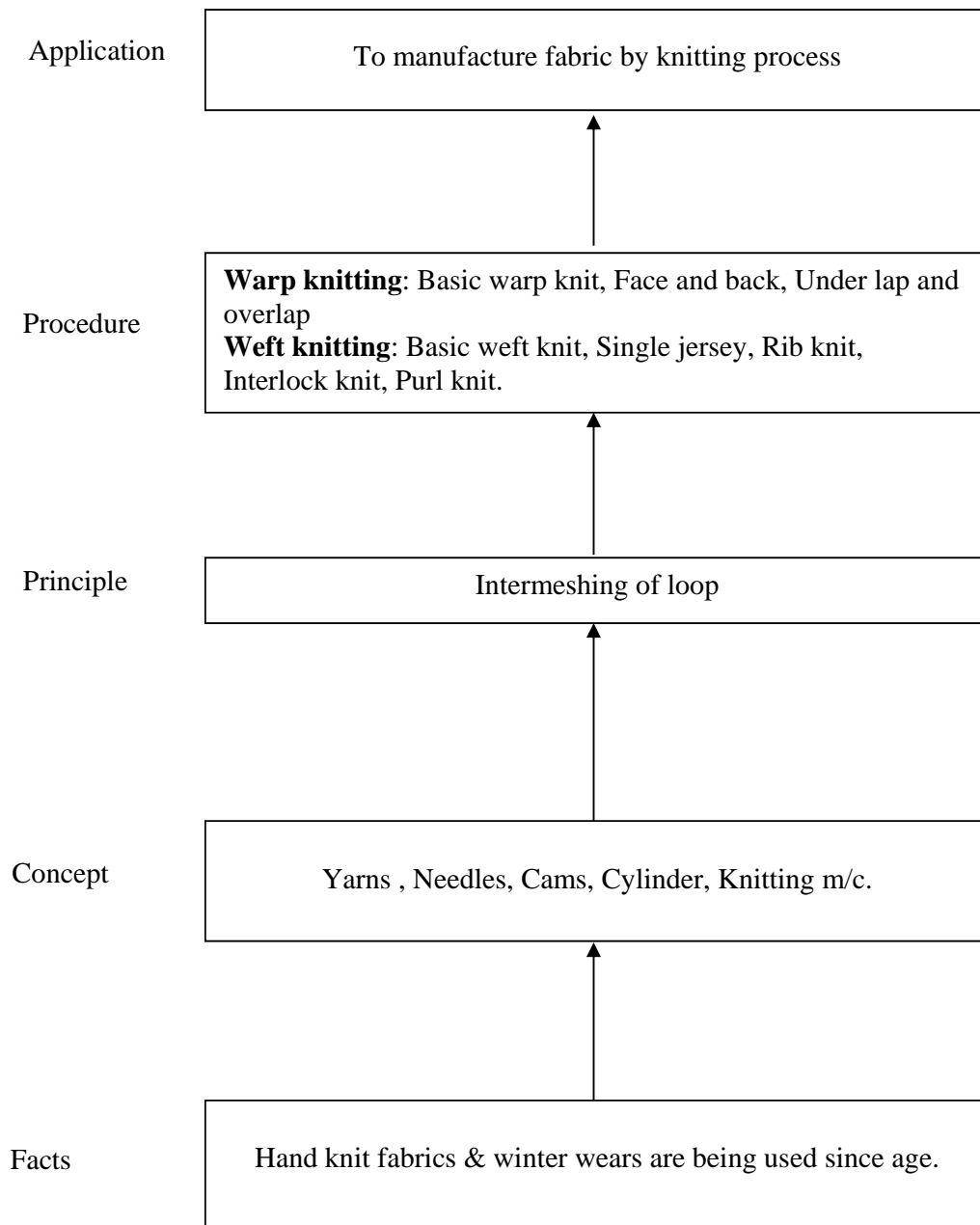
Knitted fabrics due to its stretchable and favorable properties are in good demand and it is expected to rise day by day. Knitted fabrics find uses for under garments, sports wear, summer and winter dresses, etc. to large extent. This sector is now diversifying into synthetics, domestic fabric, carpets, 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 No.	Contents	Hours	Marks
1	<p>Topic 1. Introduction of Knitting Process Specific objective: The student will able to</p> <ul style="list-style-type: none"> • To define knitting process • To interpret the difference between woven & knitted fabric. • Classify different knitting machine. <p>Content:- 1.1) Definition of warp & weft knitting. 1.2) Various ways of fabric manufacture 1.3) Reasons for the growth of knitting 1.4) Properties of knits as compared to woven 1.5) Definition of basic terms in knitting (Course, Wales, Stitch Length, Needle Loop, Face Loop, Back loop, Course Length) 1.6) Classification of weft knitting machines</p>	04	10
2	<p>Topic 2. Weft knitting – Single jersey m/c. Specific objective: The student will able to</p> <ul style="list-style-type: none"> • Identify different parts of knitting and their function • Describe intermeshing process for knitting • Identify type of knitted fabric <p>Content: 2.1) Different zones in circular weft knitting (creel, knitting, take up zone) 2.2) Details of creel zone - Types of creel, their advantage & disadvantage, - Details of positive feeder – function & its types - Concept of multifeeder machines 2.3) Details of knitting zone - Functional elements of knitting machine - Types of needle & its comparison - Knitting action of different needles - Sinker & its function - Cylinder :Gauge, pitch, 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</p>	05	12
3	<p>Weft knitting Machines-double jersey Specific objectives: The student will able to</p> <ul style="list-style-type: none"> • Classify different type of knitted fabrics. • Operate knitting machine. • Interpret different knitted fabric structure for appropriate use • Select the procedure of knitted fabric production. 	05	12

	<p>Content:</p> <p>3.1) Types of double jersey fabric (Rib, Interlock, Purl)</p> <p>3.2) Rib knitting machine-Structure, loop diagram, machine features, Needle arrangement, trick arrangement, knitting cycle.</p> <p>3.3) Interlock machine- Structure, loop diagram, machine features, needle & trick arrangement, Cam arrangement.</p> <p>3.4) Purl knitting machine- loop diagram, needle arrangement, principle of needle transfer.</p> <p>3.5) Characteristic of Rib, interlock & purl fabrics</p>		
4	<p>Weft knitted fabrics-design aspects</p> <p>Specific objective:-The student will able to</p> <ul style="list-style-type: none"> • Represent the knitted fabric on paper. • Draw different knitted fabric structure. • Differentiate the knitted fabrics. • Estimate yarn required for knitted fabric. <p>Content:</p> <p>4.1) Basic structure of weft knitted fabrics.</p> <p>4.2) Different types of stitches like knit, tuck, miss, purl, Loop diagram of tuck & float stitch, Effect of tuck & float stitch on fabric.</p> <p>4.3) Representation of stitches on point paper (verbal, line diagram, symbolic, diagrammatic notation)</p> <p>4.4) Concept of design, needle order and cam order with example</p> <p>4.5) Derivates of single jersey fabric- La-coste, cross tuck, satin, jersey blister, thick fleece</p> <p>4.6) Derivatives of Rib structure-milano rib, double pique, pique poplin, evermonte</p> <p>4.7) Derivatives of Interlock structures- punto- di -roma, ottoman rib, texi pique.</p>	04	12
5	<p>Weft knitting – Jacquard & advanced knitting</p> <p>Specific objective:-The student will able to</p> <ul style="list-style-type: none"> • Identify different knitted structure. • Select appropriate technique for knitted fabric. <p>Content:</p> <p>5.1) Need of jacquard with example</p> <p>5.2) Concept of Relanit technique</p> <p>5.3) Concept of stripper with example</p> <p>5.4) Concept of plush (pile) fabric.</p> <p>5.5) Concept of fleecy fabric</p> <p>5.6) Stitch length and its importance</p>	05	10
6	<p>Weft knitting – Quality and calculations.</p> <p>Specific objective: The student will able to</p> <ul style="list-style-type: none"> • Calculate knitting production in Kg/Day or Meters/day • Estimate yarn requirement for a particular production • Calculate no. of machine required for designed output <p>Content :</p> <p>6.1) Weft knit fabric Defects(Causes & Remedies)</p> <p>6.2) Tests for weft knit Quality</p> <p>6.3) Concept of Spriality & Barre</p>	04	12

	6.4) Production calculations GSM Calculation Tightness factor		
7	<p>Warp Knitting..... 14 marks</p> <p>Specific objective : The student will able to</p> <ul style="list-style-type: none"> • Describe the process of warp knitting • Compare different knitting technologies. • To differentiates flat knitting and circular knitting. • To understand mechanism of flat knitting. <p>Content:-</p> <p>7.1) Warp knitting – General, Loop structure of warp knit fabric, compersion between warp & weft knitting.</p> <p>7.2) Elements of warp knitting - Raschel machine Passage of yarn through knitting machine - Raschel machine Knitting cycle for warp knit fabric.- Raschel machine</p> <p>7.3) Warp knitting - Fabric structure, chain notation, Single bar fabric structures, Applications of warp knit fabrics</p> <p>Sub topic:-7.1 Flat Bed knitting.....8 marks</p> <p>7.1.1) Introduction of flat knitting 7.1.2) Types and classification 7.1.3) Knitting elements 7.1.4) Yarn path in flat knitting machine Knitting cycle</p>	13	22
8	<p>Knit Wear Tech. - Only related to knitted Garment Construction</p> <p>Specific objective: The student will able to</p> <ul style="list-style-type: none"> • To understand pattern making for knitted fabric. • To understand procedure of garmenting. <p>Content:</p> <p>8.1) Pattern making, block pattern 8.2) Fabric spreading 8.3) Cutting of fabric – objects & methods 8.4) Production of sample garment 8.5) Fitting problems & correction for patterns with and without darts 8.6) Study of Planning, drawing and reproduction of the knit garment.</p>	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.

List of Practical's:

- 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:**

Sr. No	Title	Author	Place of Publication & Publisher
1	Knitting Technology	David Spencer	Woodhead Publishing - UK
2	Introduction to clothing manufacture	Terry Cooklin	Om book Services New-Delhi
3	The Tech. of clothing manufacture	Havold carr & Barbara Lathan	Blackwell Science Ltd . UK
4	Warp knit engineering.	A Reinfeld	Blackwell Science Ltd . UK
5	Warp knitting production	S. Raj	Varlag mellinadtext Heidelberg GMBH
6	Warp knitting Technology	D. F. Paling	Columbine Press Ltd, Manchester
7	Knitting Technology	D. B. Ajgaonkar	Universal Publishir Mumbai
8	Knitting Technology	Iyer & Mervinger	Om book Services 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 Technology

Course Code : DC

Semester : Fourth

Subject Title : Clothing Production Machinery & Equipment

Subject Code : 17460

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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
1	<p>Marker Making & Spreading Specific Objectives: to know marker planning & spreading process in mass production</p> <p>Fabric Packages</p> <ul style="list-style-type: none"> • Types of fabric packages, • Effect of type on spreading method. <p>Marker Making</p> <ul style="list-style-type: none"> • Definition, • Types of marker(block, continuous, half garment, whole garment, single size, multiple size(sectional, interlocked, mixed size) • Factors affecting marker efficiency and quality, • Equipments used for making a marker.(Manual, pantograph, Computerized) <p>Spreading</p> <ul style="list-style-type: none"> • Definition • Types of spread(Single, multiple, stepped ply) and forms of spreading,(One way, face to face and two way) • Requirements for fabric spreading- methods (Manual, Spreading carriage, automatic spreading). • Equipments. 	14	08
2	<p>Cutting Machines Specific Objectives: to understand construction & working of various cutting m/cs</p> <ul style="list-style-type: none"> • Introduction, Types & requirements of quality cutting • Portable knives (straight knife, round knife) • Stationary knives (band knife, die cutting machine) • Specialised Knives – Notchers , drills , • Defects in cutting & their remedies. 	16	10
3	<p>Needles Specific Objectives: to know various parts & types of sewing m/c needles</p> <ul style="list-style-type: none"> • Types • Parts • Functions • Needle size. • Defects due to faulty needles 	10	05
4	<p>Sewing Machine Specific Objectives: to understand the basic parts & their function in sewing m/cs</p> <ul style="list-style-type: none"> • Basic parts • Needle • Bobbin shuttle • Loopers • Loop spreader • Threading figure • Throat plate 	16	12

	<ul style="list-style-type: none"> • 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 		
5	<p>Over Lock Machines Specific Objectives: to know the construction & working of over lock m/c</p> <ul style="list-style-type: none"> • Types of Machine • Threading Diagram • Needle Height • Feed dog Height Angles • Position of upper & Lower Knife, Loopers 	10	08
6	<p>Flat Lock Machine Specific Objectives: to know the construction & working of flat lock m/c</p> <ul style="list-style-type: none"> • Types • Threading steps with diagram • Stitch sequence • Needle height • Differential feed ratio • Loopers 	06	05
7	<p>Work Aid & Fusing, Pressing m/cs Specific Objectives: to understand concept of work aids & attachments. Also to the fusing & pressing for the apparels.</p> <ul style="list-style-type: none"> • Attachments of sewing machine • Rollers • Guides • Folders, • Compacting pressure foot • Hemmer • Placket making • Pocket making attachments • Collar turning machine • Garment folding machine <p>Fusing</p> <ul style="list-style-type: none"> • Objectives & Requirements • Types (Fabrics used and Resins) • Requirements(Time, Temperature, Pressure) • Equipment(electric iron, movable flat beds, conveyor, carasol) • Methods of application of resin <p>Pressing Machines</p> <ul style="list-style-type: none"> • Terms(Under, Mouldings, Top Pressing) • Types (Dry, Steam, High Pressure Steam) • Accessories (Ironing Board, Sleeve Board, Bucks) 	16	10

	<ul style="list-style-type: none"> Equipments (Mechanical, Steam, Tunnel) 		
8	Modern Sewing Machines Specific Objectives: to understand modernization in sewing m/cs & to learn some modern m/cs. <ul style="list-style-type: none"> Computer aid Button hole, button sewing, Bar tack, Blind stitch machine. Sewing problems e.g. Seam puckering 	12	06
TOTAL		100	64

Sr. No.	Practical
1	Study the various types & sizes of needles used for different machines & different fabric. 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 machine 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 & cutting for any one type of basic garment. 8 Hrs.
10	Study of vacuum pressing table 4 Hrs.

Learning Resources:**Books:**

Author	Title	Year of Publication	Place of Publication & Publisher
Harold Carr & Barbara Latham	The Technology of clothing Manufacture	1994	Om book Service. England
R.M. & Webster J.	Stitches & Seams	1998	Manchester, England
Shaeffer Claire	Sewing for Apparel 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			Examination Scheme					
TH	TU	PR	PAPER 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:

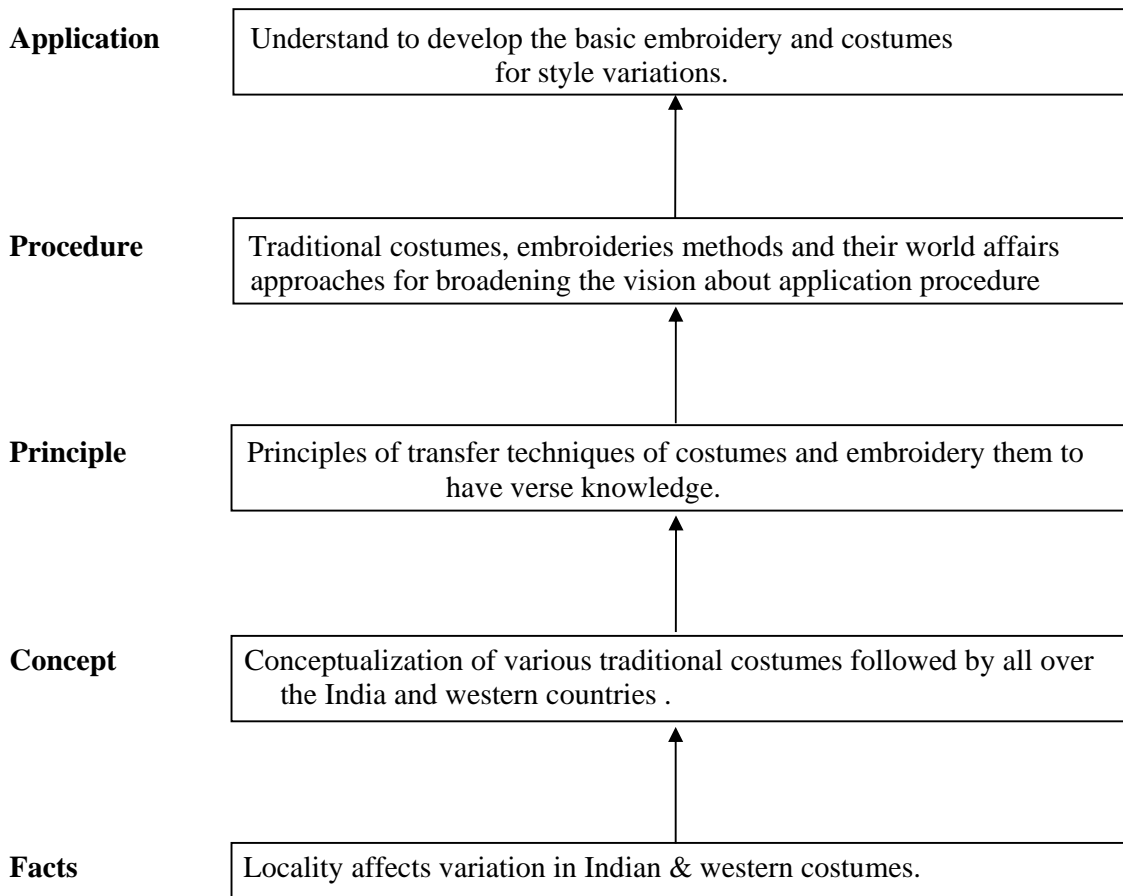
In India as well as in the western countries, there is vast enhancement and diversities in the dimension of costumes which depend on religion, climate, attitude, ethical values, social lifestyle and prosperity.

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
1	<p>History of western costume Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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 <p>Contents:</p> <p>1.1 Europe costume in 20th century</p> <ul style="list-style-type: none"> • Men's wear • Women's wear • Accessories <p>1.2 Baltic costume</p> <ul style="list-style-type: none"> • Men's wear • Women's wear • Accessories <p>1.3 Asia costume</p> <ul style="list-style-type: none"> • Men's wear • Women's wear • Accessories <p>1.4 Byzantine costume</p> <ul style="list-style-type: none"> • Men's wear • Women's wear • Accessories 	10	20
2	<p>History of Western Costume Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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 <p>Contents:</p> <p>2.1 French costume in 20th century</p> <ul style="list-style-type: none"> • Men's wear • Women's wear • Accessories <p>2.2 American costume in 20th century</p> <ul style="list-style-type: none"> • Men's wear • Women's wear • Accessories <p>2.3 Japanese costume</p> <ul style="list-style-type: none"> • Men's wear • Women's wear • Accessories <p>2.4 China costume</p> <ul style="list-style-type: none"> • Men's wear • Women's wear • Accessories 	12	20

3	<p>History of Indian costume</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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 <p>Contents:</p> <p>3.1 Introduction to historic costumes</p> <ul style="list-style-type: none"> • Male costumes during 200 B.C. • Female costumes during 200 B.C. • Male costumes during 100 A.D.to 1100 A.D. • Female costumes during 100 A.D. to 1100 A.D <p>3.2 Indus valley civilization costumes</p> <ul style="list-style-type: none"> • Male attire • Female attire <p>3.3 Mauryan and Sunga period costumes</p> <ul style="list-style-type: none"> • Male attire • Female attire <p>3.4 Gupta period costume</p> <ul style="list-style-type: none"> • Male attire • Female attire <p>3.5 Mughal period costume</p> <ul style="list-style-type: none"> • Male attire • Female attire 	10	20
4	<p>Regional Costumes and Jewelry in India</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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 <p>Contents:</p> <p>4.1 Kashmir costume</p> <ul style="list-style-type: none"> • Male costumes • Female costumes • Jewelry <p>4.2 Punjab costume</p> <ul style="list-style-type: none"> • Male costumes • Female costumes • Jewelry <p>4.3 Rajasthan costume</p> <ul style="list-style-type: none"> • Male costumes • Female costumes • Jewelry <p>4.4 Gujarat costume</p> <ul style="list-style-type: none"> • Male costumes • Female costumes • Jewelry <p>4.5 Bengal costume</p> <ul style="list-style-type: none"> • Male costumes 	12	15

	<ul style="list-style-type: none"> • Female costumes • Jewelry <p>4.6 Karnataka costume</p> <ul style="list-style-type: none"> • Male costumes • Female costumes • Jewelry 		
5	<p>Indian Traditional Regional Embroidery</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Students will be able to Indian traditional embroidery ➤ Students will be able to Indian fabrics, stitches ➤ Students will be able to Indian motifs, colors <p>Contents:</p> <p>5.1 Kashmiri of Kashmir</p> <ul style="list-style-type: none"> • Motifs • Colors • Fabric • Stitches <p>5.2 Kantha of Bengal</p> <ul style="list-style-type: none"> • Motifs • Colors • Fabric • Stitches <p>5.3 Kasuti of Karnataka</p> <ul style="list-style-type: none"> • Motifs • Colors • Fabric • Stitches <p>5.4 Phulakari of Punjab</p> <ul style="list-style-type: none"> • Motifs • Colors • Fabric • Stitches <p>5.5 Kathiawar and Kutch of Gujarat</p> <ul style="list-style-type: none"> • Motifs • Colors • Fabric • Stitches 	10	12
6	<p>Costumes for Special Purpose</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Students will be able to theatre costumes ➤ Students will be able to sports costumes ➤ Students will be able to factors influencing costume changes ➤ Students will be able to world affairs <p>Contents:</p> <p>6.1 Theatre costume</p> <ul style="list-style-type: none"> • Fabric • Accessories <p>6.2 Sports costume</p>	10	13

	<ul style="list-style-type: none"> • Fabric • Accessories 6.3 Factors influencing costume changes <ul style="list-style-type: none"> • Style • Religion • Climate • Attitude • Lifestyle 6.4 World Affairs <ul style="list-style-type: none"> • Economical • Geographical • Socio-political 		
Total		64	100

Practical:**Skills to be developed:****Intellectual Skills:****Motor Skills:****Learning Resources:****1. Books:**

Sr. No.	Author	Title	Publisher
1	G.S. Ghurge	Indian Costumes	Mahajan Publishers, Ahmedabad
2	Savithri Pandit	Indian Embroidery	Mahajan Publishers, Ahmedabad
3	Contini Mila	Fashion from Ancient Egypt to the present day	West Duxbury Manchester
4	Shailaja D. Naik	Traditional Embroideries Of India	A.P.H.Publishing Corporation, New Delhi
5	Barfoot Audrey	Everyday costumes in Britain	Woodhead Publishing Cambridge,U.K.
6	Pistolese, Rojara	History & Fashion	Woodhead Publishing Cambridge,U.K.

2. CDs, PPTs, Models, Charts etc. :**3. IS, BIS and International Codes:****4. Websites:**

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:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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
1	A) Development of textile design with weaving software (12 hrs) 1) Development of stripes shirting design 2) Development of checks shirting design 3) Development of extra warp design 4) Development of extra weft design 5) Development of saree design with body border and pallo 6) Development of home textiles
2	B) Development of textile design with print software (12 hrs.) 1) Development of ladies dress material design 2) Development of all over scarce design 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 Publication	Place of Publication & 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, 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:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

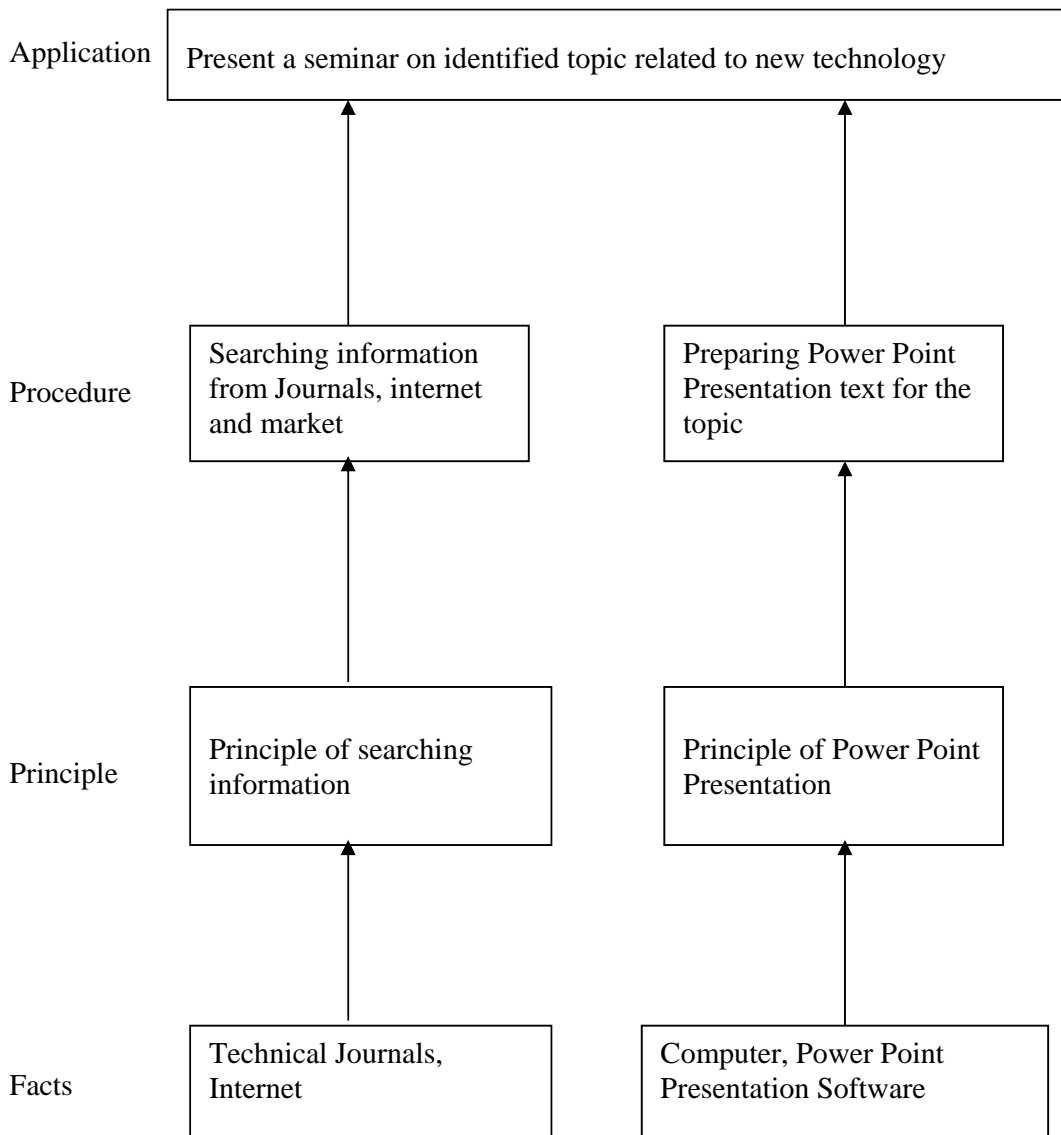
The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation 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
1	<p>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 :</p> <ol style="list-style-type: none"> 1) Garment industry 2) Apparel marketing 3) Apparel merchandising 4) Garment chemical processing industry 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. 	14
2	<p>Lectures by Professional / Industrial Expert lectures to be organized from any two of the following areas:</p> <ol style="list-style-type: none"> 1) Interview Techniques. 2) Modern machines in garmenting 3) Applications of CAD/CAM in fashion & apparel manufacturing. 4) Testing of fabrics for apparel manufacturing. 	06
3	<p>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:</p> <ol style="list-style-type: none"> 1) Different types of needles. 2) CAD/CAM Software. 3) Accessories for Garments. 4) Apparel production process. 5) Fashion Designing. 6) Fashion Merchandising. 	08
4	<p>Seminar: Seminar topic shall 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)</p>	08
5	<p>Mini Project / Activities: (any one)</p> <ol style="list-style-type: none"> 1) Stitching a trouser /woman's wear/kid's wear with own pattern cutting. 2) Development of different design on a CAD Software. 3) Collection of different accessories used for garments 	12
Total		48

Course Name : Diploma in Fashion & Clothing Technology

Course Code : DC

Semester : Fourth

Subject Title : Industrial Training

Subject Code : 17051

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

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.

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.

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.

 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												WITH EFFECT FROM 2012-13						
SEMESTER : FOURTH												DURATION : 16 WEEKS						
FULL TIME / PART TIME : FULL TIME												SCHEME : G						
SR. NO.	SUBJECT TITLE			Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME								SW (17400)	
									PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)		
										Max	Min	Max	Min	Max	Min	Max		Min
1	Environmental Studies \$			EST	17401	01	--	02	01	50#*	20	--	--	--	--	25@	10	50
2	Industrial Measurements β			IME	17434	03	--	02	03	100	40	--	--	--	--	25@	10	
3	Principles of Analog Communication			PAC	17439	03	--	02	03	100	40	25#	10	--	--	25@	10	
4	Microprocessor			MIC	17443	03	--	02	03	100	40	25#	10	--	--	25@	10	
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)			Examination in 5th 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, β - 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 5th Semester. <ul style="list-style-type: none"> ➤ 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/AU**

Semester : Fourth

Subject Title : Environmental Studies

Subject Code : 17401

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

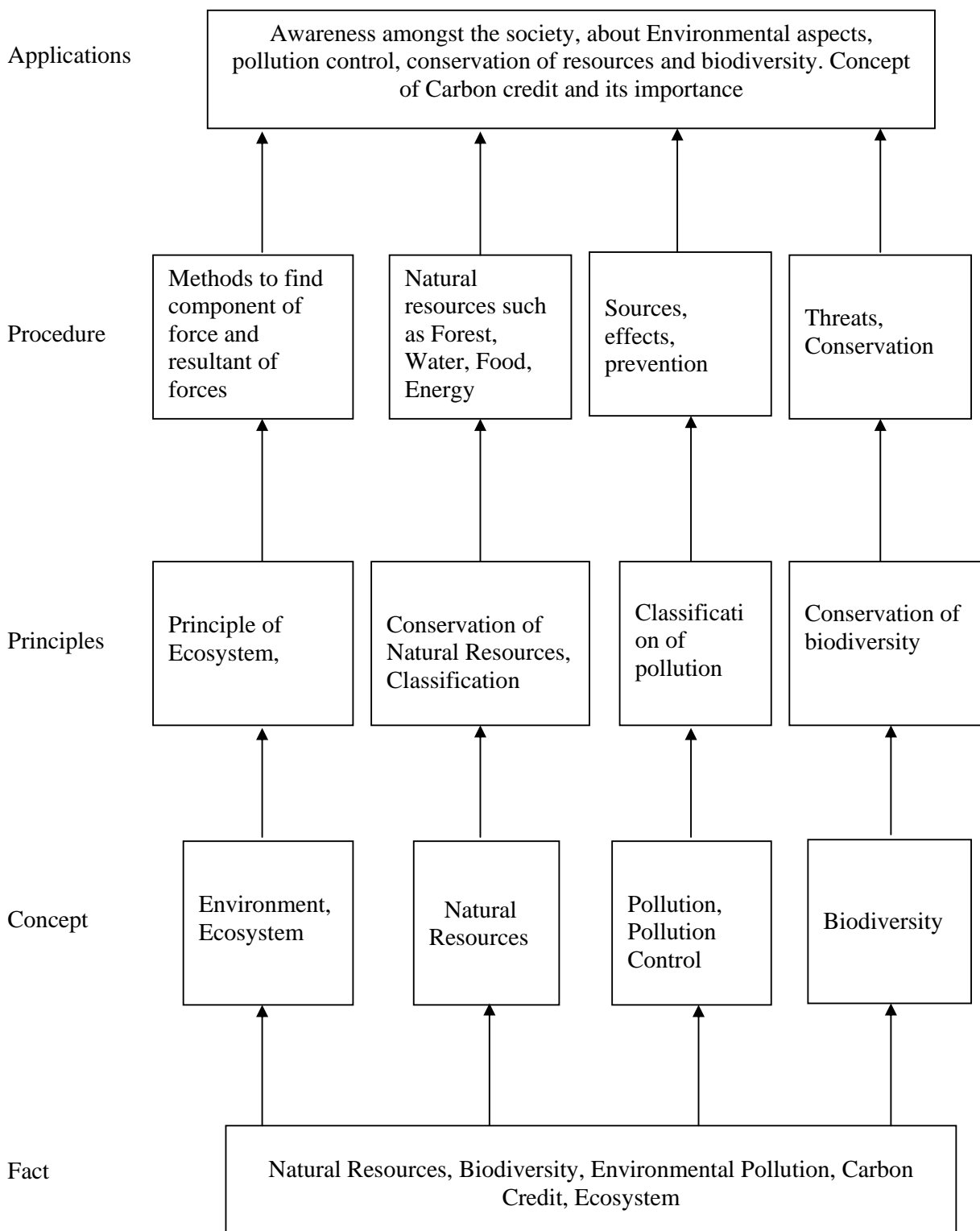
It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

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
<p>Topic 1: Nature of Environmental Studies</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define the terms related to Environmental Studies ➤ State importance of awareness about environment in general public <p>Contents:</p> <ul style="list-style-type: none"> • Definition, Scope and Importance of the environmental studies • Importance of the studies irrespective of course • Need for creating public awareness about environmental issues 	01	04
<p>Topic 2: Natural Resources and Associated Problems</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define natural resources and identify problems associated with them ➤ Identify uses and their overexploitation ➤ Identify alternate resources and their importance for environment <p>Contents:</p> <p>2.1 Renewable and Non renewable resources</p> <ul style="list-style-type: none"> • Definition • Associated problems <p>2.2 Forest Resources</p> <ul style="list-style-type: none"> • General description of forest resources • Functions and benefits of forest resources • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc. <p>2.3 Water Resources</p> <ul style="list-style-type: none"> • Hydrosphere: Different sources of water • Use and overexploitation of surface and ground water • Effect of floods, draught, dams etc. on water resources and community <p>2.4 Mineral Resources:</p> <ul style="list-style-type: none"> • Categories of mineral resources • Basics of mining activities • Mine safety • Effect of mining on environment <p>2.5 Food Resources:</p> <ul style="list-style-type: none"> • Food for all • Effects of modern agriculture • World food problem 	04	10
<p>Topic 3. Ecosystems</p> <ul style="list-style-type: none"> • Concept of Ecosystem • Structure and functions of ecosystem • Energy flow in ecosystem • Major ecosystems in the world 	01	04
<p>Topic 4. Biodiversity and Its Conservation</p> <ul style="list-style-type: none"> • Definition of Biodiversity • Levels of biodiversity 	02	06

<ul style="list-style-type: none"> • Value of biodiversity • Threats to biodiversity • Conservation of biodiversity 		
Topic 5. Environmental Pollution <ul style="list-style-type: none"> • Definition • Air pollution: Definition, Classification, sources, effects, prevention • Water Pollution: Definition, Classification, sources, effects, prevention • Soil Pollution: Definition, sources, effects, prevention • Noise Pollution: Definition, sources, effects, prevention 	03	08
Topic 6. Social Issues and Environment <ul style="list-style-type: none"> • Concept of development, sustainable development • Water conservation, Watershed management, Rain water 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 	03	10
Topic 7. Environmental Protection Brief description of the following acts and their provisions: <ul style="list-style-type: none"> • Environmental Protection Act • Air (Prevention and Control of Pollution) Act • Water (Prevention and Control of Pollution) Act • Wildlife Protection Act • Forest Conservation Act Population Growth: Aspects, importance and effect on environment <ul style="list-style-type: none"> • Human Health and Human Rights 	02	08
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. No.	Author	Title	Publisher
01	Anindita Basak	Environmental Studies	Pearson Education
02	R. Rajgopalan	Environmental Studies from Crises to Cure	Oxford University Press
03	Dr. R. J. Ranjit Daniels, Dr. 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			Examination Scheme					
TH	TU	PR	PAPER 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.

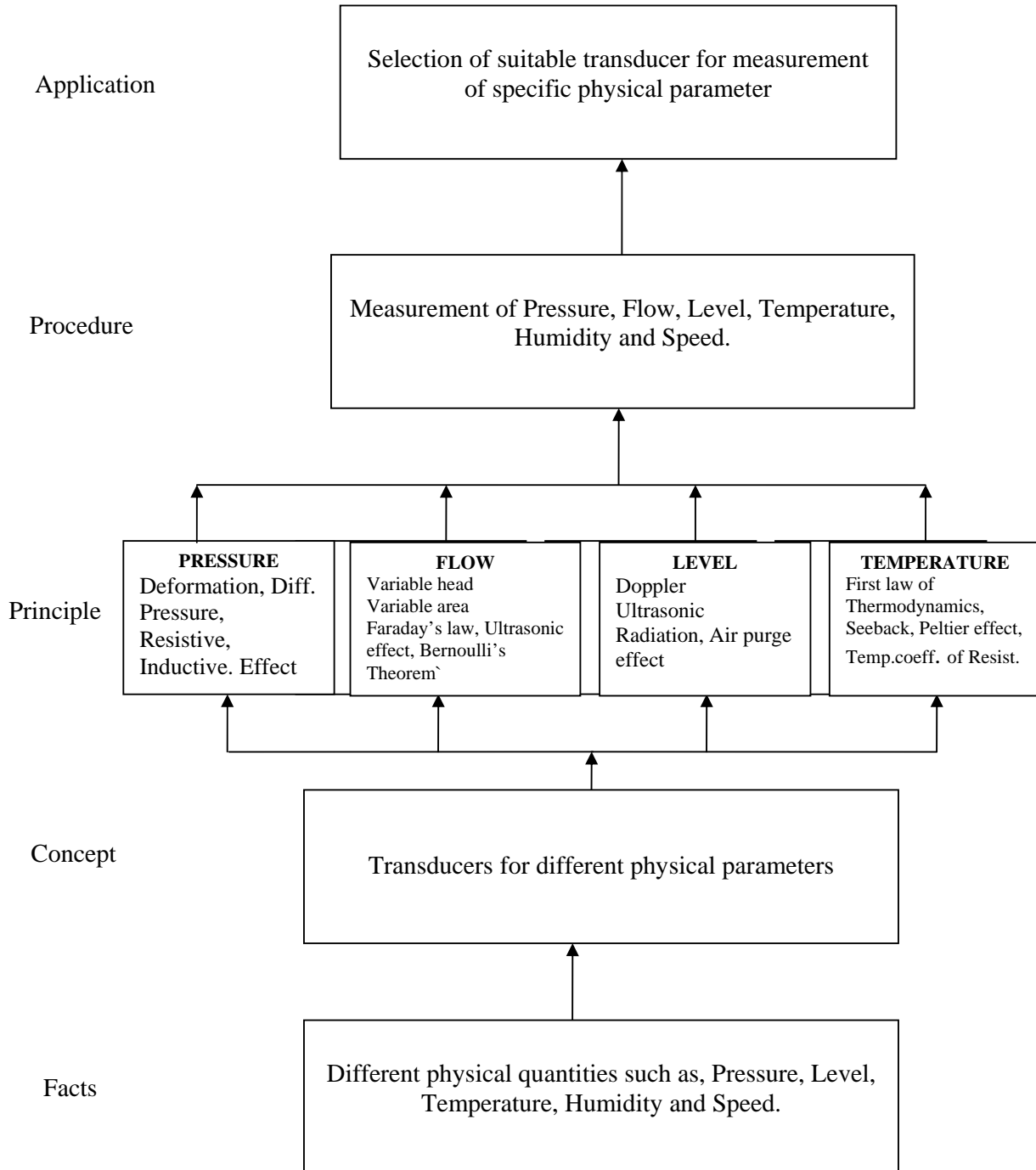
With the background of measuring instruments, this subject deals with measurement of different physical parameters like temperature, pressure etc. covering the entire gamut of industrial measurement. Different types of transducers used for measurement of different physical quantities with their construction, 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 No	Theory	Hrs.	Marks
1	<p>Transducers: Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw and describe the block diagram of Instrumentation system. ➤ Compare different Transducers ➤ Draw and describe different Electronic Transducers. <p>Contents</p> <ul style="list-style-type: none"> • Instrumentation System: 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 Digital, Primary and Secondary. • Electrical Transducers: Resistive transducers- Linear & Angular potentiometers Capacitive transducer Inductive transducer –LVDT, RVDT (As a displacement transducer) Piezoelectric transducer (Principle of operation and applications of above) • Selection criterion of transducers 	08	16
2	<p>Pressure measurement</p> <ul style="list-style-type: none"> ➤ Draw and describe the non-elastic and elastic pressure transducers. ➤ Draw and describe electronic pressure transducers. ➤ Write procedure of calibration of elastic pressure gauges using dead weight tester. <p>Contents</p> <ul style="list-style-type: none"> • Pressure: Definition Types - Absolute, Gauge, Atmospheric, Vacuum(Definition, Units) • Classification of Pressure measuring devices • Non elastic pressure transducer: U tube Inclined Tube Well type manometer • Elastic pressure transducer: Bourdon Tube Bellows Diaphragm Capsule • Electronic pressure transducers: Bourdon tube with LVDT Diaphragm with Strain gauge 	08	20

	<ul style="list-style-type: none"> • Calibration of pressure gauge using dead weight tester <p>Note: Each transducer should be studied on the basis of working principle, construction, advantages, disadvantages and applications.</p>		
3	<p>Flow Measurement</p> <ul style="list-style-type: none"> ➤ List of different types of flow. ➤ List of different types of flow measuring transducers. ➤ Draw and describe construction and working of different Flow measuring transducers. <p>Contents</p> <ul style="list-style-type: none"> • Flow: <ul style="list-style-type: none"> Definition Types of Flow –Laminar, turbulent , Reynolds number • Classification of flow measuring transducers : <ul style="list-style-type: none"> Variable head flow meter- Venturimeter, orifice plate meter Variable area flow meter – Rota meter Electromagnetic Flow meter Ultrasonic flow meter- Time difference and Doppler Type <p>Note: Each transducer should be studied on the basis of working principle, construction, advantages, disadvantages and applications.</p>	06	14
4	<p>Level Measurement</p> <ul style="list-style-type: none"> ➤ State the need of level measurement. ➤ List of different level measuring methods. ➤ Draw the construction and describe working of Level measuring transducers. <p>Contents</p> <ul style="list-style-type: none"> • Level: <ul style="list-style-type: none"> Definition Need of level measurement • Classification of level measurement methods: <ul style="list-style-type: none"> Float type – linear & rotary potentiometer (Contact type) Capacitive type (Contact type) Ultrasonic type (Non-contact type) Radiation type (Non-contact type) RADAR type (Non-contact type) <p>Note: Each transducer should be studied on the basis of working principle, construction, advantages, disadvantages and applications.</p>	08	16
5	<p>Temperature measurement</p> <ul style="list-style-type: none"> ➤ List different temperature measuring scales and its conversions. ➤ List different temperature measuring transducers. ➤ Draw the construction and describe working of different temperature transducers. <p>Contents</p> <ul style="list-style-type: none"> • Temperature : <ul style="list-style-type: none"> Definition and units First law of thermodynamics Different temperature scales & their conversions • Classification of temperature measuring transducers: 	10	20

	<p>Filled system type thermometer. Bimetallic thermometer 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) Pyrometer - Optical, Radiation</p> <p>Note: Each transducer should be studied on the basis of working principle, construction, advantages, disadvantages and applications.</p>		
6	<p>Special Transducers and Measurements</p> <ul style="list-style-type: none"> ➤ List different types of humidity and its units. ➤ Draw the construction and describe working of Humidity transducers. ➤ Draw the construction and describe working of Speed measuring transducers. <p>Contents</p> <ul style="list-style-type: none"> • Humidity: Definition Types - Absolute, relative • Humidity measurement devices: Psychrometer - Dry & wet Bulb thermometer type Hygrometer- hair type , capacitive , resistive type • Speed Definition Classification of speed measurement methods Photoelectric pick-up (Non contact type) Magnetic pick-up (Non contact type) • pH Measurement <p>Note: Each transducer should be studied on the basis of working principle, construction, advantages, disadvantages and applications.</p>	08	14
	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. No.	Author	Title	Publisher
01	A.K.Sawhney	Electrical and Electronic Measurements and Instrumentation	Dhanpat Rai & Sons.
02	S.K.Singh	Industrial Instrumentation & Control	Tata McGraw Hill Publishing Co. Ltd; N. Delhi
03	D. Patranabis	Principles of Industrial Instrumentation	Tata McGraw Hill Publishing Co. Ltd; N. Delhi
04	Rangan Mani Sharma	Instrumentation Systems and Devices	Tata McGraw Hill Publishing Co. Ltd; N. Delhi
05	Bela Liptak Kriszta Venczel	Process Measurement Instrument Engineers Handbook	Chilton Book Co.
06	B.C.Nakra K.K.Chaudhry	Instrumentation Measurement and Analysis	Tata McGraw Hill Publishing 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:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

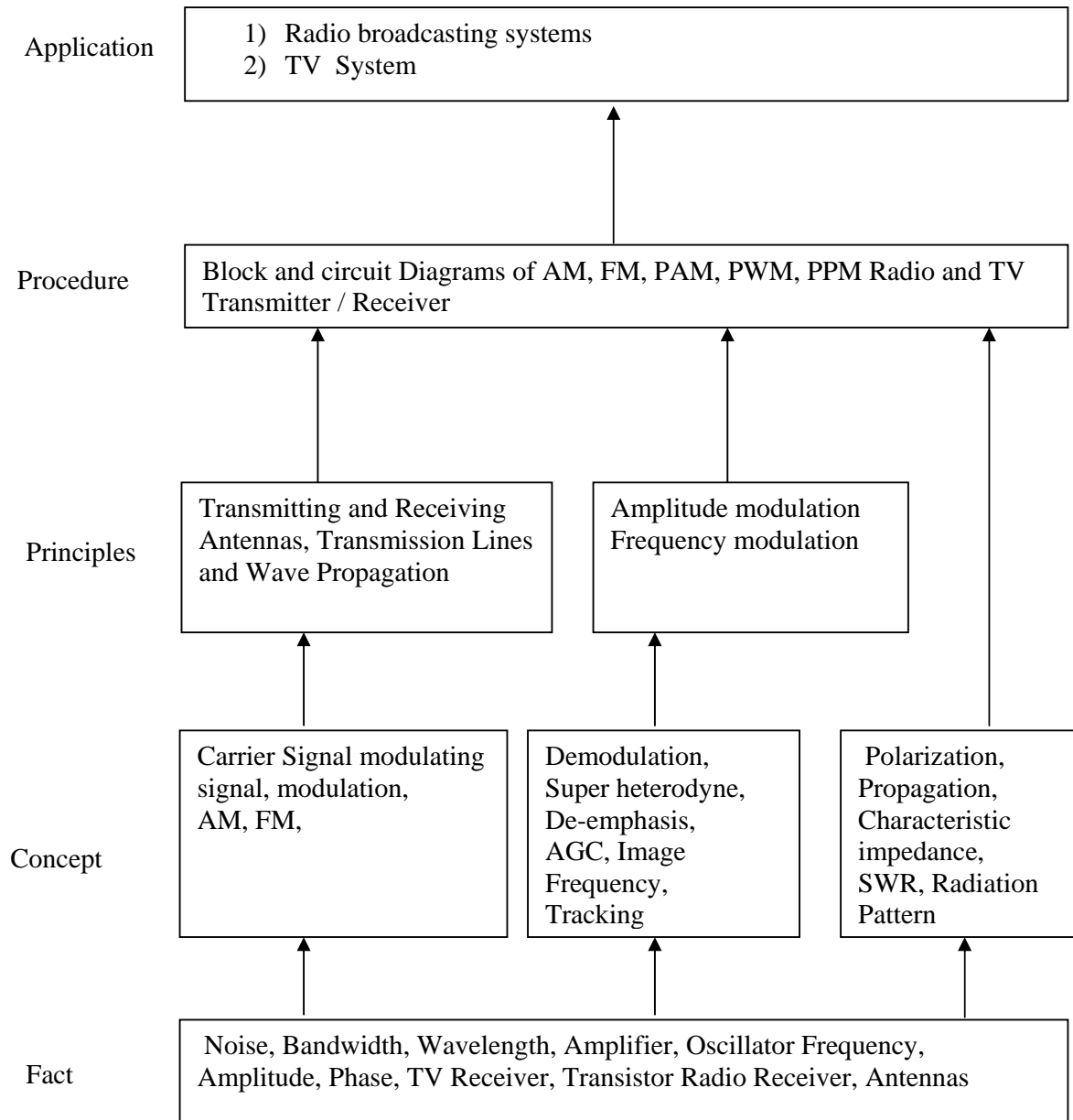
Study of Elements of Electronics, Electronic Devices and Circuits is prerequisite for Analog communication subject.

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 No	Theory	Hrs.	Marks
1	<p>Electronic Communication and Modulation Techniques</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Able to draw block diagram of electronic communication system ➤ Identify types of electronic communication systems. ➤ Describe different types of modulation. <p>Contents:</p> <p>1.1 Basics of electronic communication [04]</p> <ul style="list-style-type: none"> • The importance of electronic communication. • 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 <p>1.2 Basics of Modulation [08]</p> <ul style="list-style-type: none"> • Need for modulation • Types: AM, FM, PM: Definition <p>1.3 Amplitude Modulation</p> <ul style="list-style-type: none"> • 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. <p>1.4 Frequency modulation [08]</p> <ul style="list-style-type: none"> • Deviation ratio, maximum deviation ratio, mathematical representation of FM & its meaning • Representation of FM signal in time domain & frequency domain • Bandwidth requirements • Concept of Pre-emphasis & De-emphasis • Generation of FM -Reactance modulator, varactor diode modulator, Armstrong method • FM signal generation using ICs 566,564 <p>1.5 Pulse Modulation Techniques [04]</p> <ul style="list-style-type: none"> • Need of Pulse Modulation • PAM, PWM, PPM- Block diagram, waveforms, advantages & disadvantages & their comparison. • Generation of PAM transistorized circuit, Generation of PWM, PPM using IC 555. 	12	24
2	<p>Wave Propagation</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Understand theory of electromagnetic radiation. ➤ State different types of wave propagation. ➤ Define the various atmospheric layers ➤ Define the terms maximum usable frequency, critical 	06	10

	<p>frequency, skip distance & fading.</p> <p>Contents:</p> <ul style="list-style-type: none"> • Fundamental of electromagnetic waves, Transverse electromagnetic wave, • Types of Wave Propagation • Ground Wave. • Sky wave, ionosphere & its effect. • Space Wave, Duct propagation • Troposphere scatter propagation • Concept of actual height & virtual weight • Critical frequency, skip distance & fading, maximum usable frequency. 		
3	<p>Antennae</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define antenna. ➤ Understand the term related with the antenna. ➤ Understand the structure, radiation pattern & application of different antennae. <p>Contents:</p> <p>3.1 Antenna fundamentals : [04]</p> <ul style="list-style-type: none"> • Resonant antenna and Non-resonant antennas • Definition : Radiation pattern ,polarization, bandwidth, beam width, antenna resistance, directivity & power gain, antenna gain <p>3.2 Dipole antenna [04]</p> <ul style="list-style-type: none"> • Half wave dipole antenna (Resonant Antenna) & its Radiation pattern. • Folded dipole antenna & its radiation pattern. • Radiation pattern for Dipole Antenna of different length. <p>3.3 Structure, radiation pattern & application of antennas. [04]</p> <ul style="list-style-type: none"> • Loop antenna. • Yagi-Uda antenna • Micro wave antenna – Dish antenna & Horn antenna • Microstrip antennas- Rectangular, circular and square 	06	12
4	<p>Radio Receiver</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State super heterodyne principle ➤ Compare TRF & super heterodyne receivers. <p>Contents:</p> <p>4.1. AM Receiver : [12]</p> <ul style="list-style-type: none"> • Block diagram of Tuned Radio Frequency receiver and its working with waveforms. • Block diagram of super heterodyne receiver • RF Section and Characteristics of AM radio receiver 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. 	08	20

	<p>4.2 FM receiver : [08]</p> <ul style="list-style-type: none"> Block diagram and explanation of FM Super heterodyne radio receiver Circuit diagram and working of slope detector and Balanced slope detector PLL as FM demodulator. 		
5	<p>TV Fundamentals Specific Objectives:</p> <ul style="list-style-type: none"> Define various terms used in TV system Explain Tri-colour theory and Grassman's Law Draw and understand composite video signal wave-forms State CCIR-B standards for TV system <p>5.1 [10]</p> <ul style="list-style-type: none"> Concept: Aspect ratio, image continuity, interlace scanning, scanning periods – horizontal and vertical, vertical resolution, horizontal resolution. Vestigial sideband transmission, bandwidth for Colour signal, brightness, contrast, viewing distance, luminance, Hue, saturation, compatibility. Colour theory, primary colours and secondary colours Grassman's law, additive Colour mixing subtractive Colour mixing. <p>5.2 [08]</p> <ul style="list-style-type: none"> Composite Video Signal - Pedestal height, Blanking pulse, Colour burst, Horizontal sync pulse details, Vertical sync pulse details, Equalizing pulses, CCIR B standards for Colour signal transmission & reception. 	08	18
6	<p>TV Transmitter and Receiver Specific Objectives:</p> <ul style="list-style-type: none"> Describe TV camera tube and colour picture tube Explain the function of Color TV transmitter and receiver. <p>Contents:</p> <p>6.1 [08]</p> <ul style="list-style-type: none"> Introduction to TV camera tube, principle and working of Vidicon Plumbicon Solid State camera based on CCD. Color Picture tube, principle and working of PIL <p>6.2 [08]</p> <ul style="list-style-type: none"> Block diagram of Colour TV transmitter. Block Diagram and operation of color TV receiver (PAL D, NTSC, and SECAM type) Block diagram of MATV, CATV, HDTV and CCTV and their applications 	08	16
Total		48	100

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. No.	Author	Title	Publisher
01	George Kennedy, Bernard Davis, SRM Prasanna	Electronic Communication Systems	TATA Mc-Graw Hill 5 th Edition
02	Louis E Frenzel	Communication Electronics	TATA Mc-Graw Hill 5 th Edition
03	V Chandra Sekar	Analog Communication	Oxford University Press
04	Television & Radio Engineering	A.M Dhake	Tata McGraw-Hill
05	Modern TV Practice (4 th 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 Electronics
Course Code : DE
Semester : Fourth
Subject Title : Microprocessor
Subject Code : 17443

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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:

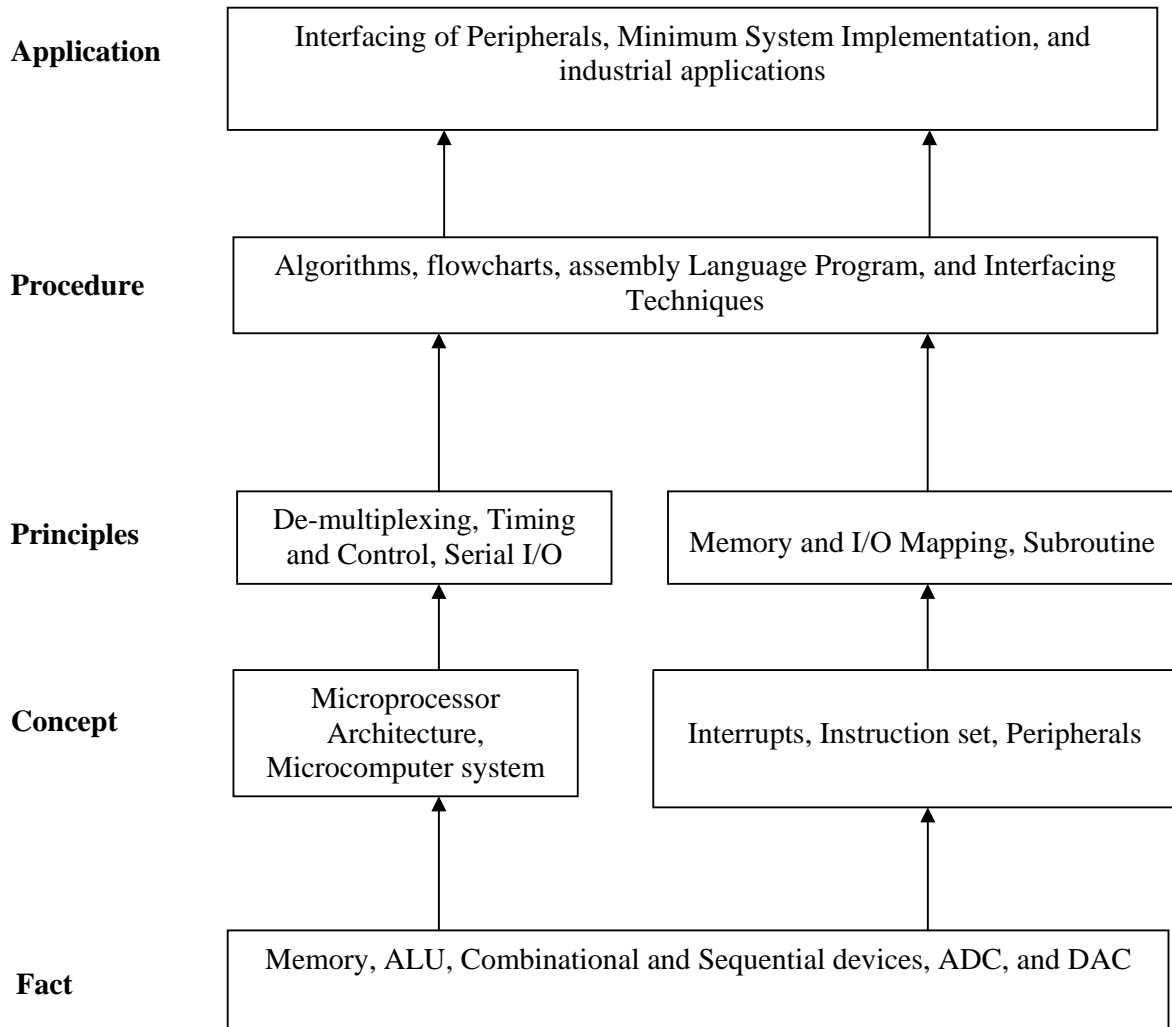
Microprocessor plays important role in computer based application and is heart of the system. The Microprocessors along with memory and I/O's constitute a complete system for industrial application. Since most of the peripherals are 8 bit in nature and hence the 8 bit processor 8085 is introduced in 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 No	Contents	Hours	Marks
1	<p>8 Bit Microprocessor - 8085</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Comprehend Components and terminology of computer system and microprocessor based system ➤ Describe Architecture of 8 bit processor <p>Contents:</p> <ul style="list-style-type: none"> • Introduction to 8 bit microprocessor and Microcomputer, system buses • Salient features of 8085 • 8085 microprocessor architecture-Register section, ALU, Interrupt control, Serial I/O control, Timing and control and pin description • De-multiplexing of low order Address/Data bus, and generation of control signals 	08	16
2	<p>8085 Instructions and Programming</p> <ul style="list-style-type: none"> ➤ Develop assembly language program. <p>Contents:</p> <ul style="list-style-type: none"> • Instruction format, Addressing modes, 8085 Instruction Set • Machine Cycle and Timing diagram • Assembly language programming 	12	24
3	<p>Subroutine and Interrupts</p> <ul style="list-style-type: none"> ➤ Comprehend stack, subroutine and interrupts <p>Contents :</p> <ul style="list-style-type: none"> • Stack and subroutine, time delay subroutine • 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 	08	12
4	<p>Memory and I/O Interfacing</p> <ul style="list-style-type: none"> ➤ Interface various memory chips with 8085 <p>Contents:</p> <ul style="list-style-type: none"> • Memory interfacing: RAM/ ROM Memory map. • I/O Interfacing Techniques- I/O mapped I/O, memory mapped I/O • Serial I/O lines – SOD and SID • Comparison of I/O mapped I/O and memory mapped I/O. 	08	16
5	<p>Programmable Peripheral Devices</p> <ul style="list-style-type: none"> ➤ Draw and describe peripheral programmable devices and interfaces <p>Contents:</p> <ul style="list-style-type: none"> • Programmable Peripheral Interface IC 8255-Block diagram, Pin Description, operating modes, simple I/O programs 	08	20

	<ul style="list-style-type: none"> • Programmable I/O ports and Timer IC 8155-Block diagram, Pin Description, operating modes of timer and I/O ports, simple programs on timer operations only • Features of 8355, Block Diagram and Pin Description • Comparison of features of 8155 and 8255 and 8355 ICs 		
6	<p>Data transfer Techniques and Interfacing the Peripherals</p> <ul style="list-style-type: none"> ➤ Classify data transfer techniques. ➤ Implement minimum system <p>Contents:</p> <ul style="list-style-type: none"> • Types of data transfer techniques • DMA controlled data transfer. • Interfacing of Peripherals 8255, 8155, 8355 • Interring of LED, Seven Segment Display, DIP Switches, ADC, DAC, Stepper Motor using PPI. • Minimum system based on 8085, 8155, and 8355 	04	12
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 location and 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. No.	Author	Title	Publisher
1	Ramesh S. Gaonkar	Microprocessor Architecture, Programming and Applications with 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-ppt-powerpoint/

3. Websites:

- 1) [www.8085 projects.info](http://www.8085projects.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			Examination Scheme					
TH	TU	PR	PAPER 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:

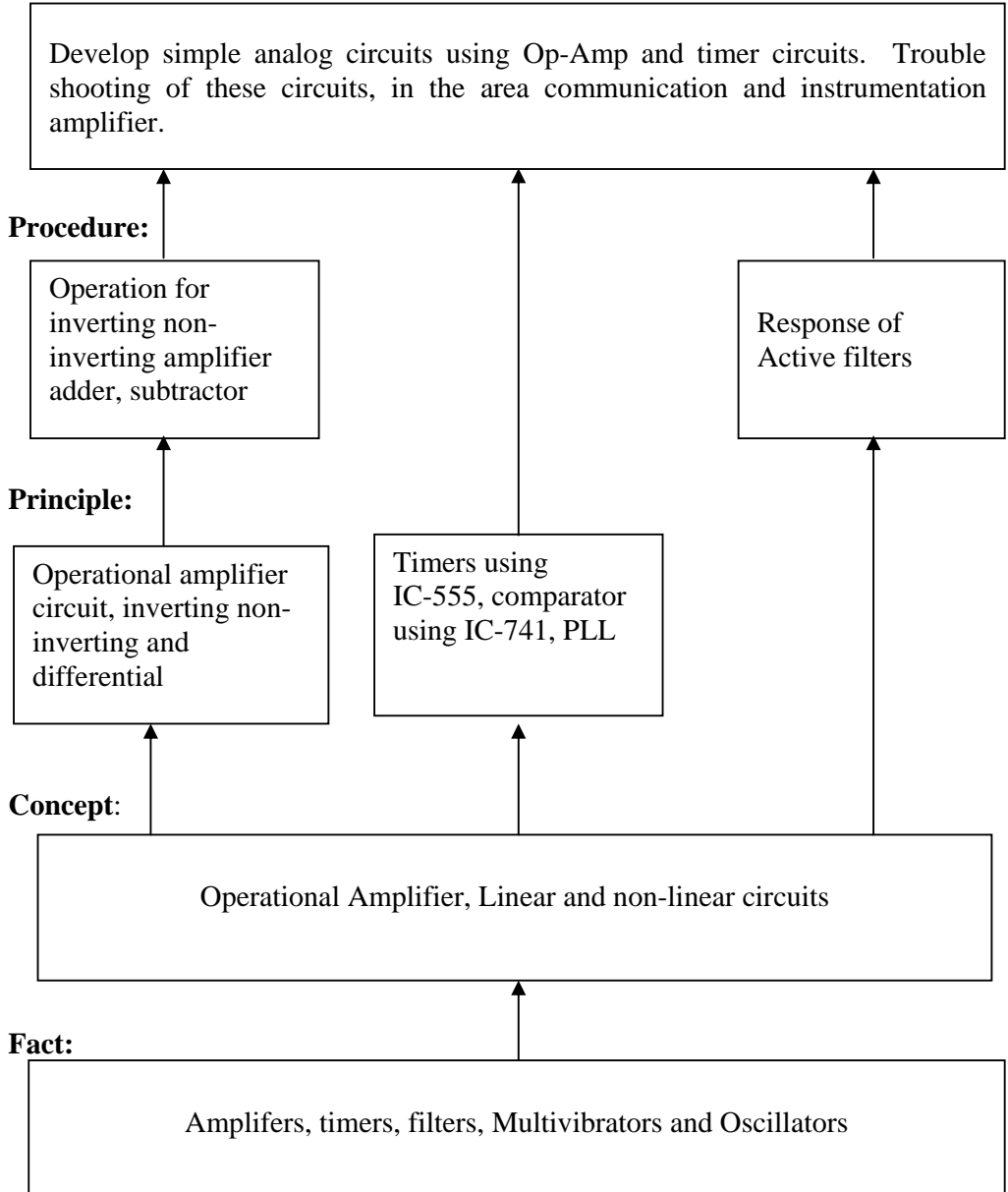
Students will be able to:

- 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
1	<p>Operational Amplifier (Op-Amp): Specific Objectives :</p> <ul style="list-style-type: none"> ➤ Draw labeled block diagram of Op-Amp ➤ Specify and define Different parameters of Op-Amp ➤ Interpret ideal transfer characteristics of Op-Amp <p>Contents:</p> <ul style="list-style-type: none"> • 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 push-pull amplifier. Equivalent Circuit, Circuit Symbols And 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. 	12	10
2	<p>Op-Amp Configuration: Specific Objectives: Students will be able to</p> <ul style="list-style-type: none"> ➤ Differentiate open and close loop configuration. ➤ Identify inverting and non-inverting configuration. ➤ Construct integrator and differentiator. <p>2.1 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, differential amplifier, unity gain amplifier (voltage follower), inverter(sign changer)</p> <p>2.2 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.</p>	12	18
3	<p>Applications of Op-Amp: Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Compute component values for instrumentation amplifier. ➤ Explain IC LM-324 ➤ Explain different applications of Op-Amp. <p>3.1 Need for signal conditioning and signal processing. [08]</p>	12	22

	<p>Circuit diagram, operation, derivation of output voltage Equation. advantages and applications of Instrumentation amplifier. Pin diagram pin functions and specifications of IC LM 324 Voltage to current converter (with floating load, with grounded load) Current to voltage converter.</p> <p>3.2 Sample and hold circuit. [16]</p> <p>Logarithmic and antilogarithmic amplifiers (using Diodes) Analog divider and analog multiplier Comparator: Circuit diagrams and operation of</p> <ul style="list-style-type: none"> • Zero crossing detector, • Schmitt trigger, • Window detector, • Phase detector, • Active peak detector, • Peak to peak detector 		
4	<p>Filters: Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Distinguish the types of filter ➤ Explain active and passive filter ➤ Explain different parameters of filter. <p>Contents:</p> <ul style="list-style-type: none"> • Introduction to filters ,Classification of filters, • Concept of passive and active filters • Merits and demerits of active filters over passive filters • 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. 	10	16
5	<p>Timers Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw block diagram of IC 555 ➤ Understand industrial applications of IC 555 ,565 <p>5.1 Introduction to timer IC 555 [10]</p> <ul style="list-style-type: none"> • Block diagram of IC 555 and its pin diagram and function of each pin. • Concepts of different timer circuits used in industries: water level controller, Touch plate switch, frequency divider. • Numericals based on timers. <p>5.2 Phase Lock Loop</p> <ul style="list-style-type: none"> • Principle of operation, block diagram of PLL. [08] • Applications of PLL as multiplier, FM demodulator. • Pin diagram and pin functions of IC 565(PLL) 	10	18

6	Oscillators: Specific Objectives: <ul style="list-style-type: none"> ➤ Explain concept of oscillators ➤ Explain different types of oscillators ➤ Develop multivibrators and oscillators for given values. Contents: <ul style="list-style-type: none"> • Concept of oscillators, • 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. 	08	16
	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: <ul style="list-style-type: none"> • Input Offset Voltage (V_{io}) • Output Offset Voltage (V_{oo}) • 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.
04	Verify the working of active integrator and differentiator circuits using op-amp IC 741 for following inputs: <ul style="list-style-type: none"> • Sine waveform • Square waveform • Rectangular waveform
05	Assemble V to I converter and I to V converter using IC 741 and measure the respective output.
06	Verify the working of following comparator circuits using op-amp IC 741 and draw the input-output waveforms <ul style="list-style-type: none"> • Zero crossing detector • Active peak detector
07	Assemble first order low pass Butterworth filter using op-amp and plot the frequency 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.
09	Assemble Monostable multivibrator circuit using IC 555. Plot the output waveform 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. 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 Analog Integrated Circuit	Tata-McGraw Hill
04	Willam D. Stanley	Operation Amplifier with Linear Integrated Circuit	Person

Course Name : Electronics Engineering and Video Engineering Group

Course Code : ET/EJ/IE/IS/EN/EX/IC/MU/EV/DE/TU/ED/EI

Semester : Fourth

Subject Title : Visual Basic

Subject Code : 17043

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

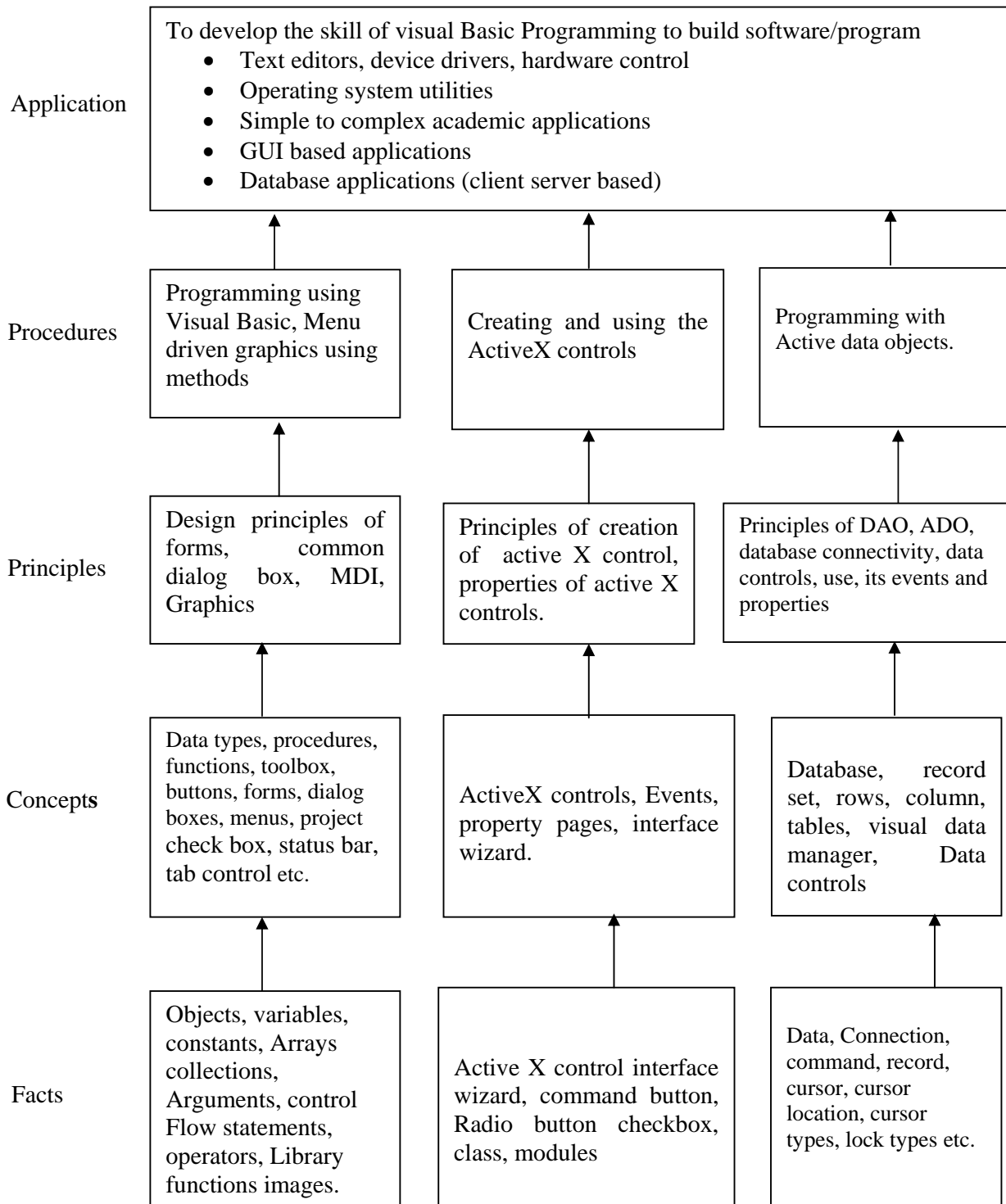
This course will lay the basic foundation of visual programming which will enable students to develop simple to complex programmable systems interfaces in the real world of work

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
<p>Topic 1] Introduction to Visual Environment Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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 ➤ Create objects, place them on forms <p>Contents:</p> <p>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.</p>	02
<p>Topic 2] Introduction to Visual Basic Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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 ➤ Use Inputbox and MsgBox functions <p>Contents:</p> <p>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 ().</p>	02
<p>Topic 3] Controls and Events Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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 <p>Contents:</p> <p>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.</p>	02
<p>Topic 4] Advance Controls & Events Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Add extrinsic controls in an application ➤ Use common dialog box control and its properties such open, save as, font, color, print and help ➤ 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 	03

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: <ul style="list-style-type: none"> ➤ 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 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.	03
Topic 6] Database and Report Specific Objectives: <ul style="list-style-type: none"> ➤ 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: 6.1 Concept of database, Record, Record set, Data control & its important properties 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	04
Total	16

TERM WORK:-

Sr No.	Name of the Experiments
1	a) Study and Understand Visual Basic Environment 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 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	a) Design Color box using RGB function to observe color change using H- scroll bar. b) Design project to demonstrate file, folder & drive controls to explore drive & folders.
7	Design GUI for Testing AC series Circuit
	Practice Experiment / Exercise
8	a) Design project to implement Common Dialog box controls such as open, save, Color, Font, Printer & Help b) Design a menu structure like notepad using menu editor
9	Design MDI application with 4 child forms & arrange forms with cascade, Tile Horizontal, 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. No.	Author	Title	Publisher
01	MSDN library on Line Reference	--	From Microsoft MSDN Library
02	Evangelos Petroustus	Mastering VB6	WILEY India
03	Steven Holzner	Visual basic 6	Dream Tech. Press
04	Content Development Group	Visual Basic 6.0 Programming	Tata McGraw Hill
05	Mohammed Azam	Programming with visual basic 6.0	Vikas Publishers
06	Nel Jerka	The complete reference VB6	Tata McGraw Hill Publishing

Course Name : Electronics Engineering Group

Course Code : ET/EJ/EN/EX/IE/IS/IC/DE/EV/MU/TU/ED/EI

Semester : Fourth

Subject Title : Professional Practices-II

Subject Code : 17044

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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:

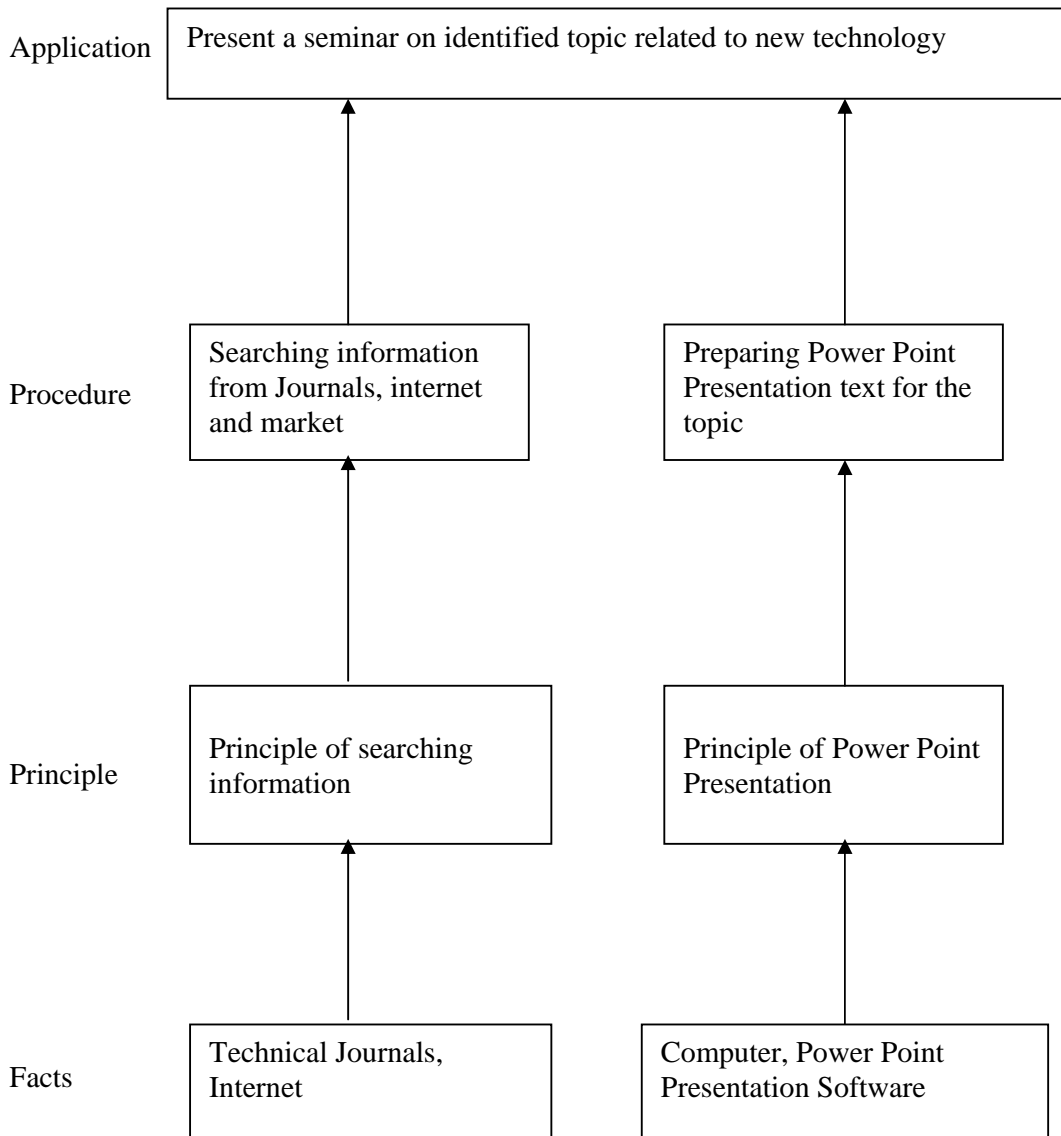
Intellectual skills:

- 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	Industrial Visits 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. Minimum two industrial visits may be arranged in the following areas/ industries : i) Electronic equipment manufacturing unit ii) Resistance Welding unit iii) Industrial automation unit iv) Sugar mill, Paper mill, Cement Industry. v) Railway station control room. vi) Telephone Exchange. vii) Any other suitable Industry.	16
2	Lectures by Professional / Industrial Expert to be organized from any of the following areas (Any three) i) Cyber laws. ii) Fiber optics communication system iii) Disaster management iv) Atomic energy v) Industrial Safety vi) Computer security systems/Ethical hacking. vii) Any other suitable topic viii) Introduction to Apprenticeship Training Scheme	08
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: 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	06
4	Seminar : 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: 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. 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 for All – Ninth Edition	PHI
05	Apprenticeship Training Scheme:- Compiled By – BOAT (Western Region), Mumbai, 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 4th semester examination.

Note:- Examination in Professional Practices of 5th 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.

 MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI 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										WITH EFFECT FROM 2012-13							
SEMESTER : FOURTH										DURATION : 16 WEEKS							
FULL TIME / PART TIME : FULL TIME										SCHEME : G							
SR. NO	SUBJECT TITLE	abbrevi ation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME										SW (17400)
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)			
								Max	Min	Max	Min	Max	Min	Max	Min		
1	Environmental Studies \$	EST	17401	01	--	02	01	50#*	20	--	--	--	--	25@	10	50	
2	Elements of Mechanical 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		
5	Industry Electrical Systems-I	IES	17416	03	01	02	03	100	40	--	--	25#	10	25@	20		
6	Transmission and Distribution of 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)			Examination in 5th Semester Professional Practices-III													
<p>Student Contact Hours Per Week: 32 Hrs.</p> <p>THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.</p> <p>Total Marks : 850</p> <p>@ - 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</p> <p>** Industrial Training (Optional) - Student can undergo Industrial Training of four weeks after fourth semester examination during summer vacation.</p> <p>Assessment will be done in Fifth semester under Professional Practices-III. They will be exempted from activities of Professional Practices-III of 5th Semester.</p> <ul style="list-style-type: none"> ➤ 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:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

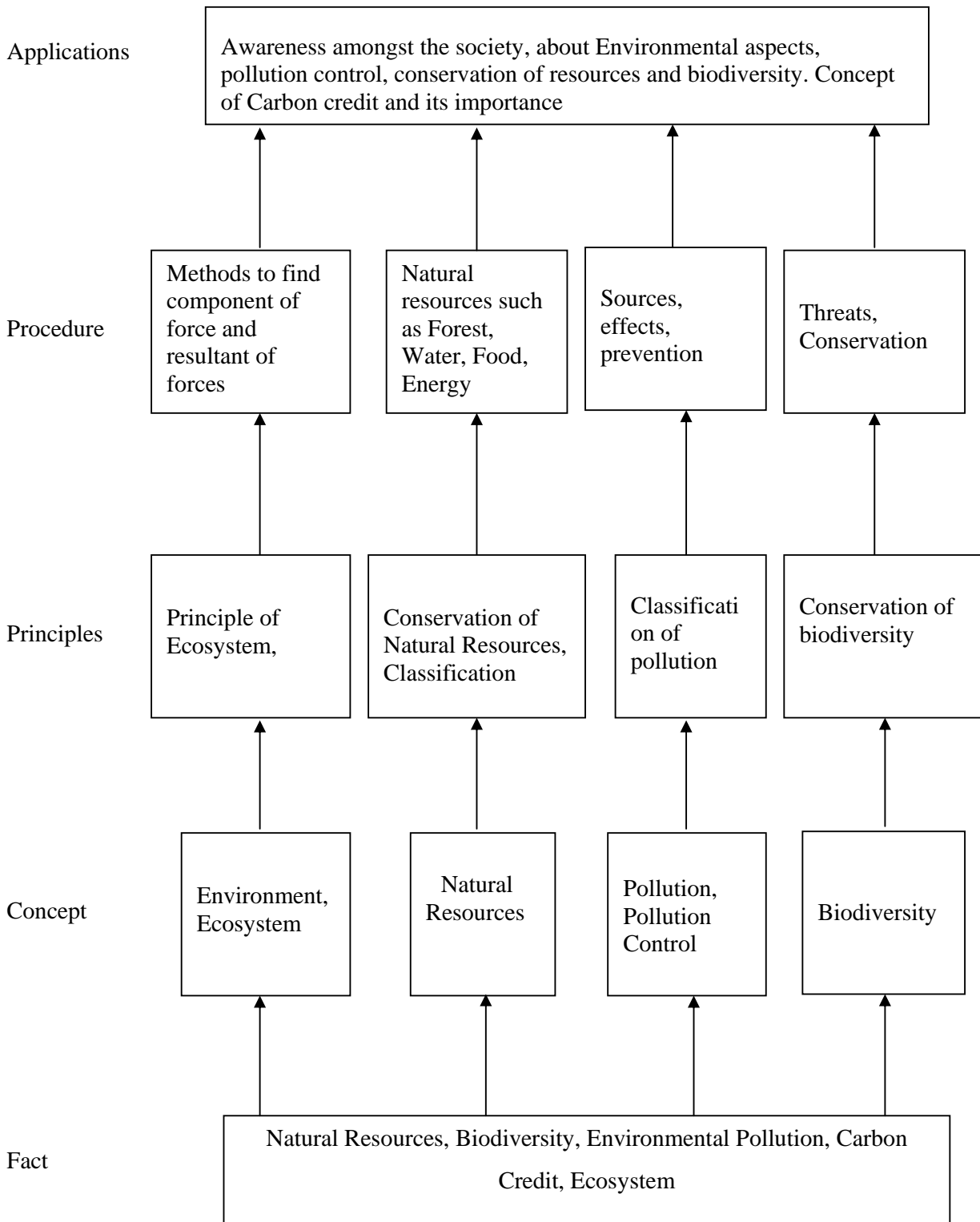
It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

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
<p>Topic 1: Nature of Environmental Studies</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define the terms related to Environmental Studies ➤ State importance of awareness about environment in general public <p>Contents:</p> <ul style="list-style-type: none"> • Definition, Scope and Importance of the environmental studies • Importance of the studies irrespective of course • Need for creating public awareness about environmental issues 	01	04
<p>Topic 2: Natural Resources and Associated Problems</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define natural resources and identify problems associated with them ➤ Identify uses and their overexploitation ➤ Identify alternate resources and their importance for environment <p>Contents:</p> <p>2.1 Renewable and Non renewable resources</p> <ul style="list-style-type: none"> • Definition • Associated problems <p>2.2 Forest Resources</p> <ul style="list-style-type: none"> • General description of forest resources • Functions and benefits of forest resources • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc. <p>2.3 Water Resources</p> <ul style="list-style-type: none"> • Hydrosphere: Different sources of water • Use and overexploitation of surface and ground water • Effect of floods, draught, dams etc. on water resources and community <p>2.4 Mineral Resources:</p> <ul style="list-style-type: none"> • Categories of mineral resources • Basics of mining activities • Mine safety • Effect of mining on environment <p>2.5 Food Resources:</p> <ul style="list-style-type: none"> • Food for all • Effects of modern agriculture • World food problem 	04	10
<p>Topic 3. Ecosystems</p> <ul style="list-style-type: none"> • Concept of Ecosystem • Structure and functions of ecosystem • Energy flow in ecosystem • Major ecosystems in the world 	01	04
<p>Topic 4. Biodiversity and Its Conservation</p> <ul style="list-style-type: none"> • Definition of Biodiversity • Levels of biodiversity • Value of biodiversity 	02	06

<ul style="list-style-type: none"> • Threats to biodiversity • Conservation of biodiversity 		
Topic 5. Environmental Pollution <ul style="list-style-type: none"> • Definition • Air pollution: Definition, Classification, sources, effects, prevention • Water Pollution: Definition, Classification, sources, effects, prevention • Soil Pollution: Definition, sources, effects, prevention • Noise Pollution: Definition, sources, effects, prevention 	03	08
Topic 6. Social Issues and Environment <ul style="list-style-type: none"> • Concept of development, sustainable development • Water conservation, Watershed management, Rain water 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 	03	10
Topic 7. Environmental Protection Brief description of the following acts and their provisions: <ul style="list-style-type: none"> • Environmental Protection Act • Air (Prevention and Control of Pollution) Act • Water (Prevention and Control of Pollution) Act • Wildlife Protection Act • Forest Conservation Act Population Growth: Aspects, importance and effect on environment <ul style="list-style-type: none"> • Human Health and Human Rights 	02	08
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. No.	Author	Title	Publisher
01	Anindita Basak	Environmental Studies	Pearson Education
02	R. Rajgopalan	Environmental Studies from Crises to Cure	Oxford University Press
03	Dr. R. J. Ranjit Daniels, Dr. 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			Examination Scheme					
TH	TU	PR	PAPER 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.

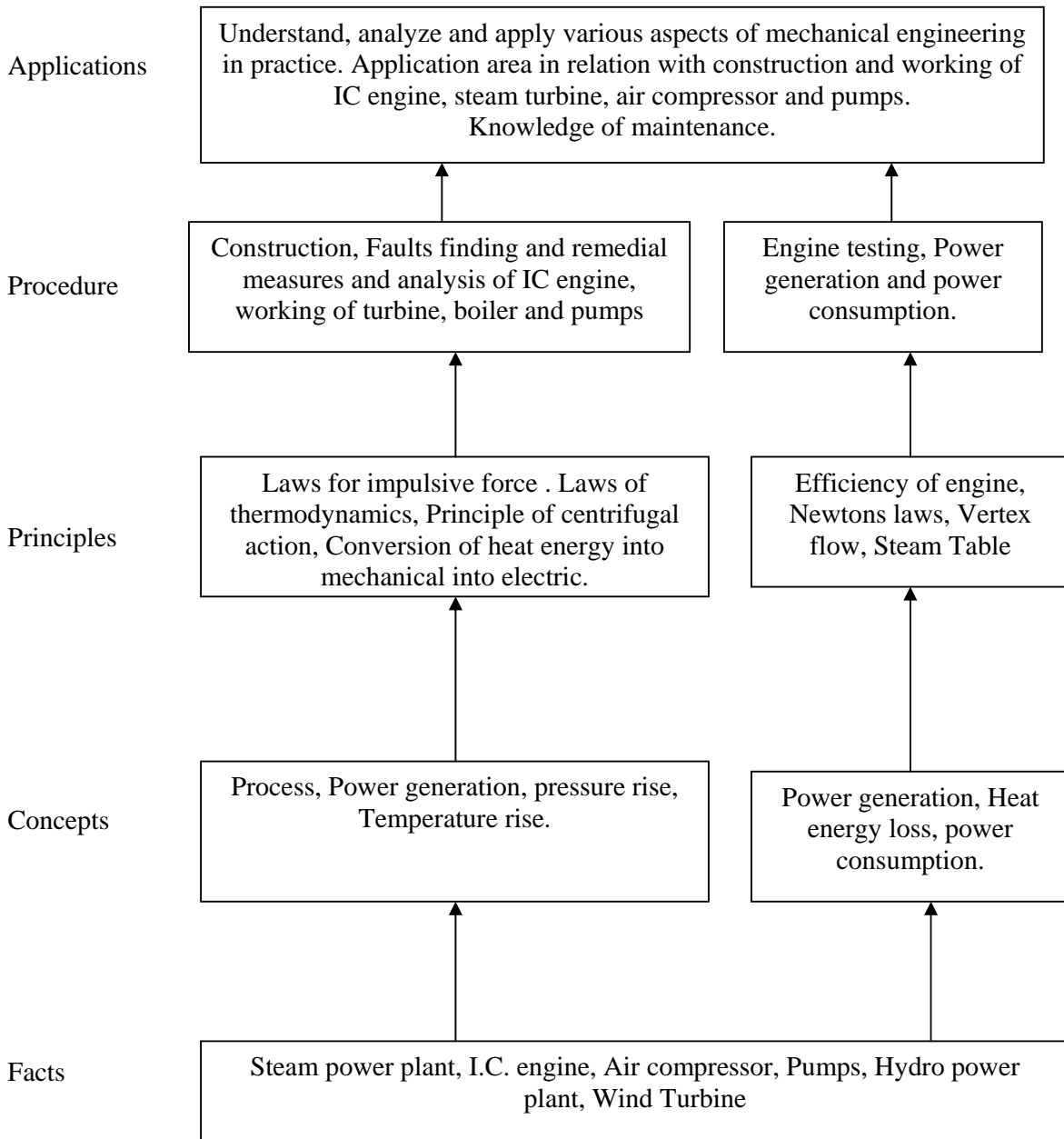
Topics on air compressors and pumps, turbine also provide necessary guide line in respect of electrical engineer. For trouble free working of these equipment with saving ion energy consumption.

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.

Learning Structure:



Theory:

Topic and Contents	Hours	Marks
Topic 1: Boilers, Steam turbines, Steam engine Specific Objectives: <ul style="list-style-type: none"> ➤ Calculate the properties of two phase system by using steam table ➤ Explain construction & working of boilers ➤ Identify the heat losses & malfunctioning of boilers Contents: <p>1.1 Construction and working of critical and super critical boilers.</p> <p>1.2 Boiler efficiency</p> <p>1.3 Boiler Act (for remedial measure).</p> <p>1.4 Classification of turbines.</p> <p>1.5 Impulse and reaction turbine.</p> <p>1.6 Power developed by turbine.</p> <p>1.7 Different power losses in turbine.</p>	10	16
Topics 2: I.C. Engines Specific Objectives: <ul style="list-style-type: none"> ➤ Calculate performance of engine ➤ Identify the malfunctioning Causes Contents: <p>2.1 Classification of I.C. engines.</p> <p>2.2 Testing and performance of I. C. engines.</p> <ul style="list-style-type: none"> ➤ Break power ➤ Indicated power ➤ Frictional power <p>2.3 Fault finding and remedial action.</p> <p>2.4 Starting motor of I.C. engine.</p>	06	10
Topic 3: Air Compressor Specific Objectives: <ul style="list-style-type: none"> ➤ Know the working principles of air compressor ➤ Identify Methods of energy saving ➤ Identify the fault & suggest remedies Contents: <p>3.1 Introduction</p> <p>3.2 Definition : Compression ratio, Compressor capacity, Free air Deliver, swept volume.</p> <p>3.3 Reciprocating and rotary air compressor, their working and Construction.</p> <p>3.4 Methods of energy saving in compressor.</p> <p>3.5 Fault finding and remedial action.</p>	08	12
Topic 4: Pumps Specific Objectives: <ul style="list-style-type: none"> ➤ Selection of pumps for various applications ➤ Know the construction & working of pumps ➤ Identify the trouble shooting of IC engines Contents: <p>4.1 Classification of pumps.</p> <p>4.2 Type of pumps and their working.</p> <p>4.3 Power required to run the pump.</p> <p>4.4 Fault finding and remedial action.</p>	08	12
Total	32	50

Practical:**Skills to be developed:****Intellectual Skills:**

1. Understand vapour process of steam boilers & different mountings & accessories
2. Analyze the performance of pumps & turbines

Motor Skills:

1. Use pressure & temp measuring device
2. Operate I C Engine & know the working of dynameters

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. No.	Author	Title	Publisher
1	Domkundwar V. M	A Course In Thermal Engg.	Dhanpat Rai & Co.
2	R. K. Bansal	Fluid Mechanics & Hydraulic Machine	Laxmi Publication
3	T. S. Rajan	Basic Mechanical Engg.	New Age International
4	Dr. Kripal Singh	Automobile Engineering	Standard Publishers Distributors
5	R. S. Khurmi	A Text Book Of Thermal Engineering	S Chand & Co. Ltd
6	C. M. Agrwal	A text Book Of Thermal Engg	Wiley Precise Text Book

Course Name : Electrical Engineering Group
Course Code : EE/EP
Semester : Fourth
Subject Title : Industrial Instrumentation
Subject Code : 17414

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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:

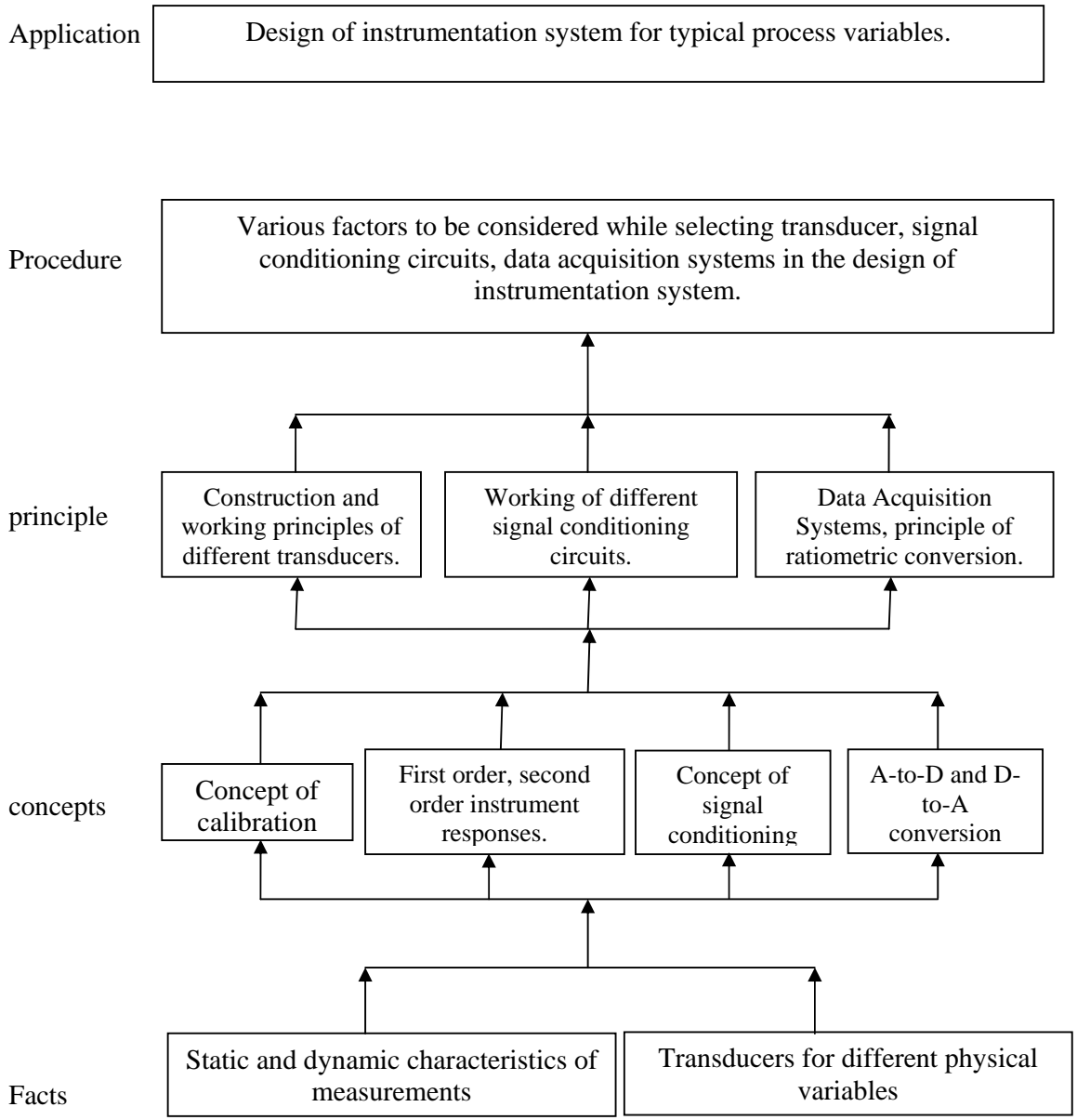
A diploma engineer is required to work in various capacities such as development, innovation & maintenance engineer, in today's highly automated industrial environment. Therefore the basic knowledge of industrial instrumentation and control is a necessary prerequisite.

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.

Learning Structure:



Theory:

Topic and Detailed Content	Hours	Marks
<p>Topic 1: Introduction to Instrumentation System</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State basic block diagram of instrumentation system. ➤ Identify static and dynamic characteristics of instruments <p>Contents:</p> <p>1.1 Basic instrumentation system</p> <ul style="list-style-type: none"> • Basic block diagram of generalized Instrumentation system • Need of each block. <p>1.2 Static characteristics of instruments</p> <ul style="list-style-type: none"> • Accuracy and measurement uncertainty • Precision, repeatability and reproducibility • Tolerance • Range and span • Linearity • Sensitivity, resolution • Zero drift ,sensitivity drift • Hysteresis effect • Dead zone <p>1.3 Dynamic characteristics of instruments</p> <ul style="list-style-type: none"> • 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 <p>1.4 Calibration</p> <ul style="list-style-type: none"> • Principles of calibration • Calibration chain and traceability 	08	16
<p>Topics 2: Transducers</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Classify the transducers on the basis their application ➤ Select appropriate transducer as per application ➤ <p>Contents:</p> <p>2.1: Transducers</p> <ul style="list-style-type: none"> • Transducers: Definition, classification of electrical transducers. <p>2.2: Measurement of strain</p> <ul style="list-style-type: none"> • Definition of stress and strain • Operation of resistance strain gauge • Construction of bonded metal foil strain gauge • Strain gauge circuits: Wheatstone bridge full bridge configuration, temperature compensation <p>2.3 Measurement of Force and Torque</p> <ul style="list-style-type: none"> • Force measurement using load cell • Types of load cells: column type and beam type <p>2.4 Measurement of torque using torque cell</p> <p>2.5 Temperature Measurement</p> <ul style="list-style-type: none"> • Thermistor-working principle, characteristics, sources of error 	20	32

<ul style="list-style-type: none"> • Thermocouple- Seebeck effect, Cold Junction compensation (CJC), CJC by electronic means, thermocouple types and their ranges. • Resistance thermometer (RTD): working principle, characteristics ranges of common RTD elements, self heating effect, advantages of platinum resistance thermometer, three wire and four wire configurations. <p>2.6 Displacement measurement</p> <ul style="list-style-type: none"> • Linear variable differential transformer (LVDT)- working principle, characteristics, null voltage phase sensitive demodulation. • Rotary motion measurement using optical rotary encoder <p>2.7 Pressure measurement</p> <ul style="list-style-type: none"> • Definition of pressure and its units • Absolute, differential and gauge pressure • Absolute pressure measurement using bourdon tube gauge • Diaphragm type pressure transducer using four element strain gauge rosettes. <p>2.8 Flow measurement</p> <ul style="list-style-type: none"> • 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 <p>2.9 Measurement of magnetic field</p> <ul style="list-style-type: none"> • Hall effect and hall effect transducer • Measurement of ac current by hall effect transducer <p>2.10 Level measurement</p> <ul style="list-style-type: none"> • Float type, capacitive and ultrasonic level measurement. <p>2.11 Rotational velocity</p> <ul style="list-style-type: none"> • Optical sensing, inductive and magnetic type pulse pickups • Analog tachometers (DC and AC) 		
<p>3. Signal Conditioning Circuits</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw basic block diagram of OP-AMP ➤ Identify different applications of OP-AMP in signal conditioning circuits. <p>Contents:</p> <p>3.1. Operational Amplifier and its characteristic parameters</p> <ul style="list-style-type: none"> • Block diagram and features of OPAMP (all stages) Circuit Symbols and Terminals. OPAMP IC's: 741 pin diagram and pin function. • Ideal op-amp: electrical characteristics. Ideal voltage transfer curve. • Definitions of parameters of op-amp: Input offset voltage, Input offset current, Input bias current, Differential input resistance, Input capacitance, CMMR, SVRR, large signal voltage gain, output voltage swing, output resistance, slew rate, gain bandwidth product, output short circuit current. <p>3.2 OP-AMP basic circuits</p> <ul style="list-style-type: none"> • 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) 	12	16

<ul style="list-style-type: none"> • Voltage to current converter (with floating load, with grounded load), Current to voltage converter. • Sample and hold circuit (IC LF 398 , Pin diagram, specification and pin functions) • Concept of comparator: zero crossing detector, Schmitt trigger, window detector, • Phase detector, active peak detector, peak to peak detector <ul style="list-style-type: none"> • Classification of filters, Concept of passive & active filters • Survey of commercially available op-amps (Any Three) 		
<p>Topic 4. Data Acquisition System</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw generalized block diagram of data acquisition system (DAS) ➤ State different types of DAS ➤ State various techniques of input signal conditioning in DAS ➤ State working principle of analog-to-digital and digital-to-analog conversion. <p>Contents:</p> <p>4.1 Generalized Data acquisition system</p> <ul style="list-style-type: none"> • Generalized Data acquisition system: Block diagram. & explanation. ➤ Signal conditioning in DAS, Ratio metric conversion, Logarithmic conversion ➤ DAS Types-Single channel, multi-channel DAS only block diagram. <p>4.2 Analog-to-digital and digital-to-analog conversion</p> <ul style="list-style-type: none"> • Study of different techniques of Analog to Digital convertors ADC and Digital to Analog converters DAC only working principle. 	08	12
<p>Topic 5. Operation of Instrumentation System</p> <p>Specific Objectives</p> <ul style="list-style-type: none"> ➤ State different factors to be considered in transducer selection ➤ Draw block diagrams and circuit diagrams for instrumentation system for different physical variables. <p>Contents:</p> <p>5.1 Transducer selection</p> <ul style="list-style-type: none"> • Points to be considered while selecting a transducer for its intended applications. <p>5.2 Working of Instrumentation system for</p> <ul style="list-style-type: none"> • Temperature Measurement by RTD, thermistor, Thermocouple. • Force measurement using load cell. • Pressure measurement using diaphragm type transducer. • Speed measurement by non-contact type transducer • Displacement measurement by LVDT. • Rotary motion using optical encoder. • Flow measurement by turbine flow meter. • Liquid level measurement by resistive sensor. • AC current RMS indication using Hall Effect transducer. 	16	24
Total	64	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 Gauge and draw graph to verify the characteristics of Force Vs Output Voltage
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.

Learning Resources:**1. Books:**

Sr. 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 Measurement and Instrumentation (19 th Edition)	Dhanpat Rai & co
5	Cooper Helfrick	Modern electronic instrumentation and measurement techniques	Prentice Hall
6	Ramakant Gaikwad	Op-AMPs and linear integrated circuits (4 th Edition)	Prentice –Hall India

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://freevidelectures.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 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.

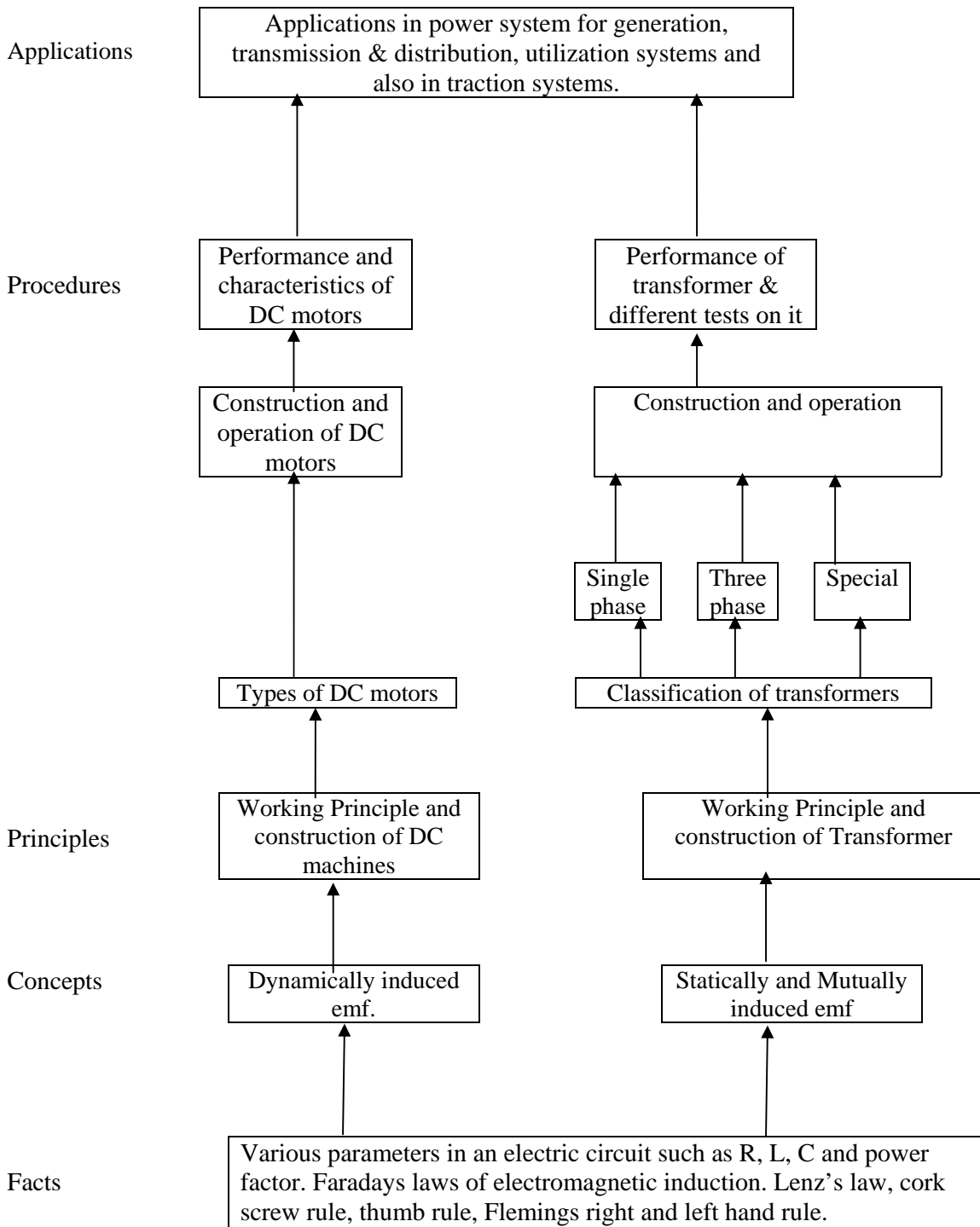
These machines are used in power system for generation, transmission & distribution, utilization systems and also in traction systems. Knowledge gained by the students will be used in the study of technological subjects such as power system operation & control, utilization system, switchgear & protection, 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.

Learning Structure:



Theory:

Topic and Contents	Hours	Marks
<p>Topic 1: DC Generators Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Identify the different parts of DC Machines. ➤ Identify different types of DC generators from connection diagram. <p>Contents:</p> <p>1.1 Introduction</p> <ul style="list-style-type: none"> • Principle of operation of DC generator • Fleming's right hand rule <p>1.2 Construction of DC machine</p> <ul style="list-style-type: none"> • Parts and functions • Different materials used for different parts. <p>1.3 E.m.f. equation of generator (derivation)</p> <ul style="list-style-type: none"> • Numericals on e.m.f. equation <p>1.4 Types of DC generators</p> <ul style="list-style-type: none"> • Connection diagrams of different types of DC generators • Applications of DC generators 	06	08
<p>Topics 2: DC Motors Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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. <p>Contents:</p> <p>2.1 Introduction</p> <ul style="list-style-type: none"> • Principle of operation of DC motor • Fleming's left hand rule • Back e.m.f. and its significance • Voltage equation and power equation of DC motor • Types of DC motors <p>2.2 DC Motor Torque and Speed</p> <ul style="list-style-type: none"> • Armature torque (derivation) • Shaft torque • Brake horse power • Numericals on torque and speed. <p>2.3 Efficiency of DC Motor</p> <ul style="list-style-type: none"> • Losses in DC motor • Power stages • Efficiency of DC motor • Condition for maximum efficiency • Numericals on efficiency. <p>2.4 DC motor characteristics</p> <ul style="list-style-type: none"> • Torque verses armature current • Speed verses armature current • Speed verses torque • Selection of motors for particular applications. <p>2.5 Speed control of DC series motor</p> <ul style="list-style-type: none"> • Flux control method 	12	18

<ul style="list-style-type: none"> • Armature resistance control method (No numerical) <p>2.6 DC motor starters</p> <ul style="list-style-type: none"> • Necessity of DC motor starters <p>2.7 Brushless DC Motor</p> <ul style="list-style-type: none"> • Introduction • Working • Applications 		
<p>Topic 3: Single Phase Transformer.</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw phasor diagram of transformer for different load conditions. ➤ Perform various tests on transformers ➤ Evaluate parameters of transformer under different loading conditions. ➤ Determine regulation and efficiency of single-phase transformer. <p>Contents:</p> <p>3.1 Introduction</p> <ul style="list-style-type: none"> • Principle of operation • Faradays law of electromagnetic induction. <p>3.2 Construction of single phase transformer.</p> <ul style="list-style-type: none"> • Magnetic circuit • Electric circuit • Dielectric circuit <p>3.3 Types of transformers</p> <ul style="list-style-type: none"> • Shell type and core type- their comparison • Step up and step down transformer • Amorphous Core type Distribution Transformer <p>3.4 EMF equation of transformer</p> <ul style="list-style-type: none"> • Derivation • Voltage transformation ratio • Numericals on above. <p>3.5 Ideal transformer</p> <ul style="list-style-type: none"> • Characteristics of ideal transformer. • Phasor diagram <p>3.6 Practical Transformer</p> <ul style="list-style-type: none"> • Transformer on no load-phasor diagram • Leakage reactance • Transformer on load- phasor diagram • Numericals on above. <p>3.7 Equivalent circuit of transformer</p> <ul style="list-style-type: none"> • Equivalent resistance and reactance • Numericals on above. <p>3.8 Voltage regulation and Efficiency of transformer</p> <ul style="list-style-type: none"> • 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. <p>3.9 Tests on Single phase Transformer</p> <ul style="list-style-type: none"> • Polarity test 	26	42

<ul style="list-style-type: none"> • Direct loading test • Open circuit test • Short circuit test • Voltage regulation and efficiency based on OC & SC tests. • Numericals on above. <p>3.10 Parallel operation of transformer</p> <ul style="list-style-type: none"> • 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. 		
<p>Topic 4: Three Phase Transformer.</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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. <p>Contents:</p> <p>4.1 Introduction</p> <ul style="list-style-type: none"> • 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)-1977 • Three phase to two phase conversion (Scott Connection) • Comparison between Distribution transformer and Power transformer <p>4.2 Selection of transformer as per IS: 10028 (Part I)-1985</p> <ul style="list-style-type: none"> • Criteria for selection of distribution transformer • Criteria for selection of power transformer <p>4.3 Parallel operation of three phase transformer</p> <ul style="list-style-type: none"> • Conditions for parallel operation <p>4.4 Specification of three-phase distribution transformer as per IS:1180 (part D)-1989</p> <p>4.5 Tests on Three-phase Transformer</p> <ul style="list-style-type: none"> • Polarity test • Phasing out test <p>4.6 Three- phase auto transformer</p> <ul style="list-style-type: none"> • Construction • Operation • Application 	12	16
<p>Topic 5: Special Transformers.</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ To use various special transformers for particular applications.. <p>Contents:</p> <p>5.1 Single phase auto transformer</p> <ul style="list-style-type: none"> • Construction and working • Comparison with two winding transformer • Advantages and disadvantages of auto transformer 	08	16

5.2	<ul style="list-style-type: none"> • Applications of auto transformer • Instrument Transformers • Current transformer- construction, working and applications • Potential transformer- construction, working and applications 		
5.3	<ul style="list-style-type: none"> • Isolation transformer • Features and applications 		
5.4	<ul style="list-style-type: none"> • 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. No.	Author	Title	Publisher
1.	V. N. Mittle & Arvind Mittal	Basic Electrical Engineering	Tata McGraw Hill Education Pvt. 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. Ltd. New Delhi
4.	V. K. Mehta & Rohit Mehta,	Principles of Electrical Machines	S.Chand and Co.Ltd., New Delhi
5.	K. Murungesh Kumar	DC Machines and Transformers	Vikas Publishing House Pvt. Ltd. New Delhi.
6.	Tarnekar & Kharabanda.	Laboratory Course in Electrical Engineering	S.Chand and Co.Ltd., New Delhi
7	B. L. Theraja	Electrical Technology	S.Chand and Co.Ltd., New Delhi
8	Edward Hughes	Electrical and Electronics Technology	ELBS Publication.
9	M. N. Bandyopadhyay	Electrical Machines theory and practice	PHI Learning Pvt. Ltd., New 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 Scheme					
TH	TU	PR	PAPER 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: -**

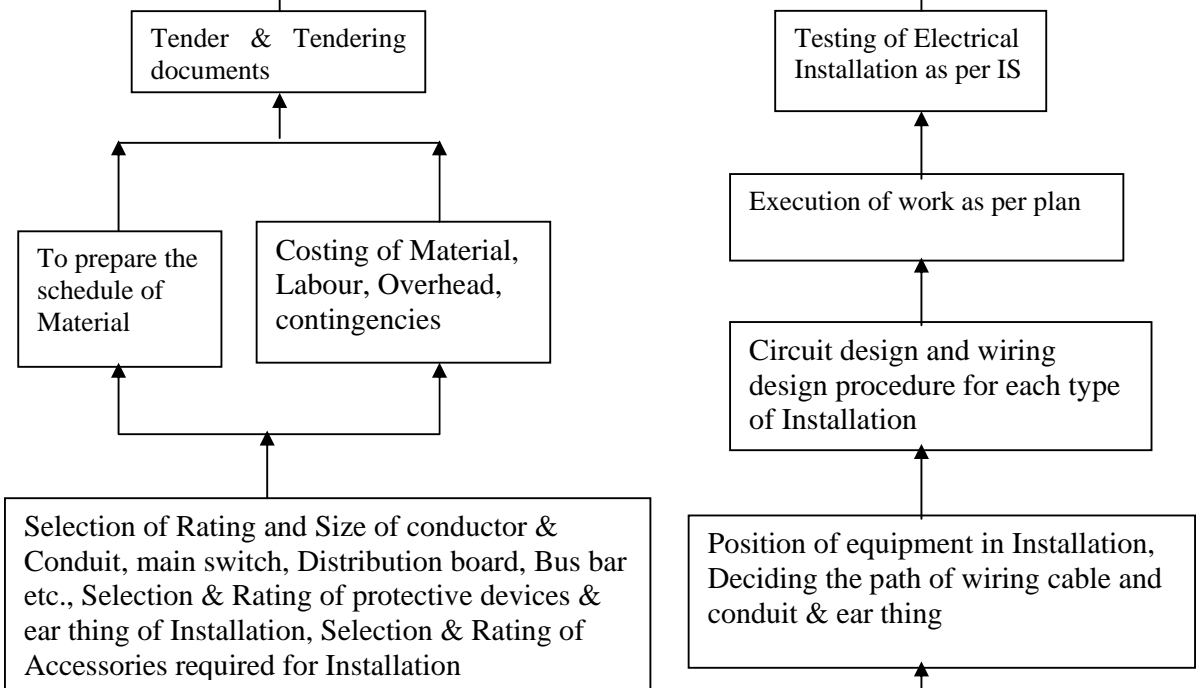
1. Read & interprets Electrical Installation drawings.
2. Understand & apply IE rules.
3. Make use of data tables & specification of wire, cables, LT lines & Distribution Transformer, MCCB, ELCB.
4. Understand principles & procedures of earthing.
5. Know basic terms to prepare design & estimate of installation.
6. Understand & apply procedures for contracts & tenders.

Learning Structure:

Application:

Estimating & costing of Residential, Commercial & Industrial Electrical Installation and prepare tendering documents, Testing of Electrical Installation and Evaluation & billing of executed work

Procedure:



Principles

Design consideration of Electrical Installation, Principles of circuit design for each type of Installation, Principles of execution of work

Concepts

Residential, commercial and Industrial wiring, Lighting and power circuit, wires, cables, overhead and underground wiring, earthing

Facts

Electrical Engineering Drawing, IE rules applicable to Residential, Commercial & Industrial Installation, General rules & Guidelines for Residential, Commercial & Industrial Installation, Data tables of conductor, Material and Accessories, Various plans & diagrams related to electrical Installation

Theory:

Topics and Contents	Hours	Marks
1. Drawings and IE rules Specific Objectives <ul style="list-style-type: none"> ➤ Understand different types of electrical Installation ➤ Know and read Electrical drawings & symbols ➤ Know IE rules <hr style="border-top: 1px dashed black;"/> <ul style="list-style-type: none"> • Classification of electrical installations • 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 	04	10
2. Service connections Specific Objectives <ul style="list-style-type: none"> ➤ Select appropriate method for service connection ➤ Differentiate between various service connections <hr style="border-top: 1px solid black;"/> <ul style="list-style-type: none"> • Concept of service connection • 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 	04	10
3. Electrification of residential Installation Specific Objectives <ul style="list-style-type: none"> ➤ 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 <hr style="border-top: 1px solid black;"/> <ul style="list-style-type: none"> • Types of wires and wiring methods as per IS No. • General rules and guidelines for installation of residential electrification and positioning of equipments • Calculation of total electrical load in the residential installation • Procedure for the design of number of sub circuits • Method of drawing single line diagram • Selection of type of wire and wiring method • Load calculation and selection of size of wire by considering overload and 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 	12	24

representation.		
<p>4. Electrification of Commercial Installation</p> <p>Specific Objectives</p> <ul style="list-style-type: none"> ➤ 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 <hr/> <ul style="list-style-type: none"> • 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 supply • Decide number of lighting and power sub circuits as per the IE rule • Decide size of wire/cable required for every sub circuit • Decide length of wire required for every sub circuit • Draw the single line diagram • Decide ratings of wiring accessories, main switch, bus bar MCB, ELCB etc. • Decide proper method of earthing for commercial installation • 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 	12	20
<p>4. Electrification of Industrial Installation</p> <p>Specific Objectives</p> <ul style="list-style-type: none"> ➤ 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 <hr/> <ul style="list-style-type: none"> • Concept of industrial load • Concept of motor wiring circuit and single line diagram • Guidelines about power wiring and motor wiring • Design considerations of electrical installation in small 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, 	12	24

contingencies charges and profit margin • Draw the circuit diagram		
6. Contracts, Tenders and Execution Specific Objectives ➤ Draft tender documents ➤ Fill tender documents following appropriate procedure and be present and act as per the requirements and rules while opening of the tender. ➤ Prepare billing		
• Concept of contract and tenders • Types of contracts and contractors • Types of tenders • Requirements of valid contract and good contractor • Tender notice • Procedure for submission and opening of tenders • Comparative statements for selection of contractors • Principles of execution of work • Billing of executed works.	04	12
Total	48	100

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. 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 design & costing	New Age
3	Allasappan & 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			Examination Scheme					
TH	TU	PR	PAPER 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:

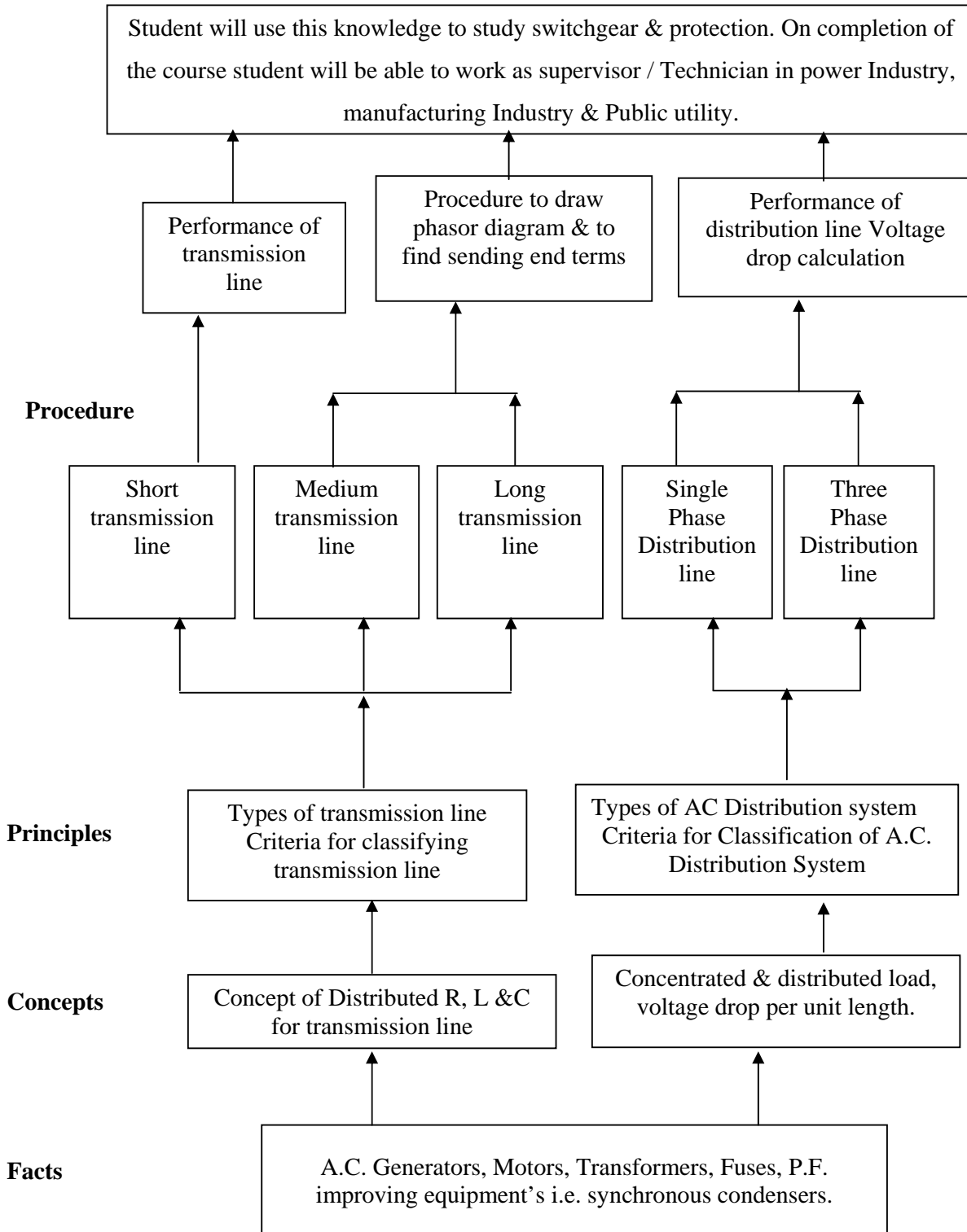
Electrical Diploma Engineers should know Transmission Voltages, Distribution Voltage. They should be able to identify various components & their functions. They will be able to measure system performance. They will use this knowledge in studying Switchgear & Protection on completing the study of Generation, 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.

Learning Structure:

Applications



Theory:

Topic and Contents	Hours	Marks
<p>Topic 1: Basic Transmission Specific Objectives: ➤ Draw single line diagram of a given transmission network ➤ Classify the lines based on their length, voltage rating</p> <p>Contents:</p> <ul style="list-style-type: none"> • Single Line Diagram of Transmission & Distribution of Electric supply system. • Meaning of Primary & Secondary Transmission and its Standard Voltage level used in India. • Classification of Transmission Lines according to voltage level, Length of Transmission line, Type of Supply Voltage & Method of Construction. • Advantage of High Voltage for power transmission 	04	08
<p>Topics 2: Transmission Line Components Specific Objectives: ➤ Identify the main Components of Transmission & Distribution Line. ➤ Select size and type of conductor for transmission line based on its rating ➤ Calculate string efficiency</p> <p>Contents: Overhead Conductors: ----- 04 marks</p> <ul style="list-style-type: none"> • Properties of Conducting Material. • Comparison of Copper & Aluminum as a Conducting Material. • Different types of Conductor such as Copper, All Aluminium Conductor (AAC), Alluminium Conductor Steel Reinforced (ACSR), All Aluminium Alloy Conductor (AAAC), Bundled Conductor, Steel Conductor and their applications. • Trade Names of various types of conductors. • Stranded Conductor: Advantages & Disadvantages. <p>Underground Cables: ----- 04 Marks</p> <ul style="list-style-type: none"> • Introduction & requirements. • Classification of cables. • Cable conductors. • Cable construction. • Cable insulation, Metallic sheathing & mechanical protection. • Comparison with overhead lines • Cable laying and Cable Joining <p>Line supports: ----- 06 marks</p> <ul style="list-style-type: none"> • Requirements of Supporting Structures • Types of Supporting Structure: • Poles: RCC Pole, RSJ (Rail Pole), Steel Tubular Pole their specification, method of erection and their comparison based of Cost, Life, Tensile strength, Insulating properties, maintenance, Weight, transportation and handling. • Steel Tower: Specifications, Material used, single circuit, double 	14	24

<p>circuit, Voltage levels.</p> <ul style="list-style-type: none"> Advantages, Disadvantages & Application of Steel Tower. <p>Line Insulators : ----- 10 marks</p> <ul style="list-style-type: none"> 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. String Insulator: Constructional features and applications. 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. Define String Efficiency and develop its Mathematical Expression (Simple Numericals) Methods of Improving String efficiency. 		
<p>Topics 3: Transmission Line Parameters</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> Use appropriate method for reducing skin effect Prepare schedule for transposition of line <p>Contents:</p> <ul style="list-style-type: none"> 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 effect. Proximity Effect: Meaning of the term, its effect on performance of 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. 	08	12
<p>Topics 4: Performance of Transmission Line</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> Determine performance of the line based on efficiency and regulation Representation of line based on A, B, C ,D constants <p>Contents:</p> <ul style="list-style-type: none"> Classification of Transmission line according to distance such as 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. Derivation of Regulation Short Transmission line. Numericals on 1-phase & 3-phase Short Transmission line: 	10	20

<p>Calculate Efficiency & Percentage Regulation.</p> <ul style="list-style-type: none"> • Analysis of Short transmission line: Equivalent Circuit & Vector Diagram (No Mathematical Treatment) • Analysis of Medium transmission line: Equivalent Circuit with Nominal 'T', Nominal 'π', and End Condenser Method, its Phasor diagram (No Mathematical Treatment) • Concept and Basic Equations of generalized circuit constants 'A', 'B', 'C', 'D' (No Derivation and Numericals) 		
<p>Topics 5: Extra High Voltage Transmission Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Understand the concept of HV Transmission ➤ Know the use of HV Lines for Transmission and National Grid ➤ Compare EHV A.C and HV D.C lines for performance <p>Contents:</p> <ul style="list-style-type: none"> • Definition of EHV line, Its necessity and Importance. • Advantages, Limitations and Applications of Extra High Voltage AC (EHVAC) Transmission Line. • Advantages, Limitation & Application of High Voltage DC (HVDC) Transmission Line. • Layout of HVDC Transmission Line: Monopolar, Bi-Polar & Homopolar • HVDC Transmission Line Routes in India, • Comparison of EHVAC & HVDC Transmission line. 	06	08
<p>Topics 6: A.C Distribution System Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Decide type of distributor to be used based on requirements ➤ Determine performance of Distributer with given parameters <p>Contents:</p> <ul style="list-style-type: none"> • Components of Distribution System. • Classification of distribution System • Requirements of an ideal Distribution System. • Meaning of Primary & Secondary Distribution System with their voltage level and Number of conductors. • Comparison between Feeder & Distributor. • Factors to be considered while designing Feeder & Distributor. • Types of different distribution Scheme such as Radial, Ring, and Grid. Layout, Advantages, Disadvantages & Applications. • Numericals on 1-phase A.C Distribution System to Calculate Voltage drop & Voltage at sending end / Receiving end with Power factor referred to Voltage at receiving end. 	12	16
<p>Topics 7: Primary and Secondary Distribution Sub-Station Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Identify components of sub stations with their ratings ➤ Identify components from single line diagram <p>Contents:</p> <ul style="list-style-type: none"> • Definition and Classification of Sub-Station according to Nature of duty, Application (Service), Construction • Site Selection for Sub-Station. • Advantages, Disadvantages & Applications of Indoor & Outdoor Sub-Station. 	10	12

<ul style="list-style-type: none"> • 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: Incoming Feeder, Busbar, Power Transformer, Lightning Arrester, Earth Switch Insulator (No Load Switch), Circuit Breaker, Horn Gap Fuse, Instrumental Transformer (CT & PT), Control Panel, Control Room and Outgoing Line, • Symbols & Functions of 11KV/400V Distribution Transformer Sub-Station: Functions of Incoming line, AB Switch, Drop down Fuse, Distribution Transformer, Cross Bracing, Anti climbing device, Danger board, Sub Station Earthing and Distribution box. 		
Total	64	100

NOTES:

1. Visit to 33 / 11 KV Substation.
2. Visit to 11KV/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. 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 S.Satyanarayana	Electrical Power Transmission and Distribution	Pearson
4.	Soni,Gupta, Bhatnagar	A Course in Electrical Power	Dhanpat Rai
5.	S.L.Uppal	A Course in Electrical Power	S.K.Khanna
6.	J.B.Gupta	Transmission and Distribution of 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:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

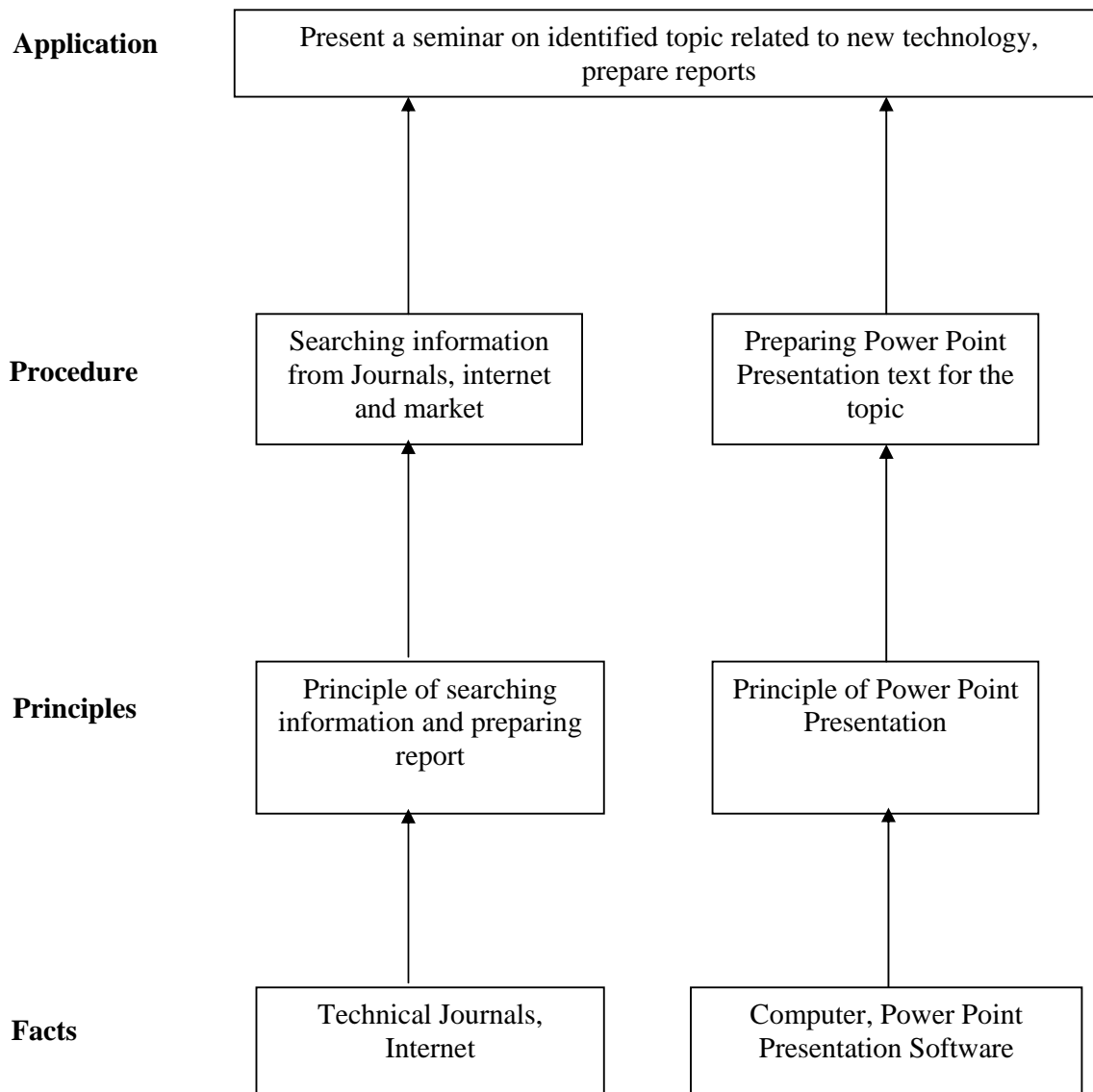
The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation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

Learning Structure:



Activity	Contents	Hours
01	<p>Industrial Visits Structured industrial visits be arranged and report of the same should be submitted by the individual student, as part of the term work. The industrial visits may be arranged in the following areas / industries :</p> <ul style="list-style-type: none"> i) Visit to HT Sub Station (Compulsory) ii) Visit to Transformer Manufacturing Industry iii) Visit to Electronics Industry iv) Visit to Design Office of MSEDCL, MSEGENCEOL v) Visit to Industry to observe:- <ul style="list-style-type: none"> a)Function of DAS and Data logger b) Electrical quantities, non-electrical quantities by recorder. vi) Adarsh Gram 	16
02	<p>Lectures by Professional / Industrial Expert / Student Seminars based on information search, expert lectures to be organized from any of the following areas:</p> <ul style="list-style-type: none"> i) Interview Techniques. ii) Effect of Transmission and Distribution Losses on cost of Energy Generation 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 	08
03	<p>Information Search: Information search can be done through manufacturers, catalogue, internet, magazines; books etc. and submit a report. Following topics are suggested :</p> <ul style="list-style-type: none"> i) Recent Trends in Insulation Material and Insulators ii) Electrical Wiring Accessories iii) Non Conventional Energy Sources with focus on solar energy iv) Elevators installation and maintenance v) Any other suitable areas 	08
04	<p>Seminar: 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)</p>	08
05	<p>Mini Projects: A group of 6to8 students be formed for group discussion; 1. Prepare a report on Electrification of multi storied building 2. Market Survey of Power Converters on the basis of Rating, Cost, Efficiency, Battery quality</p>	08
Total		48

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 4th semester examination.

Note:- Examination in Professional Practices of 5th 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.
- Their 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.

 MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES																	
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					
SEMESTER : FOURTH												DURATION : 16 WEEKS					
FULL TIME / PART TIME : FULL TIME												SCHEME : G					
SR. NO.	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME										SW (17400)
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)			
								Max	Min	Max	Min	Max	Min	Max	Min		
1	Environmental Studies \$	EST	17401	01	--	02	01	50#*	20	--	--	--	--	25@	10	50	
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		
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	--	15	--	450	--	100	--	--	--	200	--	50	
**	Industrial Training (Optional)			Examination in 5th Semester Professional Practices-III													
<p>Student Contact Hours Per Week: 30 Hrs.</p> <p>THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.</p> <p>Total Marks : 800</p> <p>@- Internal Assessment, # - External Assessment, No Theory Examination, \$ - Common to all branches, #* - Online Theory Examination, β - Common to DE / EV / MU</p> <p>Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work.</p> <p>** Industrial Training (Optional) - Student can undergo Industrial Training of four weeks after fourth semester examination during summer vacation.</p> <p>Assessment will be done in Fifth semester under Professional Practices-III. They will be exempted from activities of Professional Practices-III of 5th Semester.</p> <ul style="list-style-type: none"> ➤ 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/AU**

Semester : Fourth

Subject Title : Environmental Studies

Subject Code : 17401

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

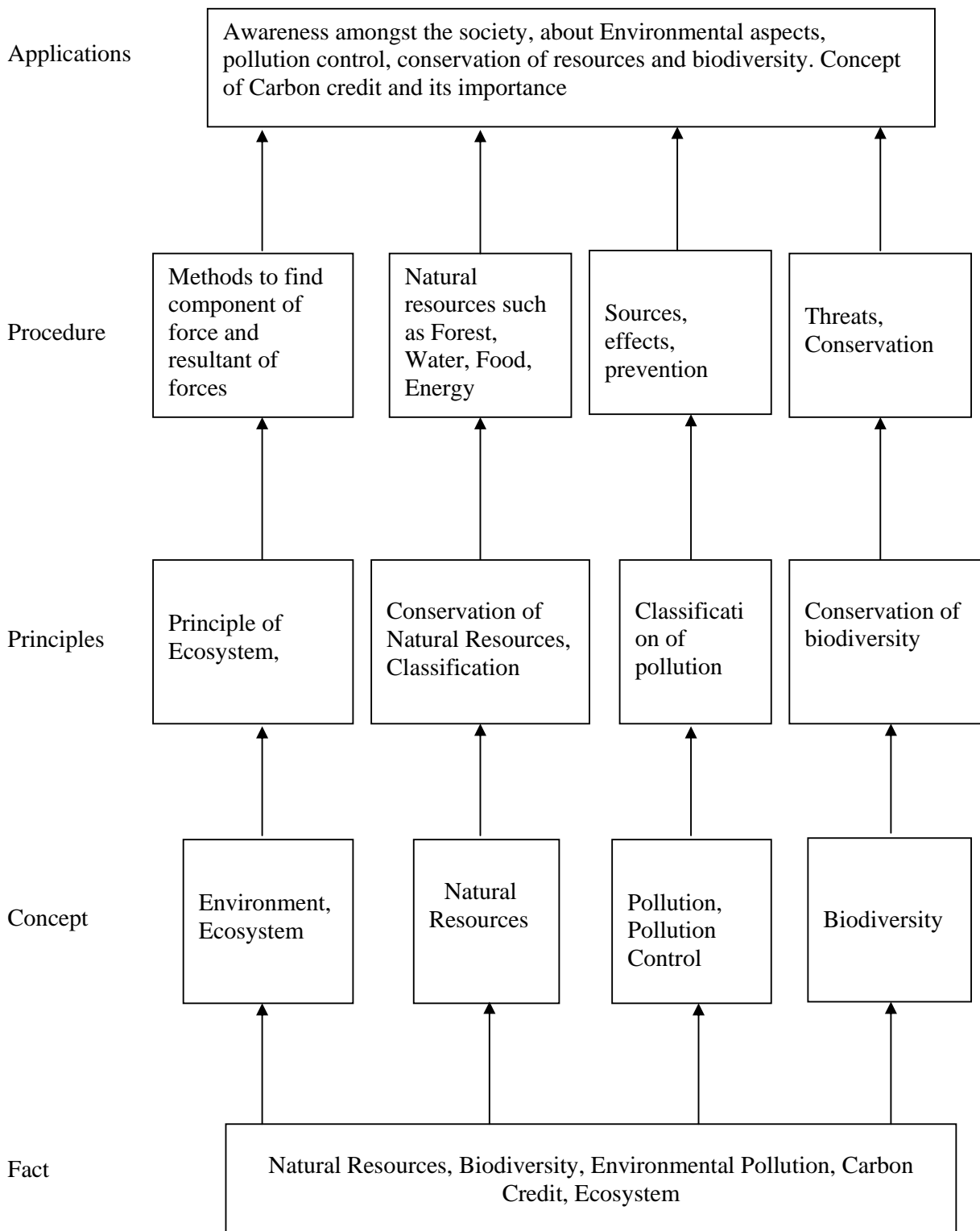
It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

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
<p>Topic 1: Nature of Environmental Studies</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define the terms related to Environmental Studies ➤ State importance of awareness about environment in general public <p>Contents:</p> <ul style="list-style-type: none"> • Definition, Scope and Importance of the environmental studies • Importance of the studies irrespective of course • Need for creating public awareness about environmental issues 	01	04
<p>Topic 2: Natural Resources and Associated Problems</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define natural resources and identify problems associated with them ➤ Identify uses and their overexploitation ➤ Identify alternate resources and their importance for environment <p>Contents:</p> <p>2.1 Renewable and Non renewable resources</p> <ul style="list-style-type: none"> • Definition • Associated problems <p>2.2 Forest Resources</p> <ul style="list-style-type: none"> • General description of forest resources • Functions and benefits of forest resources • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc. <p>2.3 Water Resources</p> <ul style="list-style-type: none"> • Hydrosphere: Different sources of water • Use and overexploitation of surface and ground water • Effect of floods, draught, dams etc. on water resources and community <p>2.4 Mineral Resources:</p> <ul style="list-style-type: none"> • Categories of mineral resources • Basics of mining activities • Mine safety • Effect of mining on environment <p>2.5 Food Resources:</p> <ul style="list-style-type: none"> • Food for all • Effects of modern agriculture • World food problem 	04	10
<p>Topic 3. Ecosystems</p> <ul style="list-style-type: none"> • Concept of Ecosystem • Structure and functions of ecosystem • Energy flow in ecosystem • Major ecosystems in the world 	01	04
<p>Topic 4. Biodiversity and Its Conservation</p> <ul style="list-style-type: none"> • Definition of Biodiversity • Levels of biodiversity 	02	06

<ul style="list-style-type: none"> • Value of biodiversity • Threats to biodiversity • Conservation of biodiversity 		
Topic 5. Environmental Pollution <ul style="list-style-type: none"> • Definition • Air pollution: Definition, Classification, sources, effects, prevention • Water Pollution: Definition, Classification, sources, effects, prevention • Soil Pollution: Definition, sources, effects, prevention • Noise Pollution: Definition, sources, effects, prevention 	03	08
Topic 6. Social Issues and Environment <ul style="list-style-type: none"> • Concept of development, sustainable development • Water conservation, Watershed management, Rain water 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 	03	10
Topic 7. Environmental Protection Brief description of the following acts and their provisions: <ul style="list-style-type: none"> • Environmental Protection Act • Air (Prevention and Control of Pollution) Act • Water (Prevention and Control of Pollution) Act • Wildlife Protection Act • Forest Conservation Act Population Growth: Aspects, importance and effect on environment <ul style="list-style-type: none"> • Human Health and Human Rights 	02	08
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. No.	Author	Title	Publisher
01	Anindita Basak	Environmental Studies	Pearson Education
02	R. Rajgopalan	Environmental Studies from Crises to Cure	Oxford University Press
03	Dr. R. J. Ranjit Daniels, Dr. 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			Examination Scheme					
TH	TU	PR	PAPER 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.

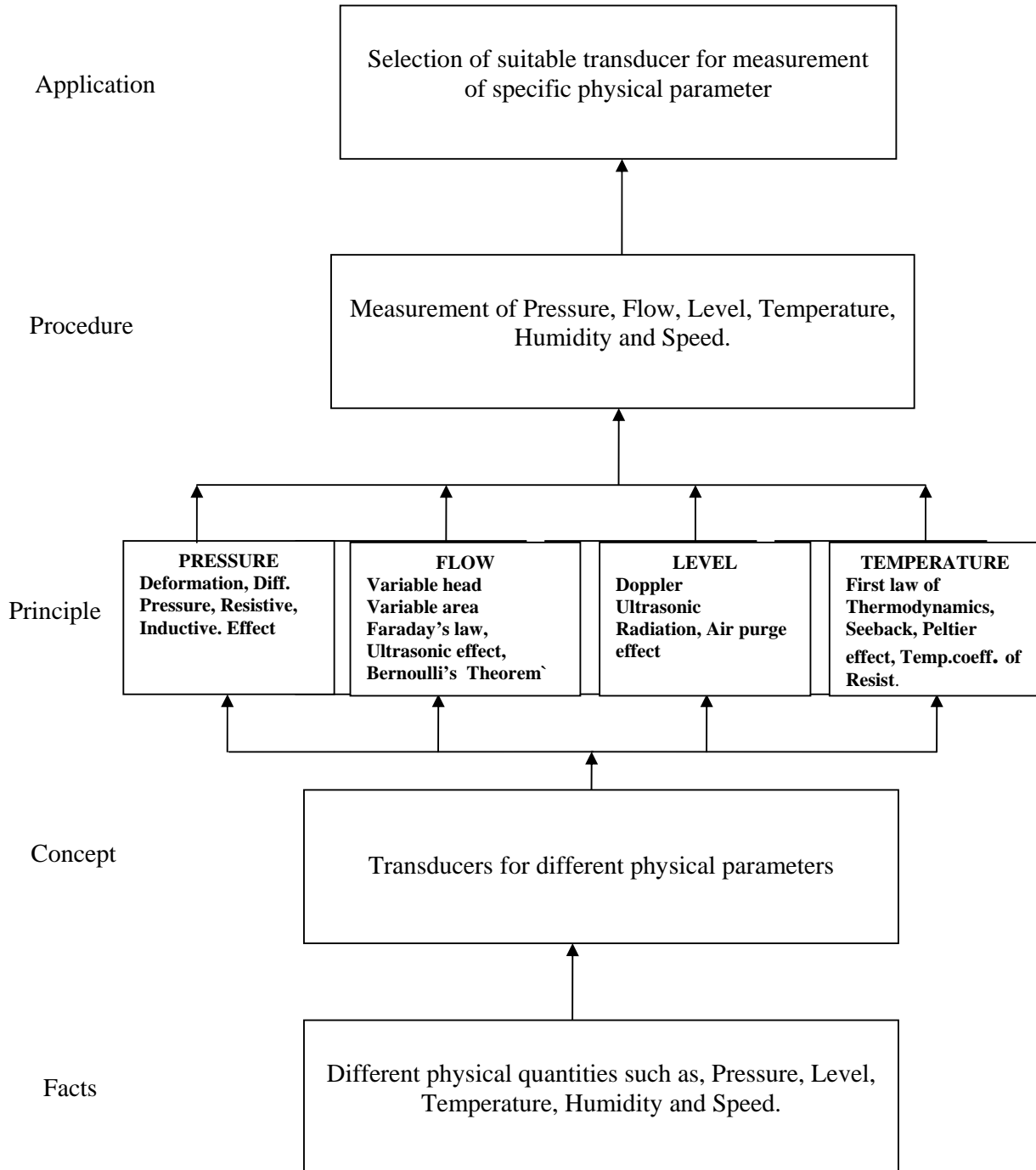
With the background of measuring instruments, this subject deals with measurement of different physical parameters like temperature, pressure etc. covering the entire gamut of industrial measurement. Different types of transducers used for measurement of different physical quantities with their construction, 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 No	Theory	Hrs.	Marks
1	<p>Transducers: Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw and describe the block diagram of Instrumentation system. ➤ Compare different Transducers ➤ Draw and describe different Electronic Transducers. <p>Contents</p> <ul style="list-style-type: none"> • Instrumentation System: 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 Digital, Primary and Secondary. • Electrical Transducers: Resistive transducers- Linear & Angular potentiometers Capacitive transducer Inductive transducer –LVDT, RVDT (As a displacement transducer) Piezoelectric transducer (Principle of operation and applications of above) • Selection criterion of transducers 	08	16
2	<p>Pressure measurement</p> <ul style="list-style-type: none"> ➤ Draw and describe the non-elastic and elastic pressure transducers. ➤ Draw and describe electronic pressure transducers. ➤ Write procedure of calibration of elastic pressure gauges using dead weight tester. <p>Contents</p> <ul style="list-style-type: none"> • Pressure: Definition Types - Absolute, Gauge, Atmospheric, Vacuum(Definition, Units) • Classification of Pressure measuring devices • Non elastic pressure transducer: U tube Inclined Tube Well type manometer • Elastic pressure transducer: Bourdon Tube Bellows Diaphragm Capsule • Electronic pressure transducers: Bourdon tube with LVDT Diaphragm with Strain gauge 	08	20

	<ul style="list-style-type: none"> • Calibration of pressure gauge using dead weight tester <p>Note: Each transducer should be studied on the basis of working principle, construction, advantages, disadvantages and applications.</p>		
3	<p>Flow Measurement</p> <ul style="list-style-type: none"> ➤ List Of different types of flow. ➤ List of different types of flow measuring transducers. ➤ Draw and describe construction and working of different Flow measuring transducers. <p>Contents</p> <ul style="list-style-type: none"> • Flow: <ul style="list-style-type: none"> Definition Types of Flow –Laminar, turbulent , Reynolds number • Classification of flow measuring transducers : <ul style="list-style-type: none"> Variable head flow meter- Venturimeter, orifice plate meter Variable area flow meter – Rota meter Electromagnetic Flow meter Ultrasonic flow meter- Doppler Type <p>Note: Each transducer should be studied on the basis of working principle, construction, advantages, disadvantages and applications.</p>	06	14
4	<p>Level Measurement</p> <ul style="list-style-type: none"> ➤ State the need of level measurement. ➤ List of different level measuring methods. ➤ Draw the construction and describe working of Level measuring transducers. <p>Contents</p> <ul style="list-style-type: none"> • Level: <ul style="list-style-type: none"> Definition Need of level measurement • Classification of level measurement methods: <ul style="list-style-type: none"> Float type – linear & rotary potentiometer (Contact type) Capacitive type (Contact type) Ultrasonic type (Non-contact type) Radiation type (Non-contact type) RADAR type (Non-contact type) <p>Note: Each transducer should be studied on the basis of working principle, construction, advantages, disadvantages and applications.</p>	08	16
5	<p>Temperature measurement</p> <ul style="list-style-type: none"> ➤ List different temperature measuring scales and its conversions. ➤ List different temperature measuring transducers. ➤ Draw the construction and describe working of different temperature transducers. <p>Contents</p> <ul style="list-style-type: none"> • Temperature : <ul style="list-style-type: none"> Definition and units Different temperature scales & their conversions • Classification of temperature measuring transducers: <ul style="list-style-type: none"> Gas Filled thermometer. 	10	20

	Bimetallic thermometer Thermistors RTD – (PT-100) , 2 wire systems (circuit diagram only) Thermocouple – Seeback & Peltier effect , Types J, K, R , S, T (Based on material, temperature ranges) Pyrometer - Optical, Radiation <u>Note:</u> Each transducer should be studied on the basis of working principle, construction, advantages, disadvantages and applications.		
6	Special Transducers and Measurements <ul style="list-style-type: none"> ➤ List different types of humidity and its units. ➤ Draw the construction and describe working of Humidity transducers. ➤ Draw the construction and describe working of Speed measuring transducers. Contents <ul style="list-style-type: none"> • Humidity: <ul style="list-style-type: none"> Definition Types - Absolute, relative • Humidity measurement devices: <ul style="list-style-type: none"> Psychrometer - Dry & wet Bulb thermometer type Hygrometer- hair type , • Speed <ul style="list-style-type: none"> Definition Classification of speed measurement methods Photoelectric pick-up (Non contact type) <u>Note:</u> Each transducer should be studied on the basis of working principle, construction, advantages, disadvantages and applications.	08	14
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. No.	Author	Title	Publisher
01	A.K.Sawhney	Electrical and Electronic Measurements and Instrumentation	Dhanpat Rai & Sons.
02	S.K.Singh	Industrial Instrumentation & Control	Tata McGraw Hill Publishing Co. Ltd; N. Delhi
03	D. Patranabis	Principles of Industrial Instrumentation	Tata McGraw Hill Publishing Co. Ltd; N. Delhi
04	Rangan Mani Sharma	Instrumentation Systems and Devices	Tata McGraw Hill Publishing Co. Ltd; N. Delhi
05	Bela Liptak Kriszta Venczel	Process Measurement Instrument Engineers Handbook	Chilton Book Co.
06	B.C.Nakra K.K.Chaudhry	Instrumentation Measurement and Analysis	Tata McGraw Hill Publishing 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			Examination Scheme					
TH	TU	PR	PAPER 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.

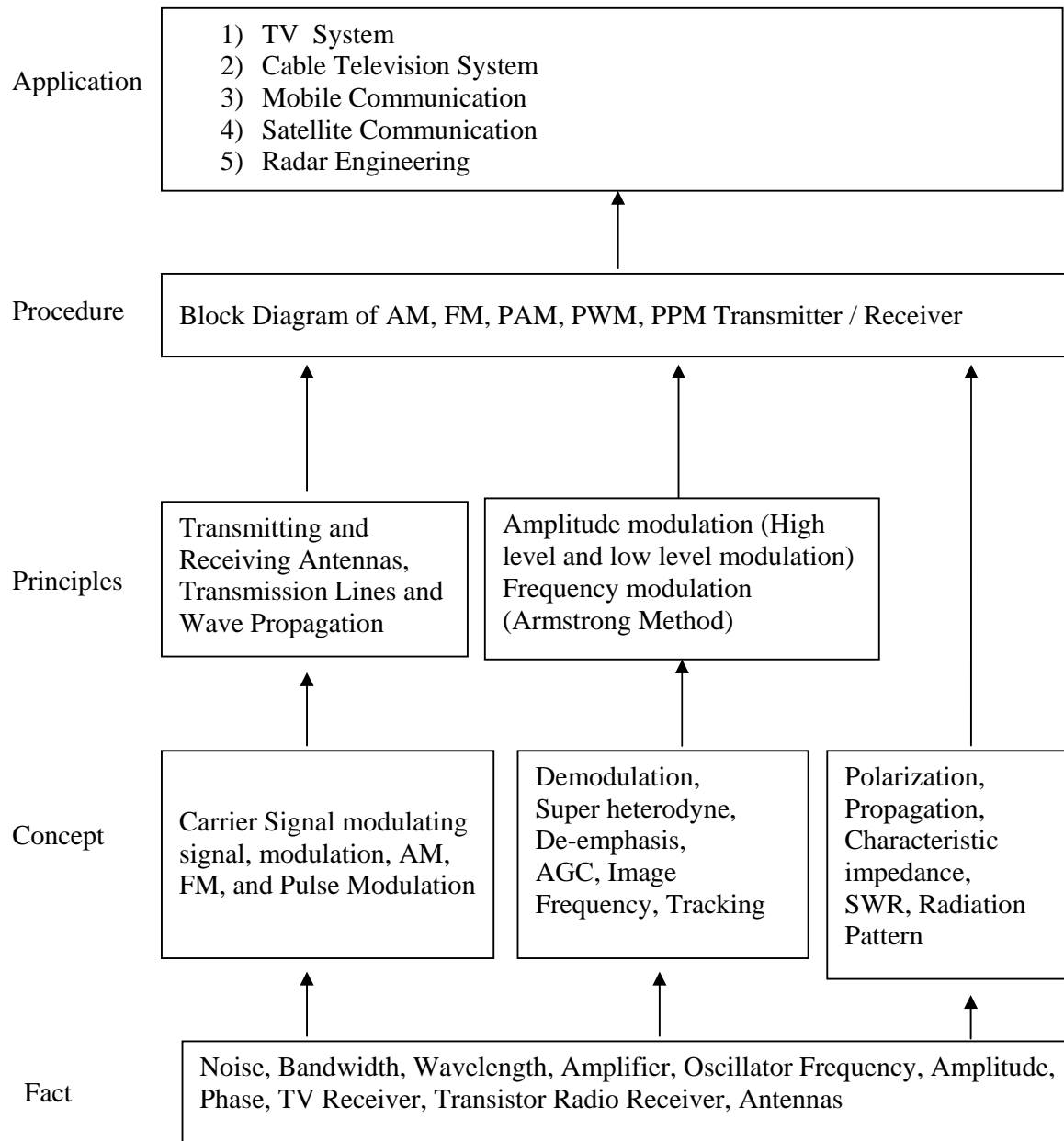
Study of Elements of Electronics, Electronic Devices and Circuits is prerequisite for Analog communication subject.

General Objectives:

The student will be 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 No	Theory	Hrs.	Marks
1	<p>Basics of Electronic Communication.</p> <p>Specific Objectives: Student will be able to-</p> <ul style="list-style-type: none"> ➤ Draw block diagram of electronic communication system ➤ Identify types of electronic communication systems. ➤ Draw electromagnetic spectrum. <p>Contents:</p> <ul style="list-style-type: none"> • The importance of electronic communication. • Definition: Analog signal, Digital signal, Baseband signal • The elements of basic electronic communication system (Draw block diagram and explain each block.): • Noise in communication system and types • Types of electronic communication. Simplex, Duplex- full / half. • The electromagnetic spectrum. • Concept of transmission bandwidth. 	04	06
2	<p>Modulation Techniques</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State the importance of modulation. ➤ Explain the process of different modulation techniques. ➤ Compute the modulation index. ➤ Differentiate between CW and pulse modulation techniques. <p>Contents:</p> <p>2.1 Basics of Modulation [04]</p> <ul style="list-style-type: none"> • Need for modulation • Types: AM, FM, PM. Definition ,waveforms <p>2.2 Amplitude Modulation [06]</p> <ul style="list-style-type: none"> • Modulation index-definition, its effect on modulated signal, simple numerical. • Mathematical representation of amplitude modulated wave & its meaning., concepts of side band (SSB,DSB) • Bandwidth requirement • Block diagram of AM transmitter and its operation • Representation of AM signal in time & frequency domain • Power relations in AM wave, simple numerical • Circuit and operation of AM modulators using BJT/FET <p>2.3 Frequency modulation [08]</p> <ul style="list-style-type: none"> • Deviation ratio, maximum deviation ratio, mathematical representation of FM & its meaning • Representation of FM signal in time domain & frequency domain • Bandwidth requirements and simple numerical • Concept of Pre-emphasis & De-emphasis • Generation of FM -Reactance modulator, varactor diode modulator, Armstrong: circuit diagram and its working • FM signal generation using ICs 566,564 <p>2.4 Pulse Modulation Techniques. [06]</p>	12	24

	<ul style="list-style-type: none"> • Need of Pulse Modulation • PAM, PWM, PPM- Block diagram, waveforms, advantages & disadvantages & their comparison. • Generation of PAM transistorized circuit, Generation of PWM, PPM using IC 555. 		
3	<p>Radio Receiver Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State super heterodyne principle ➤ Compare TRF & super heterodyne receivers. ➤ Explain the terms Automatic Frequency Control (AFC) and Automatic Gain Control (AGC). <p>Contents:</p> <p>3.1. Radio Receiver Types: [08]</p> <ul style="list-style-type: none"> • Block diagram of Tuned 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 Sensitivity, selectivity, fidelity. • Image frequency and its rejection, Double spotting • Frequency changing and tracking. <p>3.2. Demodulation of AM signal. [04]</p> <ul style="list-style-type: none"> • Diode detector, practical diode detector. • Need of AGC & its types – simple, delayed. <p>3.3 FM receiver : [06] Block diagram and explanation of FM Super heterodyne radio receiver with waveforms. Circuit diagram and working of limiter</p> <p>3.4 FM detector Types : [06]</p> <ul style="list-style-type: none"> • Balanced slope detector • Phase Discriminator • Ratio detector. • PLL as FM demodulator. 	14	24
4	<p>Topic.4 Transmission line Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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. <p>Contents:</p> <p>4.1 Fundamentals of transmission line. [04]</p> <ul style="list-style-type: none"> • Equivalent circuit of transmission line (general, RF equivalents.) • Characteristics impedance and its method of calculation, simple Numerical. • Losses in transmission line. <p>4.2 Standing waves [08]</p> <ul style="list-style-type: none"> • 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. 	08	18

	<ul style="list-style-type: none"> • Quarter wave transformer & impedance matching • Properties of line of various lengths. <p>4.3 Impedance Matching [06]</p> <ul style="list-style-type: none"> • Stub: single & double. • Baluns 		
5	<p>Wave Propagation Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Explain the theory of electromagnetic radiation. ➤ State different types of wave propagation. ➤ Define the various atmospheric layers ➤ Define the terms maximum usable frequency, critical frequency, skip distance & fading. <p>Contents:</p> <p>5.1 Fundamental of electromagnetic waves , Transverse electromagnetic wave, polarization [04]</p> <p>5.2 Types of Wave Propagation [08]</p> <ul style="list-style-type: none"> • Ground Wave. • Sky wave, ionosphere & its effect. • Space Wave , Duct propagation • Troposphere scatter propagation • Concept of actual height & virtual weight • Critical frequency, skip distance & fading, maximum usable frequency. 	04	12
6	<p>Antennas. Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define antenna. ➤ Define the term related with the antenna. ➤ Draw the structure, radiation pattern of antennas. ➤ State application of different antennas. <p>Contents:</p> <p>6.1 Antenna fundamentals : [04]</p> <ul style="list-style-type: none"> • Resonant antenna and Non-resonant antennas • Definition : Radiation pattern ,polarization, bandwidth, beam width, antenna resistance, directivity & power gain, antenna gain <p>6.2 Dipole antenna [04]</p> <ul style="list-style-type: none"> • Half wave dipole antenna (Resonant Antenna) & its Radiation pattern. • Folded dipole antenna & its radiation pattern. • Radiation pattern for Dipole Antenna of different length. <p>6.3 Structure, radiation pattern & application of antennas. [08]</p> <ul style="list-style-type: none"> • Loop antenna. • Telescopic antenna. • Yagi-Uda antenna • Micro wave antenna – Dish antenna &Horn antenna • Microstrip patch antennae- Rectangular, square and circular 	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. 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 impedance of co-axial cable. Find the impedance and VSWR.
12	Visit to the Radio Transmitter station and write a Transmitter specification.

Learning Resources:**1. Books:**

Sr. No.	Author	Title	Publisher
01	George Kennedy, Bernard Davis, SRM Prasanna	Electronic Communication Systems	TATA Mc-Graw Hill 5 th Edition
02	Louis E Frenzel	Communication Electronics	TATA Mc-Graw Hill 5 th 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

2. Websites:

- 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 Scheme					
TH	TU	PR	PAPER 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.

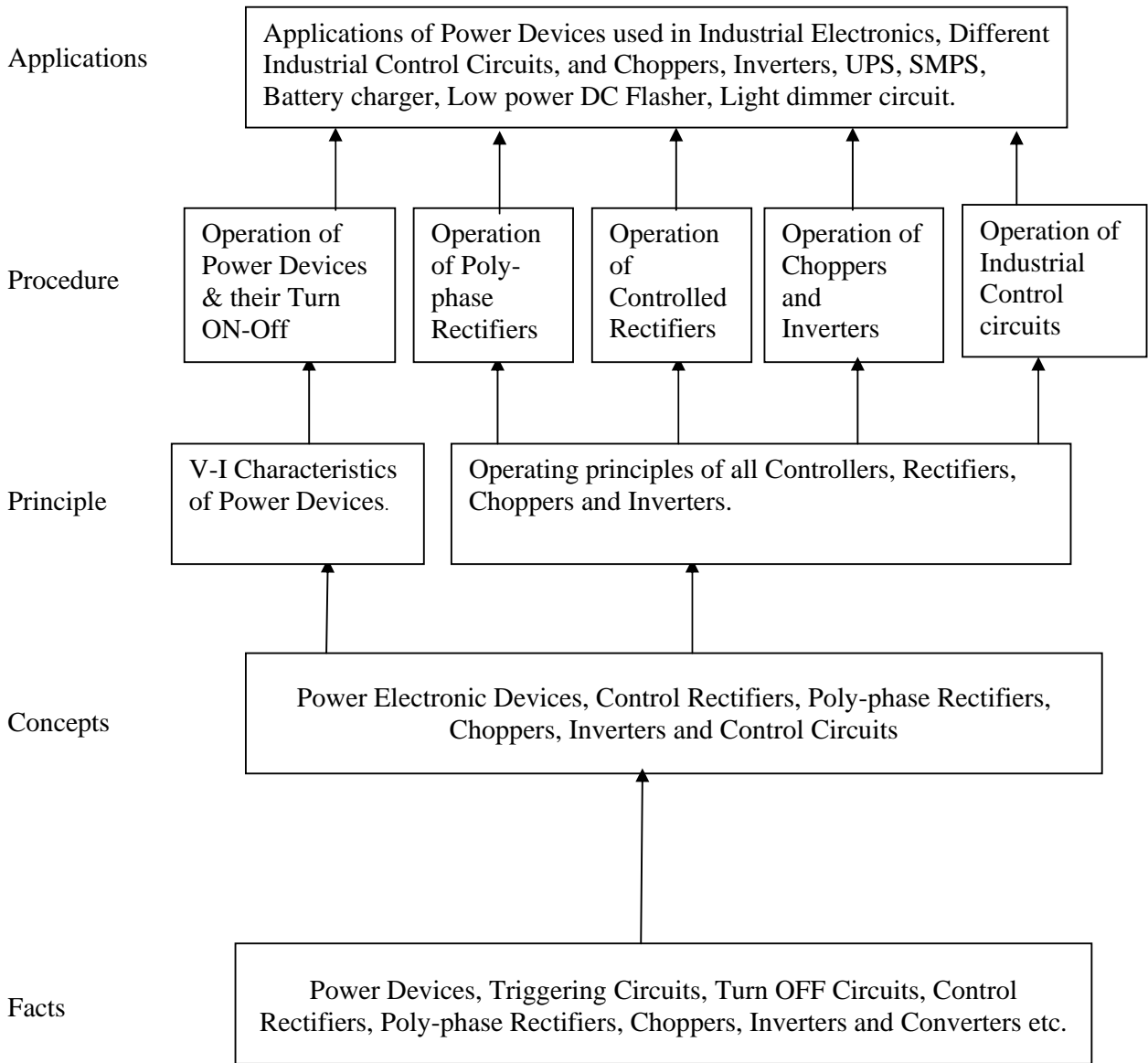
Concepts of electronic devices and circuits along with their applications are necessary. Industrial electronic is the foundation subject to study industrial drives, and advanced industrial electronics.

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 No	Contents	Hours	Marks
1	<p>Power Electronics Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Realize construction, working principle of different Power Devices. ➤ To select proper power device for particular applications. <p>Contents:</p> <ul style="list-style-type: none"> • Introduction to power electronics. • Power transistor: Construction, Operating Principle, V-I characteristics and Uses of power transistors. • Power MOSFET- Construction, Operating Principle, V-I characteristics and Uses of Depletion and Enhancement type power MOSFET. • IGBT- Construction, Operating Principle, V-I characteristics and Uses of IGBT. 	04	10
2	<p>Thyristor Family Devices Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Classify different power devices. ➤ Identify thyristors and triggering devices. ➤ Describe the operation of thyristor. ➤ Interpret V-I characteristics of different power devices. <p>Contents:</p> <ul style="list-style-type: none"> • SCR: Construction, Operating Principle with Two transistor analogy, V-I characteristics, Latching Current (I_L) and Holding Current (I_H). Applications of SCR, LASCR, SCS, GTO and TRIAC. • Thyristor family devices LASCR, SCS, GTO and TRIAC: Construction, Operating Principle, V-I characteristics and applications. • Triggering Devices- Construction, Operating Principle, V-I characteristics and applications of UJT, PUT, SUS, SBS and DIAC. 	10	20
3	<p>Turn ON and Turn OFF methods of SCR Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Classify Turn ON and Turn OFF circuits. ➤ Compare low power and high power triggering circuits <p>Contents:</p> <ul style="list-style-type: none"> • Concept of Turn ON mechanism of SCR: High Voltage triggering, thermal triggering, Illumination triggering, dv/dt triggering Gate triggering of SCR. • Gate trigger circuits –Resistance triggering circuit, Resistance 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- 	08	16

	Series resonant commutation circuit, Class B-Shunt resonant commutation circuit, Class C-Complimentary Symmetry commutation circuit		
4	<p>Phase controlled Rectifiers Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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. <p>Contents:</p> <ul style="list-style-type: none"> • Concept of phase control. (Firing Angle α and conduction angle \emptyset) • Circuit diagram, working, equations for and Waveforms of V_{DC} of following rectifiers. • 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. 	16	24
5	<p>Converters Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Understand the concept of Chopper. ➤ Realize the concept of Inverter. ➤ Explain operation of Chopper and Inverter. ➤ List different applications of Chopper and Inverter. <p>Contents:</p> <ul style="list-style-type: none"> • Concept of Choppers • Chopper: basic circuit and its operation using MOSFET • Step Up and Step down Chopper using MOSFET basic circuits. • 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. 	04	14
6	<p>Industrial Control Circuits. Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Understand the concept of Industrial Control Circuits. ➤ Draw the Circuit diagram and explain working of Industrial control circuits. ➤ Draw the Block diagram and explain working of SMPS and UPS. <p>Contents: Circuit diagram, working and applications of :</p> <ul style="list-style-type: none"> • Low power DC flasher. • Light dimmer circuit using DIAC-TRIAC. • Electronic timer using SCR. 	06	16

	<ul style="list-style-type: none"> • Battery charger using SCR. • Emergency Lighting System. • 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. No	Author	Title	Publisher
01	Alok Jain	Power Electronics and Its Applications	Penram International Publishing (India) Pvt. Ltd.
02	S. K. Bhattacharya	Fundamentals of Power Electronics	ISTE Learning materials centre.
03	M D Singh K B Khanchandani	Power Electronics	Tata McGraw-Hill
04	Muhammad H. Rashid	Power Electronics Circuits 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			Examination Scheme					
TH	TU	PR	PAPER 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:

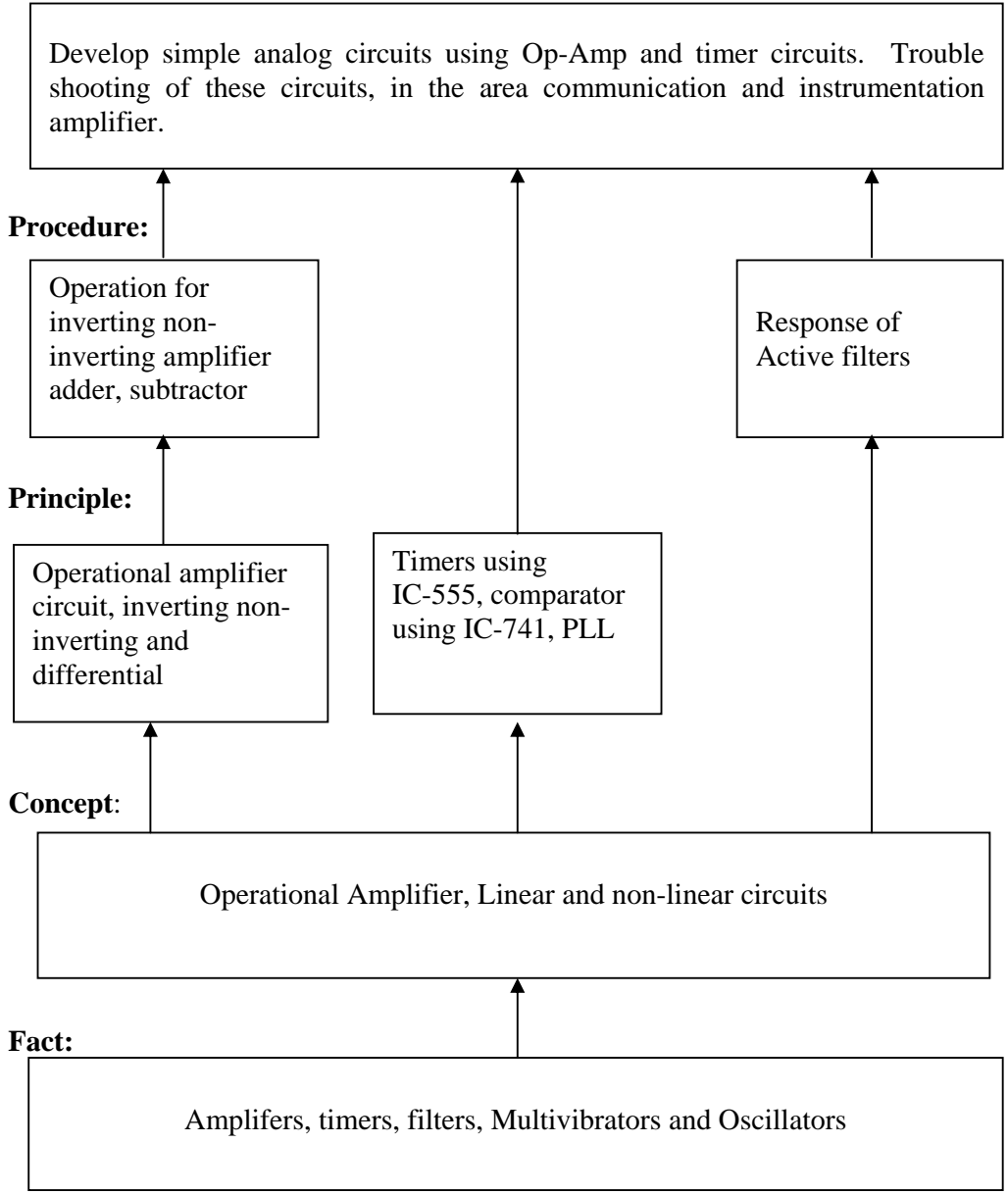
Students will be able to:

- 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
1	<p>Operational Amplifier (Op-Amp): Specific Objectives :</p> <ul style="list-style-type: none"> ➤ Draw labeled block diagram of Op-Amp ➤ Specify and define Different parameters of Op-Amp ➤ Interpret ideal transfer characteristics of Op-Amp <p>Contents:</p> <ul style="list-style-type: none"> • 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 push-pull amplifier. Equivalent Circuit, Circuit Symbols And 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. 	12	10
2	<p>Op-Amp Configuration: Specific Objectives: Students will be able to</p> <ul style="list-style-type: none"> ➤ Differentiate open and close loop configuration. ➤ Identify inverting and non-inverting configuration. ➤ Construct integrator and differentiator. <p>2.1 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, differential amplifier, unity gain amplifier (voltage follower), inverter(sign changer)</p> <p>2.2 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.</p>	12	18
3	<p>Applications of Op-Amp: Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Compute component values for instrumentation amplifier. ➤ Explain IC LM-324 ➤ Explain different applications of Op-Amp. <p>3.1 Need for signal conditioning and signal processing. [08]</p>	12	22

	<p>Circuit diagram, operation, derivation of output voltage Equation. advantages and applications of Instrumentation amplifier. Pin diagram pin functions and specifications of IC LM 324 Voltage to current converter (with floating load, with grounded load) Current to voltage converter.</p> <p>3.2 Sample and hold circuit. [16]</p> <p>Logarithmic and antilogarithmic amplifiers (using Diodes) Analog divider and analog multiplier Comparator: Circuit diagrams and operation of</p> <ul style="list-style-type: none"> • Zero crossing detector, • Schmitt trigger, • Window detector, • Phase detector, • Active peak detector, • Peak to peak detector 		
4	<p>Filters: Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Distinguish the types of filter ➤ Explain active and passive filter ➤ Explain different parameters of filter. <p>Contents:</p> <ul style="list-style-type: none"> • Introduction to filters ,Classification of filters, • Concept of passive and active filters • Merits and demerits of active filters over passive filters • 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. 	10	16
5	<p>Timers Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw block diagram of IC 555 ➤ Understand industrial applications of IC 555 ,565 <p>5.1 Introduction to timer IC 555 [10]</p> <ul style="list-style-type: none"> • Block diagram of IC 555 and its pin diagram and function of each pin. • Concepts of different timer circuits used in industries: water level controller, Touch plate switch, frequency divider. • Numericals based on timers. <p>5.2 Phase Lock Loop</p> <ul style="list-style-type: none"> • Principle of operation, block diagram of PLL. [08] • Applications of PLL as multiplier, FM demodulator. • Pin diagram and pin functions of IC 565(PLL) 	10	18

6	Oscillators: Specific Objectives: <ul style="list-style-type: none"> ➤ Explain concept of oscillators ➤ Explain different types of oscillators ➤ Develop multivibrators and oscillators for given values. Contents: <ul style="list-style-type: none"> • Concept of oscillators, • 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. 	08	16
	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: <ul style="list-style-type: none"> • Input Offset Voltage (V_{io}) • Output Offset Voltage (V_{oo}) • 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.
04	Verify the working of active integrator and differentiator circuits using op-amp IC 741 for following inputs: <ul style="list-style-type: none"> • Sine waveform • Square waveform • Rectangular waveform
05	Assemble V to I converter and I to V converter using IC 741 and measure the respective output.
06	Verify the working of following comparator circuits using op-amp IC 741 and draw the input-output waveforms <ul style="list-style-type: none"> • Zero crossing detector • Active peak detector
07	Assemble first order low pass Butterworth filter using op-amp and plot the frequency 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.
09	Assemble Monostable multivibrator circuit using IC 555. Plot the output waveform 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. 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 Analog Integrated Circuit	Tata-McGraw Hill
04	Willam D. Stanley	Operation Amplifier with Linear Integrated Circuit	Person

Course Name : Electronics Engineering and & Video Engineering Group

Course Code : ET/EJ/IE/IS/EN/EX/IC/MU/EV/DE/TU/ED/EI

Semester : Fourth

Subject Title : Visual Basic

Subject Code : 17043

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

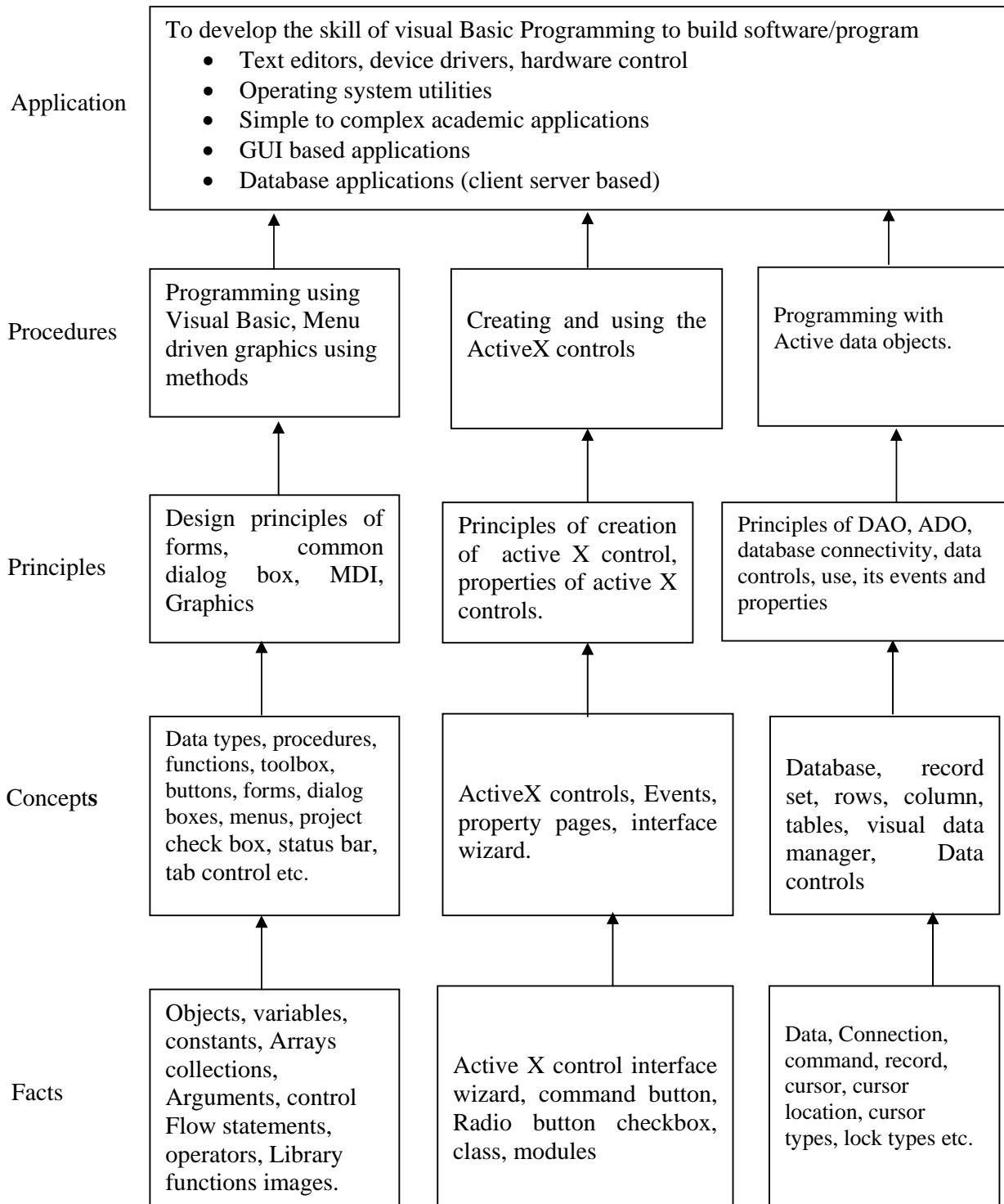
This course will lay the basic foundation of visual programming which will enable students to develop simple to complex programmable systems interfaces in the real world of work

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
<p>Topic 1] Introduction to Visual Environment Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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 ➤ Create objects, place them on forms <p>Contents:</p> <p>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.</p>	02
<p>Topic 2] Introduction to Visual Basic Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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 ➤ Use Inputbox and MsgBox functions <p>Contents:</p> <p>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 ().</p>	02
<p>Topic 3] Controls and Events Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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 <p>Contents:</p> <p>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.</p>	02
<p>Topic 4] Advance Controls & Events Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Add extrinsic controls in an application ➤ Use common dialog box control and its properties such open, save as, font, color, print and help ➤ 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 	03

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: <ul style="list-style-type: none"> ➤ 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 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.	03
Topic 6] Database and Report Specific Objectives: <ul style="list-style-type: none"> ➤ 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: 6.1 Concept of database, Record, Record set, Data control & its important properties 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	04
Total	16

TERM WORK:-

Sr No.	Name of the Experiments
1	a) Study and Understand Visual Basic Environment 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 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	a) Design Color box using RGB function to observe color change using H- scroll bar. b) Design project to demonstrate file, folder & drive controls to explore drive & folders.
7	Design GUI for Testing AC series Circuit
	Practice Experiment / Exercise
8	a) Design project to implement Common Dialog box controls such as open, save, Color, Font, Printer & Help b) Design a menu structure like notepad using menu editor
9	Design MDI application with 4 child forms & arrange forms with cascade, Tile Horizontal, 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. No.	Author	Title	Publisher
01	MSDN library on Line Reference	--	From Microsoft MSDN Library
02	Evangelos Petroustus	Mastering VB6	WILEY India
03	Steven Holzner	Visual basic 6	Dream Tech. Press
04	Content Development Group	Visual Basic 6.0 Programming	Tata McGraw Hill
05	Mohammed Azam	Programming with visual basic 6.0	Vikas Publishers
06	Nel Jerka	The complete reference VB6	Tata McGraw Hill Publishing

Course Name : Electronics Engineering Group

Course Code : ET/EJ/EN/EX/IE/IS/IC/DE/EV/MU/TU/ED/EI

Semester : Fourth

Subject Title : Professional Practices-II

Subject Code : 17044

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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:

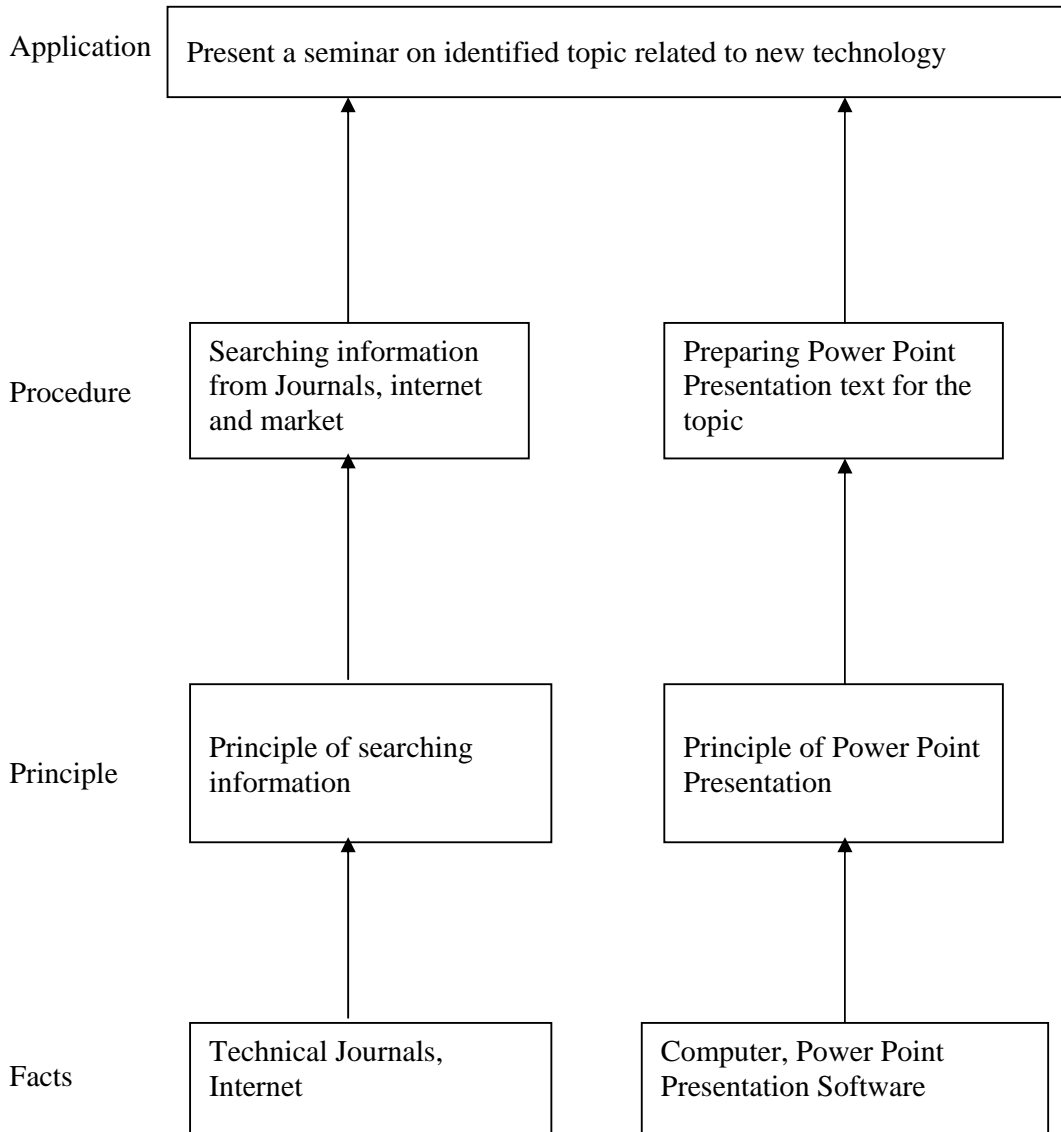
Intellectual skills:

- 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	<p>Industrial Visits 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. Minimum two industrial visits may be arranged in the following areas/ industries :</p> <ul style="list-style-type: none"> i) Electronic equipment manufacturing unit ii) Resistance welding unit iii) Industrial automation unit iv) Sugar mill, Paper mill, Cement Industry. v) Railway station control room. vi) Telephone Exchange. vii) Any other suitable Industry. 	16
2	<p>Lectures by Professional / Industrial Expert to be organized from any of the following areas (Any three)</p> <ul style="list-style-type: none"> i) Cyber laws. ii) Fiber optics communication system iii) Disaster management iv) Atomic energy v) Industrial Safety vi) Computer security systems/Ethical hacking. vii) Any other suitable topic viii) Introduction to Apprenticeship Training Scheme 	08
3	<p>Information Search : Information search can be done through manufacturers, catalogue, internet, magazines; books etc. and submit a report on one of the following topics:</p> <ul style="list-style-type: none"> 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 	06
4	<p>Seminar : 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)</p>	10
5	<p>Group Discussion: 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.</p>	08
Total		48

Learning Resources:**1. Books:**

Sr. 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 for All – Ninth Edition	PHI
05	Apprenticeship Training Scheme:- Compiled By – BOAT (Western Region), Mumbai, 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 4th semester examination.

Note:- Examination in Professional Practices of 5th 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.

 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										WITH EFFECT FROM 2012-13							
SEMESTER : FOURTH										DURATION : 16 WEEKS							
FULL TIME / PART TIME : FULL TIME										SCHEME : G							
SR. NO.	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME										SW (17400)
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)			
								Max	Min	Max	Min	Max	Min	Max	Min		
1	Environmental Studies \$	EST	17401	01	--	02	01	50#*	20	--	--	--	--	25@	10	50	
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		
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 5th 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, β - 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 5th Semester. <ul style="list-style-type: none"> ➤ 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/AU**

Semester : Fourth

Subject Title : Environmental Studies

Subject Code : 17401

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

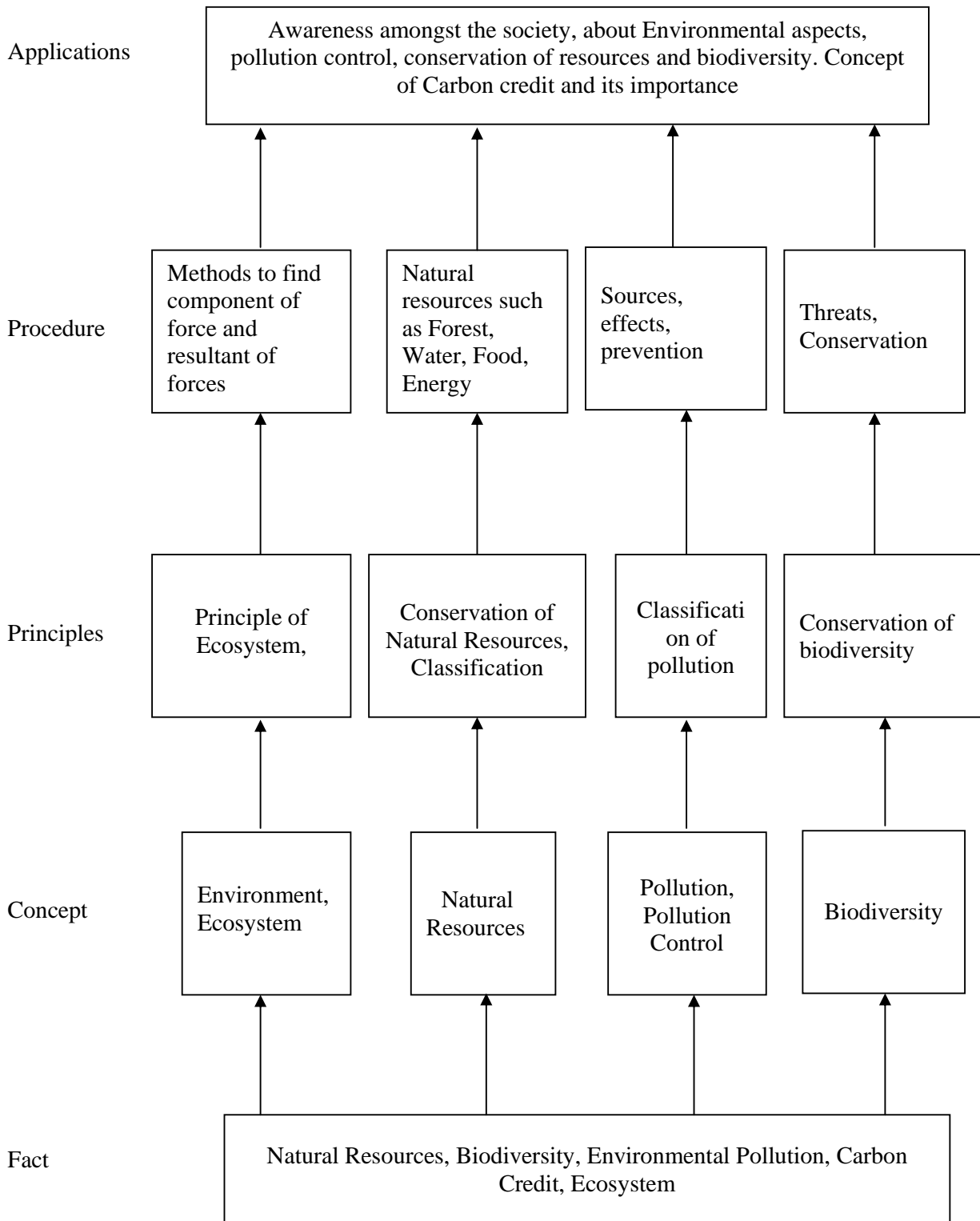
It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

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
<p>Topic 1: Nature of Environmental Studies</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define the terms related to Environmental Studies ➤ State importance of awareness about environment in general public <p>Contents:</p> <ul style="list-style-type: none"> • Definition, Scope and Importance of the environmental studies • Importance of the studies irrespective of course • Need for creating public awareness about environmental issues 	01	04
<p>Topic 2: Natural Resources and Associated Problems</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define natural resources and identify problems associated with them ➤ Identify uses and their overexploitation ➤ Identify alternate resources and their importance for environment <p>Contents:</p> <p>2.1 Renewable and Non renewable resources</p> <ul style="list-style-type: none"> • Definition • Associated problems <p>2.2 Forest Resources</p> <ul style="list-style-type: none"> • General description of forest resources • Functions and benefits of forest resources • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc. <p>2.3 Water Resources</p> <ul style="list-style-type: none"> • Hydrosphere: Different sources of water • Use and overexploitation of surface and ground water • Effect of floods, draught, dams etc. on water resources and community <p>2.4 Mineral Resources:</p> <ul style="list-style-type: none"> • Categories of mineral resources • Basics of mining activities • Mine safety • Effect of mining on environment <p>2.5 Food Resources:</p> <ul style="list-style-type: none"> • Food for all • Effects of modern agriculture • World food problem 	04	10
<p>Topic 3. Ecosystems</p> <ul style="list-style-type: none"> • Concept of Ecosystem • Structure and functions of ecosystem • Energy flow in ecosystem • Major ecosystems in the world 	01	04
<p>Topic 4. Biodiversity and Its Conservation</p> <ul style="list-style-type: none"> • Definition of Biodiversity • Levels of biodiversity • Value of biodiversity • Threats to biodiversity 	02	06

<ul style="list-style-type: none"> • Conservation of biodiversity 		
Topic 5. Environmental Pollution <ul style="list-style-type: none"> • Definition • Air pollution: Definition, Classification, sources, effects, prevention • Water Pollution: Definition, Classification, sources, effects, prevention • Soil Pollution: Definition, sources, effects, prevention • Noise Pollution: Definition, sources, effects, prevention 	03	08
Topic 6. Social Issues and Environment <ul style="list-style-type: none"> • Concept of development, sustainable development • Water conservation, Watershed management, Rain water 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 	03	10
Topic 7. Environmental Protection Brief description of the following acts and their provisions: <ul style="list-style-type: none"> • Environmental Protection Act • Air (Prevention and Control of Pollution) Act • Water (Prevention and Control of Pollution) Act • Wildlife Protection Act • Forest Conservation Act Population Growth: Aspects, importance and effect on environment <ul style="list-style-type: none"> • Human Health and Human Rights 	02	08
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. No.	Author	Title	Publisher
01	Anindita Basak	Environmental Studies	Pearson Education
02	R. Rajgopalan	Environmental Studies from Crises to Cure	Oxford University Press
03	Dr. R. J. Ranjit Daniels, Dr. Jagdish Krishnaswamy	Environmental Studies	Wiley India

Course Name : Diploma in Electronics & Video Engineering

Course Code : EV

Semester : Fourth

Subject Title : Electronic Instrumentation

Subject Code : 17435

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

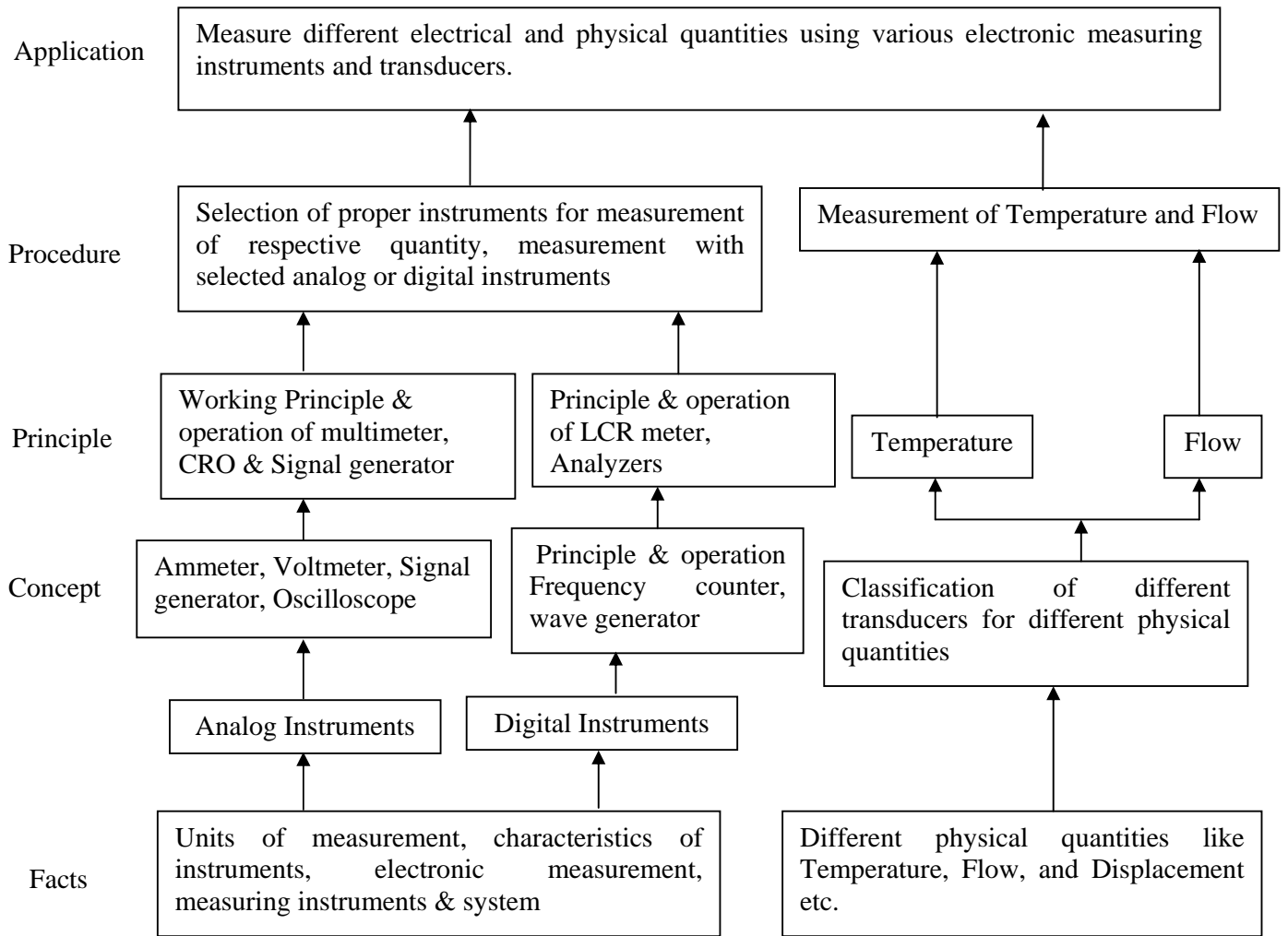
This subject presumes that the students are familiar with basic utilization of measuring instruments. The era of this subject consists of the information about concepts, principles and procedures of analog and digital electronic measuring instruments and measuring techniques. With the help of transducers 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 No.	Theory	Hrs.	Marks
1	<p>Basics of Measurement: Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define measurement and instrument. ➤ Classify various instruments. <p>Contents</p> <ul style="list-style-type: none"> • Classification of Instruments: Absolute, Secondary Instruments • Definitions of Static characteristics of Instruments: Accuracy, Precision, Sensitivity, Resolution, Static error, Reproducibility, Drift, Dead Zone • Definitions of dynamic characteristics of Instruments: Speed of response, Lag, fidelity, Dynamic error • Types of Errors- Gross, Systemic, Random • Units of measurement of fundamental quantity 	06	10
2	<p>Analog DC and AC Meters</p> <ul style="list-style-type: none"> ➤ Draw the constructional diagram of PMMC meter. ➤ State the working principles of different types of DC/AC Voltmeter/Ammeter and list their specifications. ➤ Describe the working of analog multimeter <p>Contents</p> <ul style="list-style-type: none"> • Classification of analog ammeter and voltmeter • Working principle and construction of PMMC instruments • Analog DC Ammeter: Shunt resistor type, Ayrton Shunt type • Analog DC Voltmeter: Multiplier voltmeter • Analog AC Voltmeter (No derivation)- Half Wave rectifier type, Full wave rectifier type, Multirange type • Analog AC Ammeter 	06	12
3	<p>Digital Meters:</p> <ul style="list-style-type: none"> ➤ Draw block diagram and describe operation of different digital meters. ➤ State the applications of digital meters <p>Contents</p> <ul style="list-style-type: none"> • Concepts of ADC & DAC (Review) (No marks) • Advantages and Disadvantages of Digital Instruments and comparison with analog instruments • Block diagram, operation and applications of Digital Frequency meter Digital Voltmeter DMM LCR –Q meter 	06	12

4	<p>Oscilloscope</p> <ul style="list-style-type: none"> ➤ Draw the basic block diagram and describe the function of each block of CRO. ➤ List and describe different applications of CRO. <p>Contents</p> <ul style="list-style-type: none"> • CRO: Basic Block diagram and function of each block • Function of delay line • Explanation of waveform generation • Applications of CRO: <ul style="list-style-type: none"> Time & frequency measurement Voltage measurement Lissagous patterns for Phase and Frequency measurement • Concept, block diagram and Operation of: Single beam dual trace & Dual beam Dual Trace CRO • Block diagram, operation and applications of digital storage oscilloscope (DSO) 	08	16
5	<p>Topic 5: Signal generator and Wave Analyzer</p> <ul style="list-style-type: none"> ➤ Draw block diagram of signal generator and waveform analyzer and their working ➤ Test the faults and rectify the faults in T.V. using pattern generator. ➤ Draw block diagram of harmonic distortion analyzer and describe its working. <p>Contents</p> <p>5.1 Signal generators: 10 Marks</p> <ul style="list-style-type: none"> • Definition and need of signal generator • Block diagram, operation and applications of : <ul style="list-style-type: none"> AF and RF type signal generator Function generator Square and Pulse generator Video pattern generator <p>5.2 Wave analyzer: 10 Marks</p> <ul style="list-style-type: none"> • Definition and need of waveform analyzer • Block diagram, operation and applications of : <ul style="list-style-type: none"> Frequency selective wave analyzer Harmonic distortion analyzer Logic analyzer Spectrum analyzer 	08	20
6	<p>Transducers</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw and describe the block diagram of Instrumentation system. ➤ Compare different Transducers <p>Contents</p> <ul style="list-style-type: none"> • Instrumentation System: <ul style="list-style-type: none"> Block diagram of Instrumentation system: Function of each block, Explanation of basic instrumentation systems • Transducer: <ul style="list-style-type: none"> Need of Transducer: Classification of transducers: Active and Passive, Analog and 	08	14

	Digital, Primary and Secondary. • Electrical Transducers: Resistive transducers- Linear & angular potentiometers Capacitive transducer Inductive transducer –LVDT ,RVDT (As a displacement transducer) Piezoelectric transducer (Principle of operation and applications of above)		
7	Special Transducers and Measurements ➤ Draw the construction and describe working of flow transducers. ➤ Draw the construction and describe working of Temperature measuring transducers. Contents <ul style="list-style-type: none"> • Flow: Definition • Classification of flow measuring transducers: Electromagnetic Flow meter Ultrasonic flow meter- Time difference and Doppler Type • 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.	06	16
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. Identify 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. No.	Author	Title	Publisher
01	A.D. Helfrick 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 Measurements & Instrumentation	Dhanpat Rai & Sons
04	S K Singh	Industrial Instrumentation and Control	Tata McGraw Hill Education Private Limited, New Delhi
05	D. Patranabis	Principles of Industrial Instrumentation	Tata McGraw Hill Publishing Co. Ltd; N. Delhi
06	Rangan Mani & Sharma	Instrumentation Systems and Devices	Tata McGraw Hill Publishing 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 Electronics & Video Engineering

Course Code : EV

Semester : Fourth

Subject Title : Radio Reception

Subject Code : 17437

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

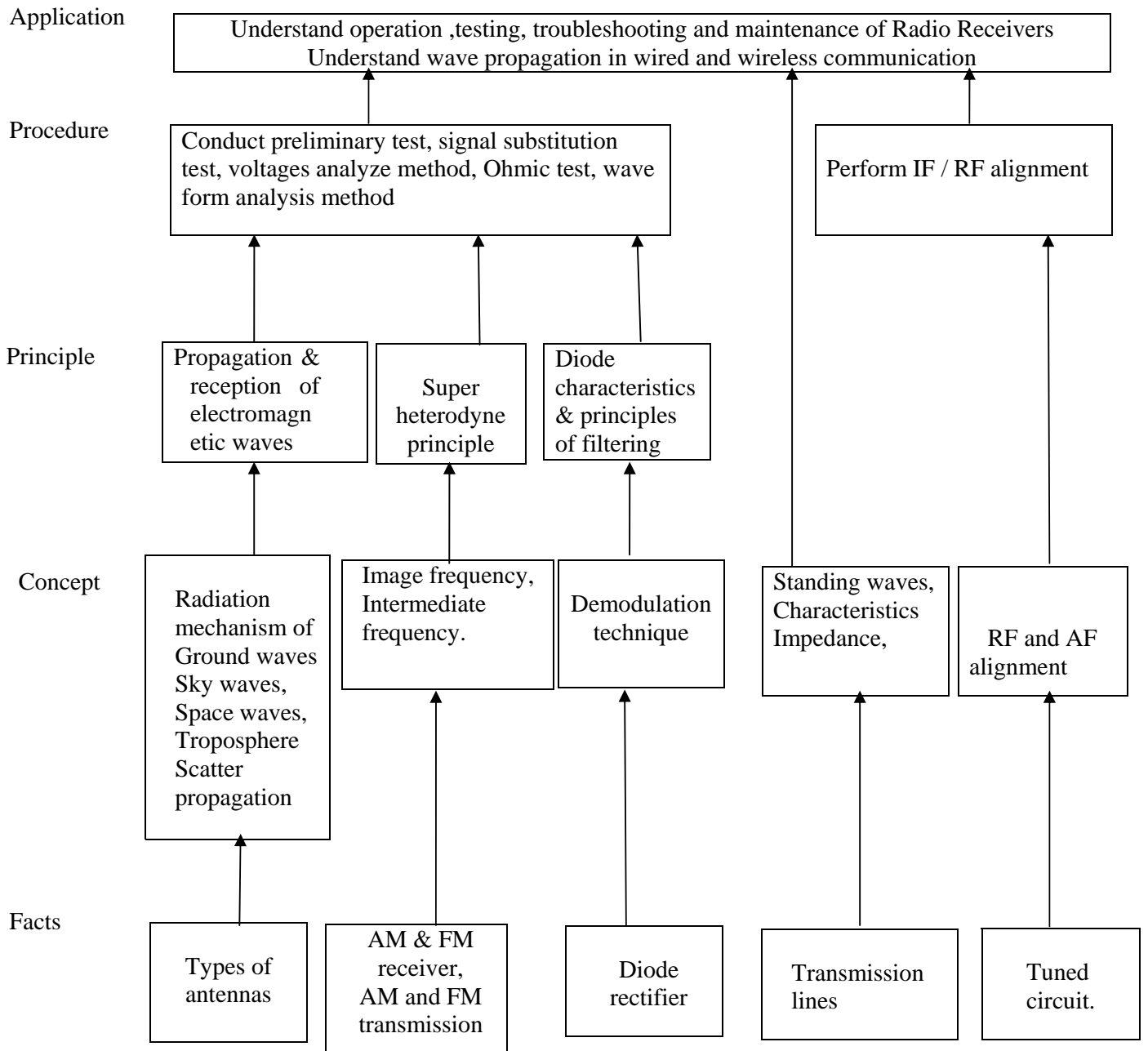
The study of this subject will be useful in understanding various telecommunication system such as TV receivers, Satellite & Radar systems and mobile communication.

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.

Learning Structure:



Theory Contents:

Topic No	Theory	Hrs.	Marks
1	<p>Wave Propagation Specific objectives: Students will be able to</p> <ul style="list-style-type: none"> ➤ Explain the concept of electromagnetic waves. ➤ Explain different types of radio wave propagation. <p>Contents:</p> <ul style="list-style-type: none"> • Fundamental of electromagnetic waves. • Definition of radiation, reception, attenuation, absorption & polarization. • Propagation of waves: Ground waves, Sky waves: ionosphere & its effects, actual height, virtual height, skip distance, critical frequency, max usable frequency, Space waves-fading, Tropospheric scatter propagation. 	08	16
2	<p>Transmission Line Specific objective:</p> <ul style="list-style-type: none"> ➤ To state understand various characteristics of transmission line and losses. <p>Contents:</p> <p>2.1 [10]</p> <ul style="list-style-type: none"> • Basic principle of transmission line. • Equivalent circuit representation of transmission line. • Characteristics impedance of transmission line. • Losses in transmission line. <p>2.2 [08]</p> <p>Standing waves:</p> <ul style="list-style-type: none"> • SWR • VSWR • Reflection coefficient. • Quarter & half wave length lines. • Reactance properties of transmission line. 	12	18
3	<p>Antenna Specific objective:</p> <ul style="list-style-type: none"> ➤ To explain construction, working principle, operation and characteristics of various antennas. ➤ To plot radiation pattern of antenna <p>Contents:</p> <p>3.1 Basics of antenna. [12]</p> <ul style="list-style-type: none"> • Electromagnetic radiation. • Hertzian Dipole. • Resonant antenna, radiation pattern and antenna length calculation. • Non resonant antenna (directional antenna). • Definition: Antenna gain, effective radiated power, directivity, power gain (ERP), antenna resistance, bandwidth, beam width and polarization. <p>3.2 [12]</p> <ul style="list-style-type: none"> • Directional high frequency antenna: Dipole arrays, Folded 	10	24

	<p>dipole antenna, Yagi uda antenna</p> <ul style="list-style-type: none"> • UHF & microwave antenna: Focal feed parabolic reflector, Cassegrain feed parabolic reflector, Horn antenna. • Wideband & special purpose antenna: Loop antenna, Phased array 		
4	<p>AM Radio Receiver. Specific objective:</p> <ul style="list-style-type: none"> ➤ Explain operation TRF and super heterodyne receivers. ➤ Define characteristics of AM radio receiver. ➤ State the procedure for alignment of TV receiver ➤ To understand concept of AGC. <p>Contents:</p> <p>4.1 AM Receiver [12]</p> <ul style="list-style-type: none"> • Block diagram of tuned radio receiver and its working. • Block diagram of superheterodyne receiver, function of each block and its working. • Characteristics of AM radio receiver: Sensitivity, Selectivity. Adjacent channel selectivity, image signal rejection ratio Frequency changing & tracking. <p>4.2 A M Receiver Alignment [12]</p> <ul style="list-style-type: none"> • Choice of intermediate frequency used for different application. • circuit diagram, operation and input and output voltages of practical diode detector. • Alignment of AM radio receivers: Necessity of alignment. RF alignment, IF alignment, Selectivity, sensitivity, fidelity, dynamic range of radio receiver, simple AGC circuit 	10	24
5	<p>FM Radio Receiver Specific objective:</p> <ul style="list-style-type: none"> ➤ To draw block diagram of FM radio receiver. ➤ To explain types of FM demodulators circuit. ➤ To state necessity of alignment of radio receiver and procedure of RF & IF alignment carried out in AM radio receivers. <p>Contents: [18] Block diagram & operation of FM radio receiver, Circuit diagram & 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.</p>	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. No.	Title	Author	Publisher
01	Electronics Communication Systems	George Kennedy	Mc Graw – Hill Book Co. Ltd. Singapore.
02	Analog Communication	V. Chandra Sekar	Oxford University Press
03	Communication Electronics	Frenzil	Mc Graw – Hill Book Co. Ltd. Singapore
04	Electronics Communication 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

Course Code : EV

Semester : Fourth

Subject Title : TV Signal Transmission System

Subject Code : 17441

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

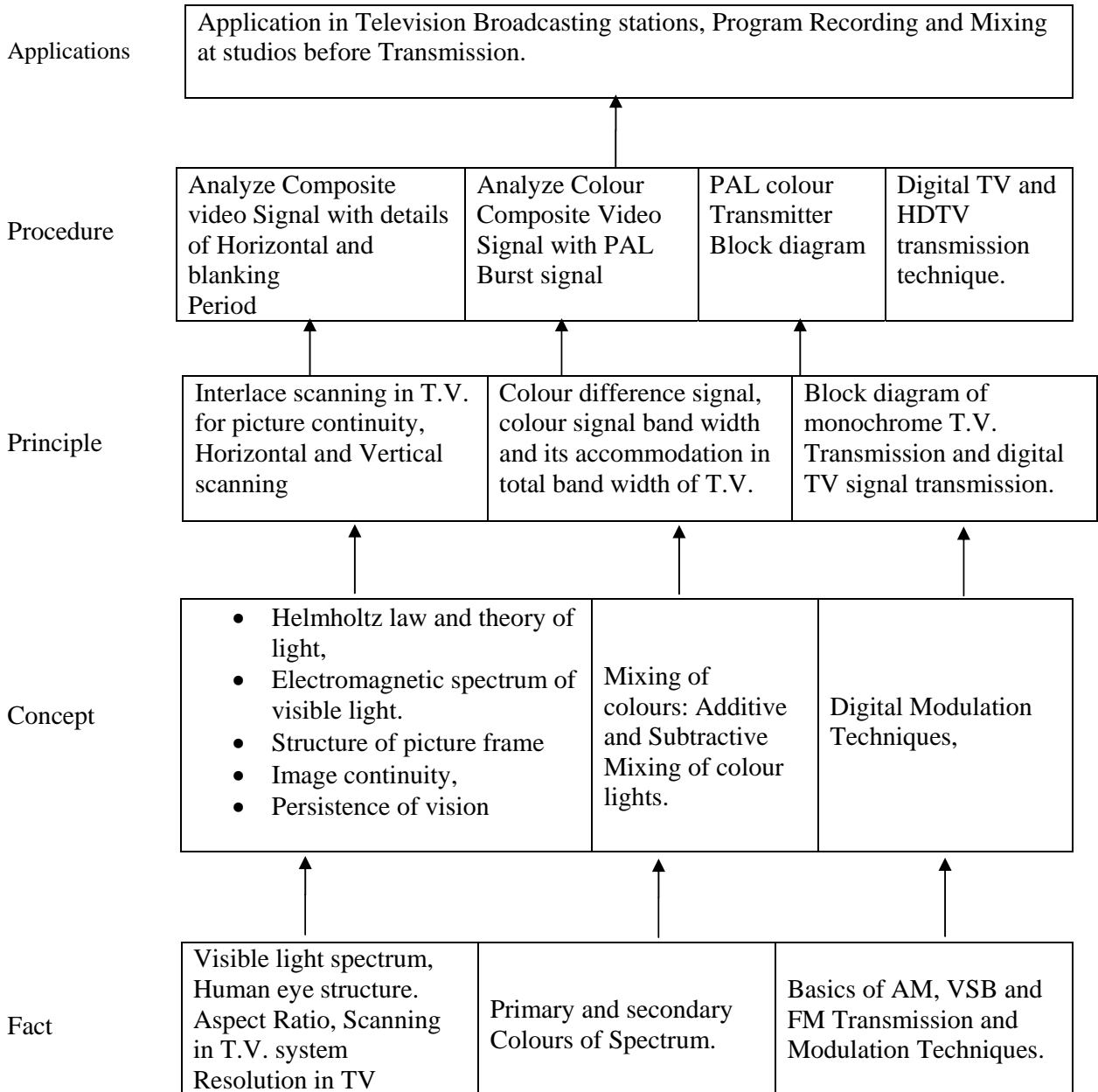
Thus students will be aware the subject of TV Receiver in further Semester.

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:



Theory:

Topic No	Contents	Hours	Marks
1	<p>T.V. Fundamentals Specific Objectives: ➤ Understand the fundamentals of TV transmission ➤ Understand the different requirements for TV signal ➤ Understand the purpose of VSB transmission.</p> <p>Contents: 1.1 Perception of vision & 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] 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]</p>	08	18
2	<p>Composite Video Signal Specific Objectives: ➤ Draw the CVS for TV signal. ➤ List the standards used for TV Signal transmission. ➤ Designate band allocation for TV Transmission.</p> <p>Contents: 2.1 [10]</p> <ul style="list-style-type: none"> • Pedestal height, Blanking pulses (H& V) Color Burst, Horizontal sync. Pulse details, vertical sync. Pulse details, Equalization Pulses, D.C. Level • 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. • 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 & their comparison, Purpose of channel allocation. [08] 	10	18
3	<p>Monochrome T.V. Transmitter Specific Objectives: ➤ Explain the modulation techniques used for TV signal Transmission. ➤ Describe the function of different camera tubes. ➤ Explain the function of monochrome TV transmission.</p> <p>Contents: 3.1 Audio and video signal transmission, FM for sound signal and AM for Picture signal, Positive and negative modulation with proper waveform and comparison [04] 3.2 Camera tubes, Block schematic of Silicon Diode Array, Videocon camera and its working, Schematic diagram of CCD Camera and its</p>	10	16

	working, Block diagram of Colour camera and its function. [08] 3.3 Block diagram of monochrome T.V. Transmitter, Block diagram of B/W TV Transmitter and function of each block. [04]		
4	<p>Colour Theory Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Explain fundamentals of Colour Theory ➤ Analyze human eye response to different colours. ➤ Visualize the concept of mixing of colours. <p>Contents:</p> <p>4.1 [10]</p> <ul style="list-style-type: none"> • Visible light spectrum, Nature of light, Draw visible light spectrum. • Human eye response to different colours. Construction of Human eye. • Color theory:- Primary and Secondary colors, Additive and Subtractive Mixing, Grassman's Law of colour mixing., Hue, Saturation, Luminance and Chrominance Signal. • 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 difference signal. <p>4.2 [08]</p> <ul style="list-style-type: none"> • Frequency interleaving, Utilization of interleaved space for colour signal transmission, Choice 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. • Block Diagram and concept of Quadrature Amplitude Modulation. Block diagram and working of QAM for PAL system. 	08	18
5	<p>PAL Transmitter Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Explain the basic principles of PAL Transmitter <p>Contents:</p> <p>5.1 PAL – V switching [06]</p> <ul style="list-style-type: none"> • Elimination of differential phase error in 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. Selection of exact PAL colour sub-carrier frequency Factors influencing to select exact PAL colour sub-carrier frequency. <p>5.2 Bandwidth for transmitted PAL colour resultant [04]</p> <ul style="list-style-type: none"> • Placement of PAL colour signal in VSB of TV Transmission, selection of bandwidth for colour signal over luminance signal, Suppressed colour sub-carrier transmission. <p>5.3 Colour composite video signal [08]</p>	06	18

	<ul style="list-style-type: none"> Draw CCVS and label it, Block diagram of PAL Encoder and function of each block with output waveforms, Block diagram of PAL Transmitter and function of each section. 		
6	<p>Digital TV Transmission Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Explain the basic fundamentals of Digital TV Transmission ➤ Explain the concept of HDTV transmission. <p>Contents:</p> <p>6.1 [06]</p> <ul style="list-style-type: none"> Concept of digital TV Transmission, Basic block diagram of digital TV signal transmission and its working. Characteristics of Digital TV Signal. Advantage & Disadvantage of digital TV Transmission <p>6.2 [06]</p> <ul style="list-style-type: none"> Features of HDTV Transmission & channel, Features of High Definition Signal. Block diagram of HDTV signal transmitter and its working. Characteristics of HD Signals and System 	06	12
Total		48	100

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.)

- To observe, draw and analyze the output CVS waveform of pattern generator for monochrome bar pattern.
- To observe, draw and analyze the output CVS waveform of pattern generator for monochrome Chessboard pattern.
- To observe, draw and analyze the output CVS waveform of pattern generator for Colour bar pattern.
- 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.)
- 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. 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 & Practices	R.R.Gulati	New Age International Ltd. Delhi.
04	Basic T.V. & Video System	Barnad Grobe	Mac- GRaw Hill Ltd., New York
05	Colour T.V. & Video 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			Examination Scheme					
TH	TU	PR	PAPER 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:

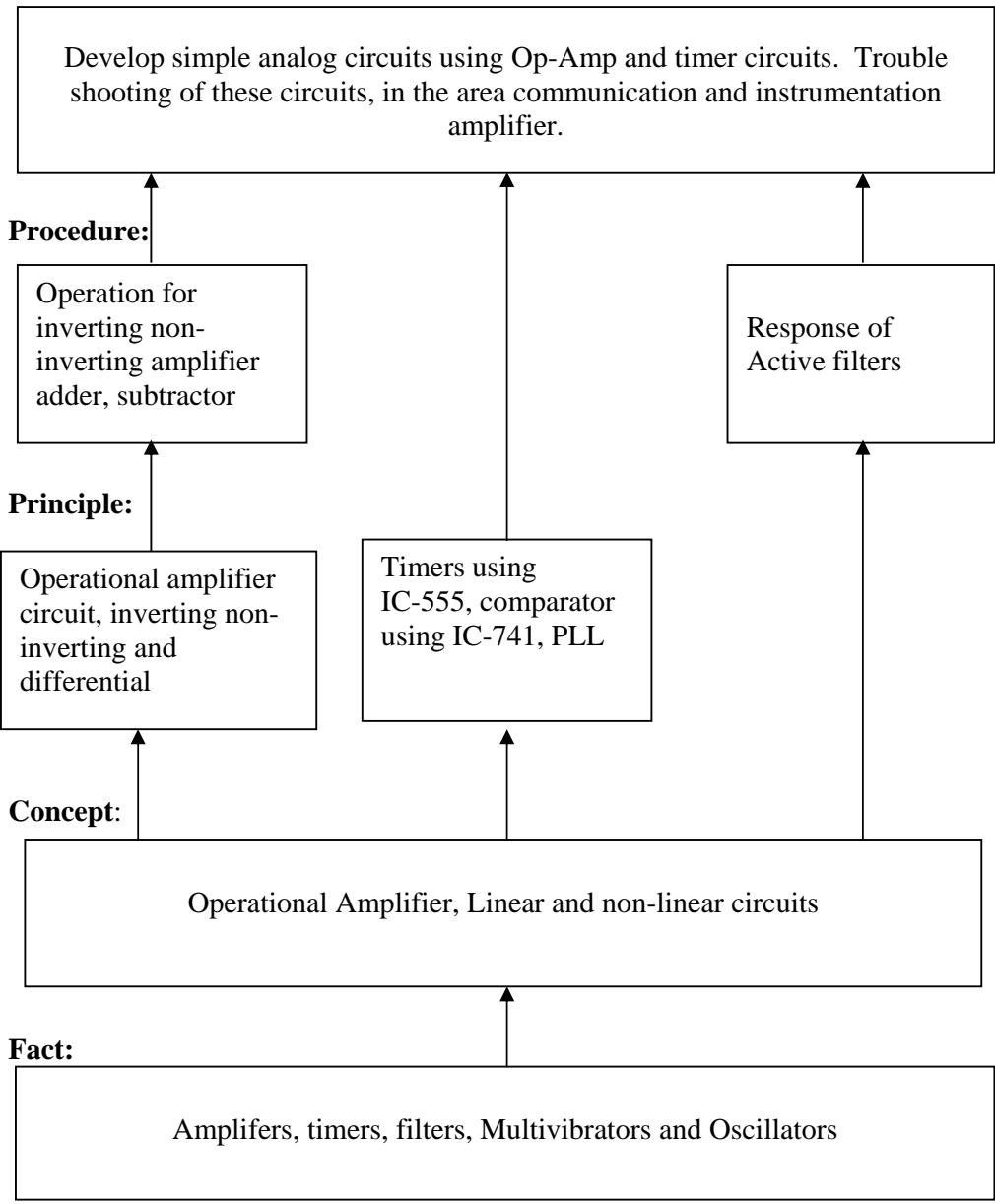
Students will be able to:

- 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
1	<p>Operational Amplifier (Op-Amp): Specific Objectives :</p> <ul style="list-style-type: none"> ➤ Draw labeled block diagram of Op-Amp ➤ Specify and define Different parameters of Op-Amp ➤ Interpret ideal transfer characteristics of Op-Amp <p>Contents:</p> <ul style="list-style-type: none"> • 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 push-pull amplifier. Equivalent Circuit, Circuit Symbols And 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. 	12	10
2	<p>Op-Amp Configuration: Specific Objectives: Students will be able to</p> <ul style="list-style-type: none"> ➤ Differentiate open and close loop configuration. ➤ Identify inverting and non-inverting configuration. ➤ Construct integrator and differentiator. <p>2.1 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, differential amplifier, unity gain amplifier (voltage follower), inverter(sign changer)</p> <p>2.2 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.</p>	12	18
3	<p>Applications of Op-Amp: Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Compute component values for instrumentation amplifier. ➤ Explain IC LM-324 ➤ Explain different applications of Op-Amp. <p>3.1 Need for signal conditioning and signal processing. [08]</p>	12	22

	<p>Circuit diagram, operation, derivation of output voltage Equation. advantages and applications of Instrumentation amplifier. Pin diagram pin functions and specifications of IC LM 324 Voltage to current converter (with floating load, with grounded load) Current to voltage converter.</p> <p>3.2 Sample and hold circuit. [16]</p> <p>Logarithmic and antilogarithmic amplifiers (using Diodes) Analog divider and analog multiplier Comparator: Circuit diagrams and operation of</p> <ul style="list-style-type: none"> • Zero crossing detector, • Schmitt trigger, • Window detector, • Phase detector, • Active peak detector, • Peak to peak detector 		
4	<p>Filters: Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Distinguish the types of filter ➤ Explain active and passive filter ➤ Explain different parameters of filter. <p>Contents:</p> <ul style="list-style-type: none"> • Introduction to filters ,Classification of filters, • Concept of passive and active filters • Merits and demerits of active filters over passive filters • 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. 	10	16
5	<p>Timers Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw block diagram of IC 555 ➤ Understand industrial applications of IC 555 ,565 <p>5.1 Introduction to timer IC 555 [10]</p> <ul style="list-style-type: none"> • Block diagram of IC 555 and its pin diagram and function of each pin. • Concepts of different timer circuits used in industries: water level controller, Touch plate switch, frequency divider. • Numericals based on timers. <p>5.2 Phase Lock Loop</p> <ul style="list-style-type: none"> • Principle of operation, block diagram of PLL. [08] • Applications of PLL as multiplier, FM demodulator. • Pin diagram and pin functions of IC 565(PLL) 	10	18

6	Oscillators: Specific Objectives: <ul style="list-style-type: none"> ➤ Explain concept of oscillators ➤ Explain different types of oscillators ➤ Develop multivibrators and oscillators for given values. Contents: <ul style="list-style-type: none"> • Concept of oscillators, • 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. 	08	16
	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: <ul style="list-style-type: none"> • Input Offset Voltage (V_{io}) • Output Offset Voltage (V_{oo}) • 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.
04	Verify the working of active integrator and differentiator circuits using op-amp IC 741 for following inputs: <ul style="list-style-type: none"> • Sine waveform • Square waveform • Rectangular waveform
05	Assemble V to I converter and I to V converter using IC 741 and measure the respective output.
06	Verify the working of following comparator circuits using op-amp IC 741 and draw the input-output waveforms <ul style="list-style-type: none"> • Zero crossing detector • Active peak detector
07	Assemble first order low pass Butterworth filter using op-amp and plot the frequency 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.
09	Assemble Monostable multivibrator circuit using IC 555. Plot the output waveform 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. 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 Analog Integrated Circuit	Tata-McGraw Hill
04	Willam D. Stanley	Operation Amplifier with Linear Integrated Circuit	Person

Course Name : Electronics Engineering Group

Course Code : ET/EJ/IE/IS/EN/EX/IC/MU/EV/DE/TU/ED/EI

Semester : Fourth

Subject Title : Visual Basic

Subject Code : 17043

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

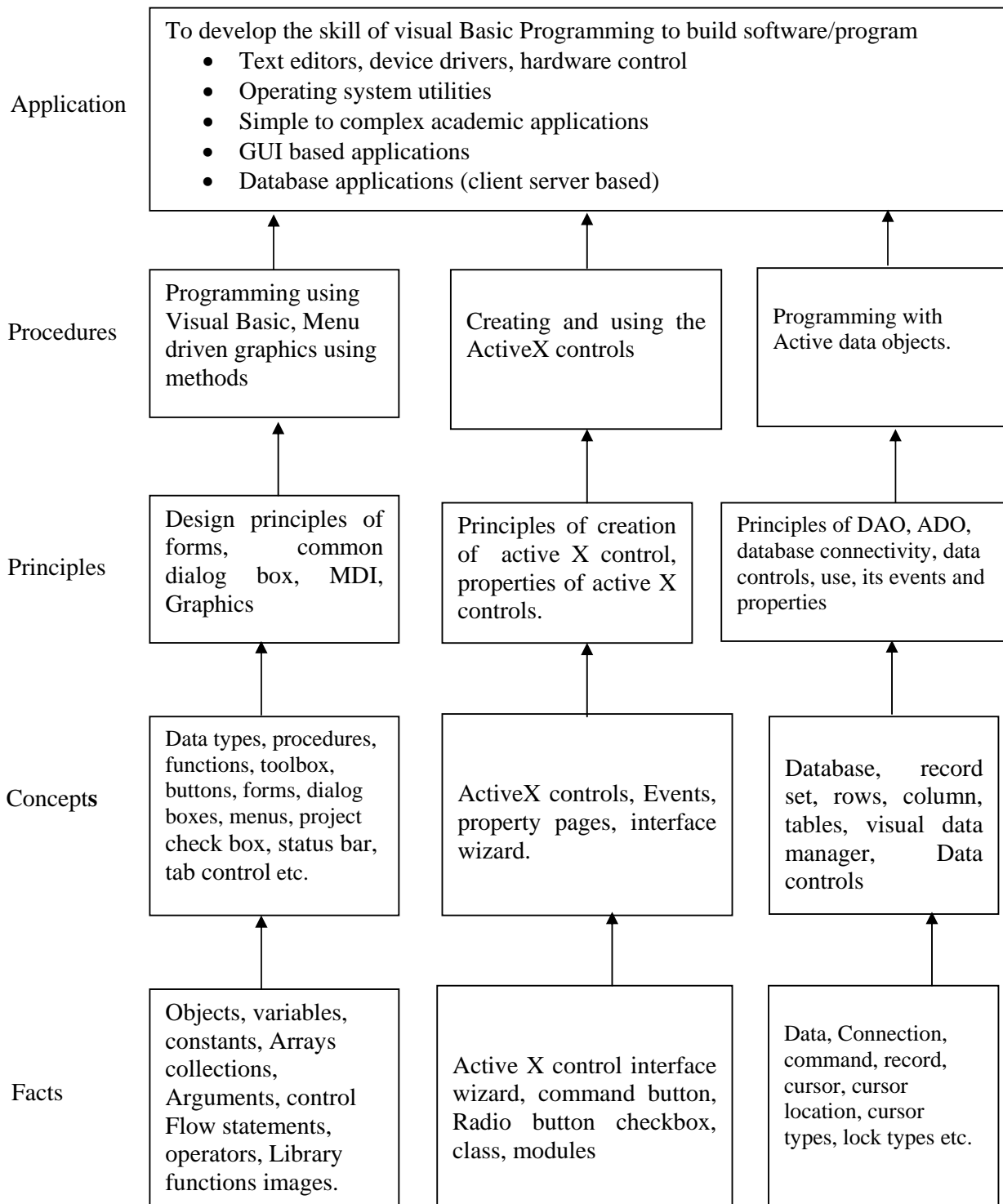
This course will lay the basic foundation of visual programming which will enable students to develop simple to complex programmable systems interfaces in the real world of work

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
<p>Topic 1] Introduction to Visual Environment Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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 ➤ Create objects, place them on forms <p>Contents:</p> <p>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.</p>	02
<p>Topic 2] Introduction to Visual Basic Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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 ➤ Use Inputbox and MsgBox functions <p>Contents:</p> <p>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 ().</p>	02
<p>Topic 3] Controls and Events Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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 <p>Contents:</p> <p>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.</p>	02
<p>Topic 4] Advance Controls & Events Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Add extrinsic controls in an application ➤ Use common dialog box control and its properties such open, save as, font, color, print and help ➤ 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 <p>Contents:</p>	03

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: <ul style="list-style-type: none"> ➤ 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 Contents: <p>5.1 Concept of module, class module, using class module to define functions, procedures, variables and accessing them using objects</p> <p>5.2 MDI- MDI form and child form, Creation and use in</p> <p>5.3 Menu: Creating own menu using menu editor, popup menu.</p> <p>5.3 Graphics: Basic controls – Line & shape control , line method, circle method, Pset method, RGB () Functions, Paint picture () method, Load picture () function.</p>	03
Topic 6] Database and Report Specific Objectives: <ul style="list-style-type: none"> ➤ 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: <p>6.1 Concept of database, Record, Record set, Data control & its important properties</p> <p>6.2 validating data, entering data, visual data manager.</p> <p>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,</p> <p>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.</p> <p>6.5 Report generation using data report and crystal report</p>	04
Total	16

TERM WORK:-

Sr No.	Name of the Experiments
1	a) Study and Understand Visual Basic Environment 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 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	a) Design Color box using RGB function to observe color change using H- scroll bar. b) Design project to demonstrate file, folder & drive controls to explore drive & folders.
7	Design GUI for Testing AC series Circuit
	Practice Experiment / Exercise
8	a) Design project to implement Common Dialog box controls such as open, save, Color, Font, Printer & Help b) Design a menu structure like notepad using menu editor
9	Design MDI application with 4 child forms & arrange forms with cascade, Tile Horizontal, 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. No.	Author	Title	Publisher
01	MSDN library on Line Reference	--	From Microsoft MSDN Library
02	Evangelos Petroustus	Mastering VB6	WILEY India
03	Steven Holzner	Visual basic 6	Dream Tech. Press
04	Content Development Group	Visual Basic 6.0 Programming	Tata McGraw Hill
05	Mohammed Azam	Programming with visual basic 6.0	Vikas Publishers
06	Nel Jerka	The complete reference VB6	Tata McGraw Hill Publishing

Course Name : Electronics Engineering Group

Course Code : ET/EJ/EN/EX/IE/IS/IC/DE/EV/MU/TU/ED/EI

Semester : Fourth

Subject Title : Professional Practices-II

Subject Code : 17044

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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:

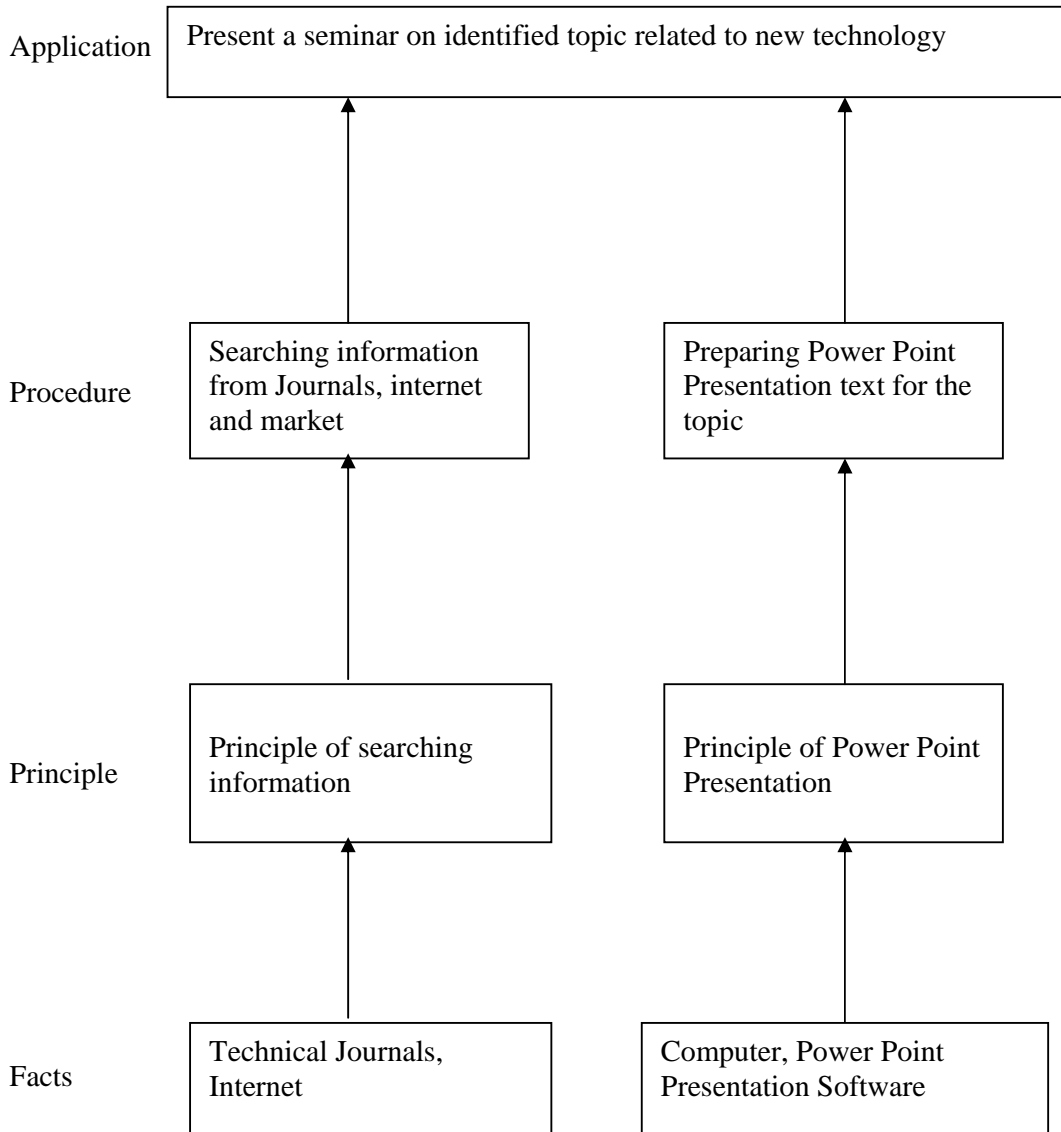
Intellectual skills:

- 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	Industrial Visits 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. Minimum two industrial visits may be arranged in the following areas/ industries : i) Electronic equipment manufacturing unit ii) Resistance Welding unit iii) Industrial automation unit iv) Sugar mill, Paper mill, Cement Industry. v) Railway station control room. vi) Telephone Exchange. vii) Any other suitable Industry.	16
2	Lectures by Professional / Industrial Expert to be organized from any of the following areas (Any three) i) Cyber laws. ii) Fiber optics communication system iii) Disaster management iv) Atomic energy v) Industrial Safety vi) Computer security systems/Ethical hacking. vii) Any other suitable topic viii) Introduction to Apprenticeship Training Scheme	08
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: 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	06
4	Seminar : 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: 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. 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 for All – Ninth Edition	PHI
05	Apprenticeship Training Scheme:- Compiled By – BOAT (Western Region), Mumbai, 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 4th semester examination.

Note:- Examination in Professional Practices of 5th 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.

 MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI 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						
SR. NO	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME									SW (17400)
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)		
								Max	Min	Max	Min	Max	Min	Max	Min	
1	Environmental Studies \$	EST	17401	01	--	02	01	50#*	20	--	--	--	--	25@	10	50
2	Manufacturing Processes β	MPR	17402	03	--	04	03	100	40	25#	10	--	--	50@	20	
3	Fluid Mechanics & Machinery β	FMM	17411	04	--	02	03	100	40	25#	10	--	--	25@	10	
4	Welding Technology	WTE	17455	03	--	02	03	100	40	25#	10	--	--	25@	10	
5	Fabrication Processes	FPR	17456	03	--	02	03	100	40	50#	20	--	--	25@	10	
6	Processes Equipments	PEQ	17457	04	--	02	03	100	40	--	--	--	--	25@	10	
7	Professional Practices-II	PPS	17048	--	--	03	--	--	--	--	--	--	--	50@	20	
TOTAL				18	--	17	--	550	--	125	--	--	--	225	--	50
**	Industrial Training (Optional)			Examination in 5th Semester Professional Practices-III												
<p>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, β - Common to ME / PG / PT/ MH / MI/FG</p> <p>Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work.</p> <p>** 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 5th Semester.</p> <ul style="list-style-type: none"> ➤ 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. 																

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			Examination Scheme					
TH	TU	PR	PAPER 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.

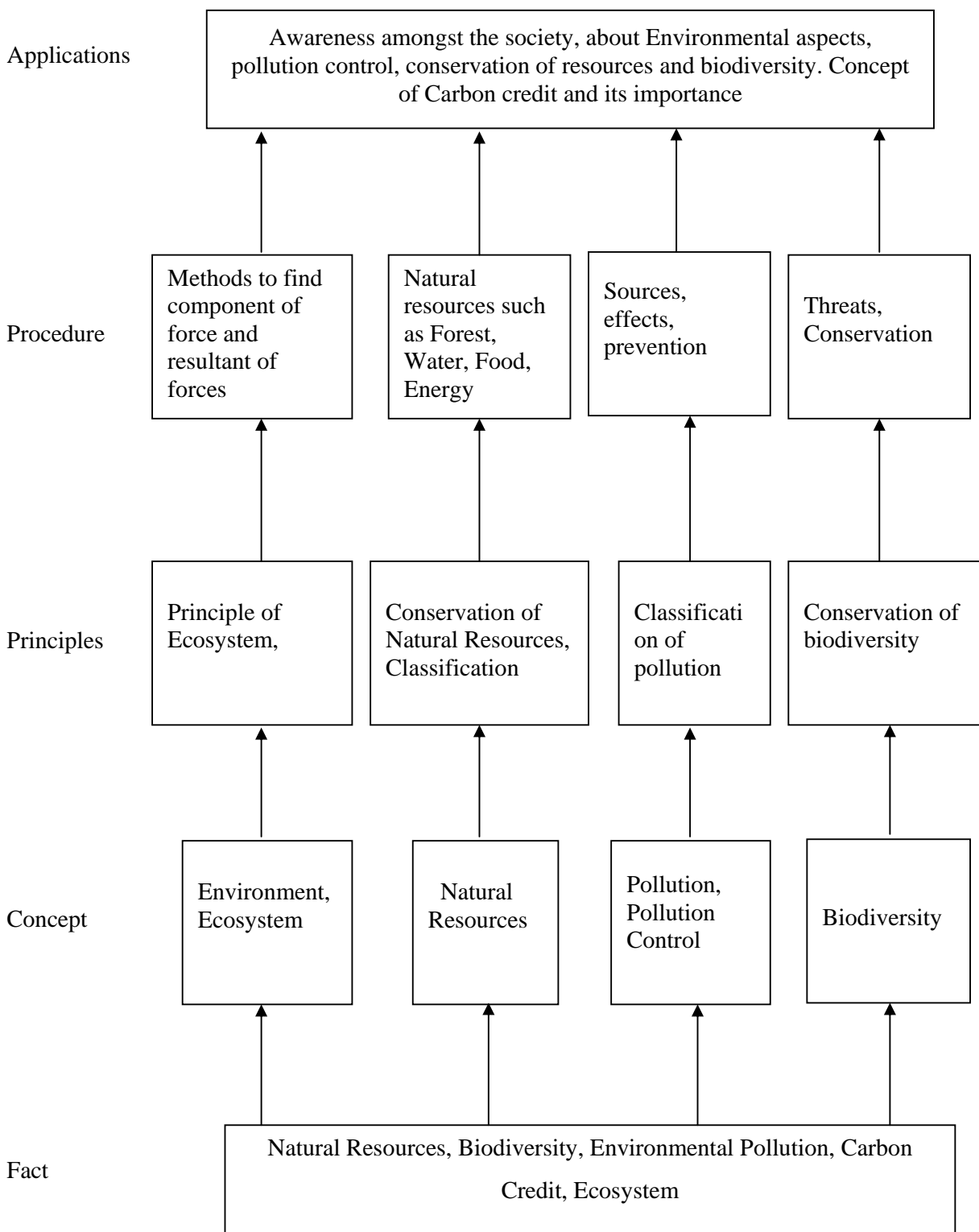
It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

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
<p>Topic 1: Nature of Environmental Studies</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define the terms related to Environmental Studies ➤ State importance of awareness about environment in general public <p>Contents:</p> <ul style="list-style-type: none"> • Definition, Scope and Importance of the environmental studies • Importance of the studies irrespective of course • Need for creating public awareness about environmental issues 	01	04
<p>Topic 2: Natural Resources and Associated Problems</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define natural resources and identify problems associated with them ➤ Identify uses and their overexploitation ➤ Identify alternate resources and their importance for environment <p>Contents:</p> <p>2.1 Renewable and Non renewable resources</p> <ul style="list-style-type: none"> • Definition • Associated problems <p>2.2 Forest Resources</p> <ul style="list-style-type: none"> • General description of forest resources • Functions and benefits of forest resources • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc. <p>2.3 Water Resources</p> <ul style="list-style-type: none"> • Hydrosphere: Different sources of water • Use and overexploitation of surface and ground water • Effect of floods, draught, dams etc. on water resources and community <p>2.4 Mineral Resources:</p> <ul style="list-style-type: none"> • Categories of mineral resources • Basics of mining activities • Mine safety • Effect of mining on environment <p>2.5 Food Resources:</p> <ul style="list-style-type: none"> • Food for all • Effects of modern agriculture • World food problem 	04	10
<p>Topic 3. Ecosystems</p> <ul style="list-style-type: none"> • Concept of Ecosystem • Structure and functions of ecosystem • Energy flow in ecosystem • Major ecosystems in the world 	01	04

Topic 4. Biodiversity and Its Conservation <ul style="list-style-type: none"> • Definition of Biodiversity • Levels of biodiversity • Value of biodiversity • Threats to biodiversity • Conservation of biodiversity 	02	06
Topic 5. Environmental Pollution <ul style="list-style-type: none"> • Definition • Air pollution: Definition, Classification, sources, effects, prevention • Water Pollution: Definition, Classification, sources, effects, prevention • Soil Pollution: Definition, sources, effects, prevention • Noise Pollution: Definition, sources, effects, prevention 	03	08
Topic 6. Social Issues and Environment <ul style="list-style-type: none"> • Concept of development, sustainable development • Water conservation, Watershed management, Rain water 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 	03	10
Topic 7. Environmental Protection Brief description of the following acts and their provisions: <ul style="list-style-type: none"> • Environmental Protection Act • Air (Prevention and Control of Pollution) Act • Water (Prevention and Control of Pollution) Act • Wildlife Protection Act • Forest Conservation Act Population Growth: Aspects, importance and effect on environment <ul style="list-style-type: none"> • Human Health and Human Rights 	02	08
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. No.	Author	Title	Publisher
01	Anindita Basak	Environmental Studies	Pearson Education
02	R. Rajgopalan	Environmental Studies from Crises to Cure	Oxford University Press
03	Dr. R. J. Ranjit Daniels, Dr. 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

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	04	03	100	25#	--	50@	175

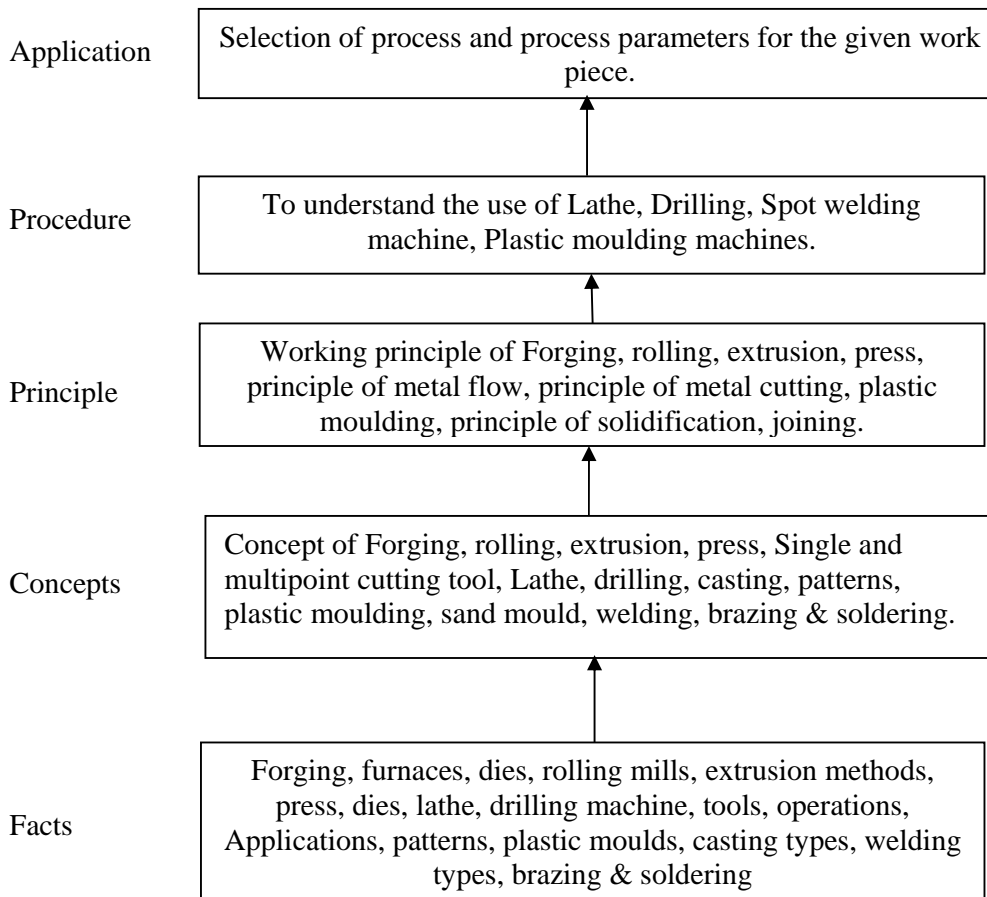
Rationale:

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:

Topic and Content	Hours	Marks
1:Forming Processes Specific Objectives: <ul style="list-style-type: none"> ➤ 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, 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.	08	18
2. Press working: Specific Objectives: <ul style="list-style-type: none"> ➤ 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 Content 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	08	16
3. Casting Processes: 22 Marks Specific Objectives: <ul style="list-style-type: none"> ➤ 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 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 & 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. 04 Marks	10	22
4. Welding Specific Objectives:	07	14

<p>➤ To define Arc welding and Gas welding Principal. ➤ To state difference between soldering and brazing processes</p> <p>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. 10 Marks</p> <p>4.2 Introduction to soldering and brazing – Process, fillers, heating methods & applications. 04 Marks</p>		
<p>5. Machining Operations Specific Objectives:</p> <p>➤ To state the working principal of lathe and drilling machines. ➤ To list out various operations performed on lathe and drilling machines</p> <p>Content 5.1 Lathe Machine: 12 Marks Introduction, classification and basic parts of center lathe & their functions, Lathe operations like facing, plain turning, taper turning, thread cutting, chamfering, grooving, knurling. Cutting tool nomenclature & tool signature, cutting parameters.</p> <p>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.</p>	10	20
<p>6. Plastic Moulding: Specific Objectives:</p> <p>➤ To state different properties of plastics ➤ To explain various plastic mauling methods like Injection, blow, compression molding</p> <p>Content Introduction, Properties of plastics, types of plastics, plastic moulding methods - compression moulding, injection moulding, blow moulding, extrusion, vacuum forming and calendaring.</p>	05	10
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. No.	Author	Title	Publisher
01	S. K. Hajra Chaudhary, Bose, Roy	Elements of workshop Technology-Volume I & II	Media Promoters and Publishers Limited
02	O. P. Khanna & Lal	Production Technology Volume- I & II	Production Technology Volume- I & II

			Dhanpat Rai Publications
03	W. A. J. Chapman, S. J. Martin	W. A. J. Chapman, S. J. 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 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/FE/FG

Semester : Fourth

Subject Title : Fluid Mechanics and Machinery

Subject Code : 17411

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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).

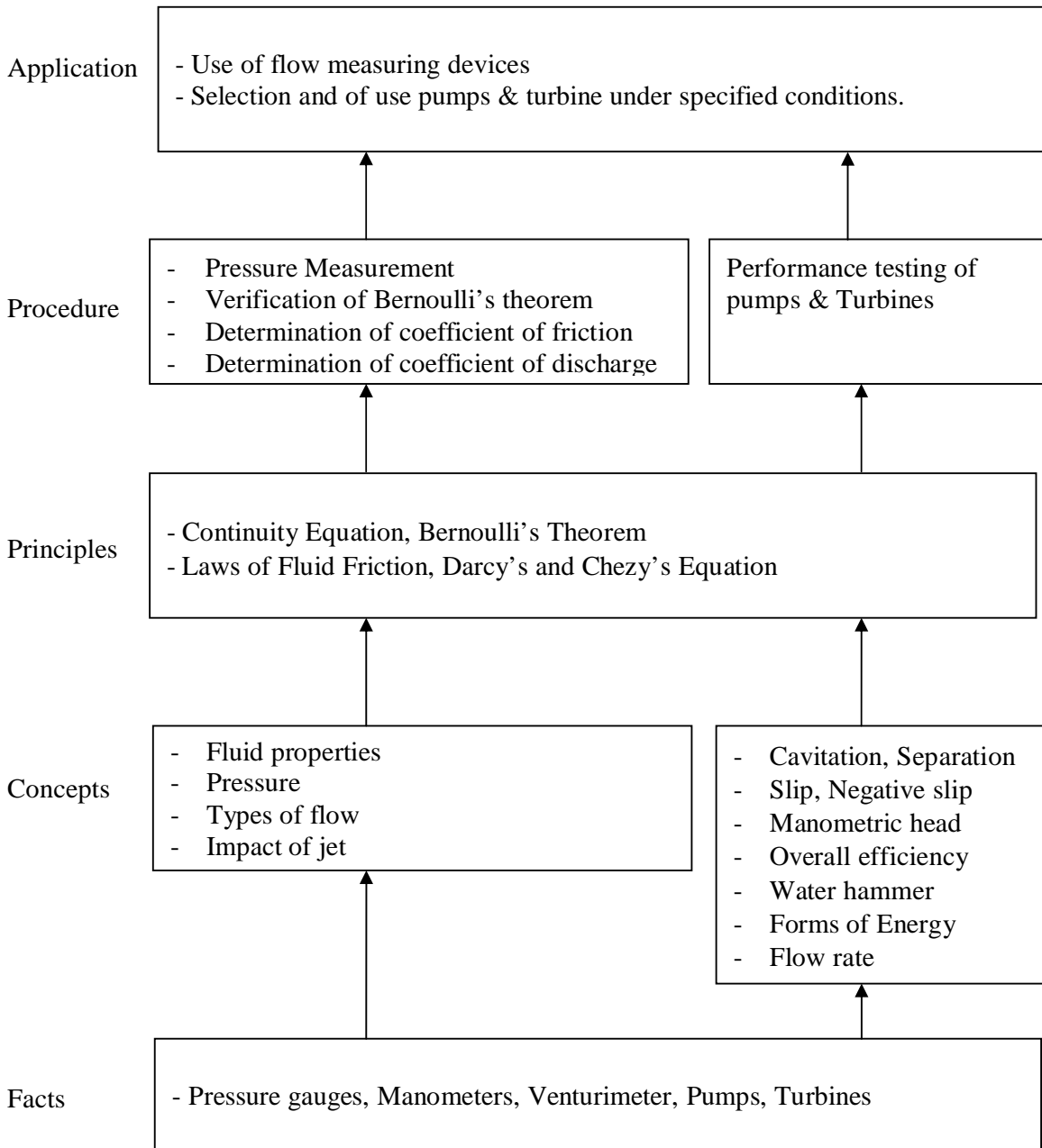
Rationale:

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
<p>1. Properties of fluid and Fluid Pressure</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define fluid properties. ➤ Differentiate between fluid pressure intensity and pressure head. ➤ Solve numerical related to properties of fluid, fluid pressure and manometers. <p>Contents:</p> <p>1.1 Properties of Fluid 06 Marks Density, Specific gravity, Specific volume, Specific Weight, Dynamic viscosity, Kinematic viscosity, Surface tension, Capillarity, Vapour Pressure, Compressibility</p> <p>1.2: Fluid Pressure & Pressure Measurement 14 Marks</p> <ul style="list-style-type: none"> • Fluid pressure, Pressure head, Pressure intensity • Concept of 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 	12	20
<p>2. Fluid Flow</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State Bernoulli's theorem and apply it to venturimeter, orifice and pitot tube. <p>Contents:</p> <ul style="list-style-type: none"> • Types of fluid flows-Laminar, turbulent, steady, unsteady, uniform, non uniform, rotational, irrotational. • Continuity equation, Bernoulli's theorem • 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 	10	14
<p>3. Flow Through Pipes</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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. <p>Contents:</p> <ul style="list-style-type: none"> • Laws of fluid friction (Laminar and turbulent) • 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 	10	14
<p>4. Impact of Jets</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Analyze explain the impact of jet on vanes in various conditions. 	06	10

<p>➤ Solve numerical on impact of jet on vanes in various conditions.</p> <p>Contents:</p> <ul style="list-style-type: none"> • Impact of jet on fixed vertical, moving vertical flat plates. • Impact of jet on curved vanes with special reference to turbines and pumps 		
<p>5. Hydraulic Turbines</p> <p>Specific Objectives:</p> <p>➤ Explain working principle of various hydraulic turbines.</p> <p>➤ Calculate work done, power generated and various efficiencies of hydraulic turbines.</p> <p>Contents:</p> <ul style="list-style-type: none"> • Layout and features of hydroelectric power plant, surge tanks and its need. • 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, • Calculation of Work done, Power, efficiency of turbine 	12	18
<p>6. Pumps</p> <p>Specific Objectives:</p> <p>➤ Explain working of centrifugal, reciprocating and multistage pumps.</p> <p>➤ Explain the concept of cavitation in pumps.</p> <p>➤ Calculate manometric head, work done and various efficiencies related to the pumps.</p> <p>➤ Select the pump for a given application.</p> <p>6.1 Centrifugal Pumps 14 Marks</p> <p>Contents:</p> <ul style="list-style-type: none"> • Construction, principle of working, priming methods and Cavitation • Types of casings and impellers. • Manometric head, Work done, Manometric efficiency, Overall efficiency, NPSH. • Performance Characteristics of Centrifugal pumps. • Trouble Shooting. • Construction, working and applications multistage pumps • Submersible pumps and jet pump <p>6.2 Reciprocating Pump 10 Marks</p> <ul style="list-style-type: none"> • 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. <p>(No numerical on reciprocating pumps)</p>	14	24
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. No	Author	Title	Publication
01	Ojha, Berndtsson, Chnadramouli	Fluid Mechanics and Machinery	Oxford University Press
02	Som S K , Biswas G.	Introduction to Fluid Mechanics and Fluid Machines 3 rd Edition	Tata McGraw-Hill Co. Ltd.
03	Modi P.N. Seth S M	Hydraulics and Fluid Mechanics including Hydraulic Machines	Standard Book House New Delhi
04	Subramanya K.	Fluid Mechanics and Hydraulic Machines: problems and solution	Tata McGraw-Hill Co. Ltd.
05	Product catalogues of various pump manufacturers		

Course Name : Diploma in Fabrication Technology & Erection Engineering

Course Code : FE/FG

Semester : Fourth

Subject Title : Welding Technology

Subject Code : 17455

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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:

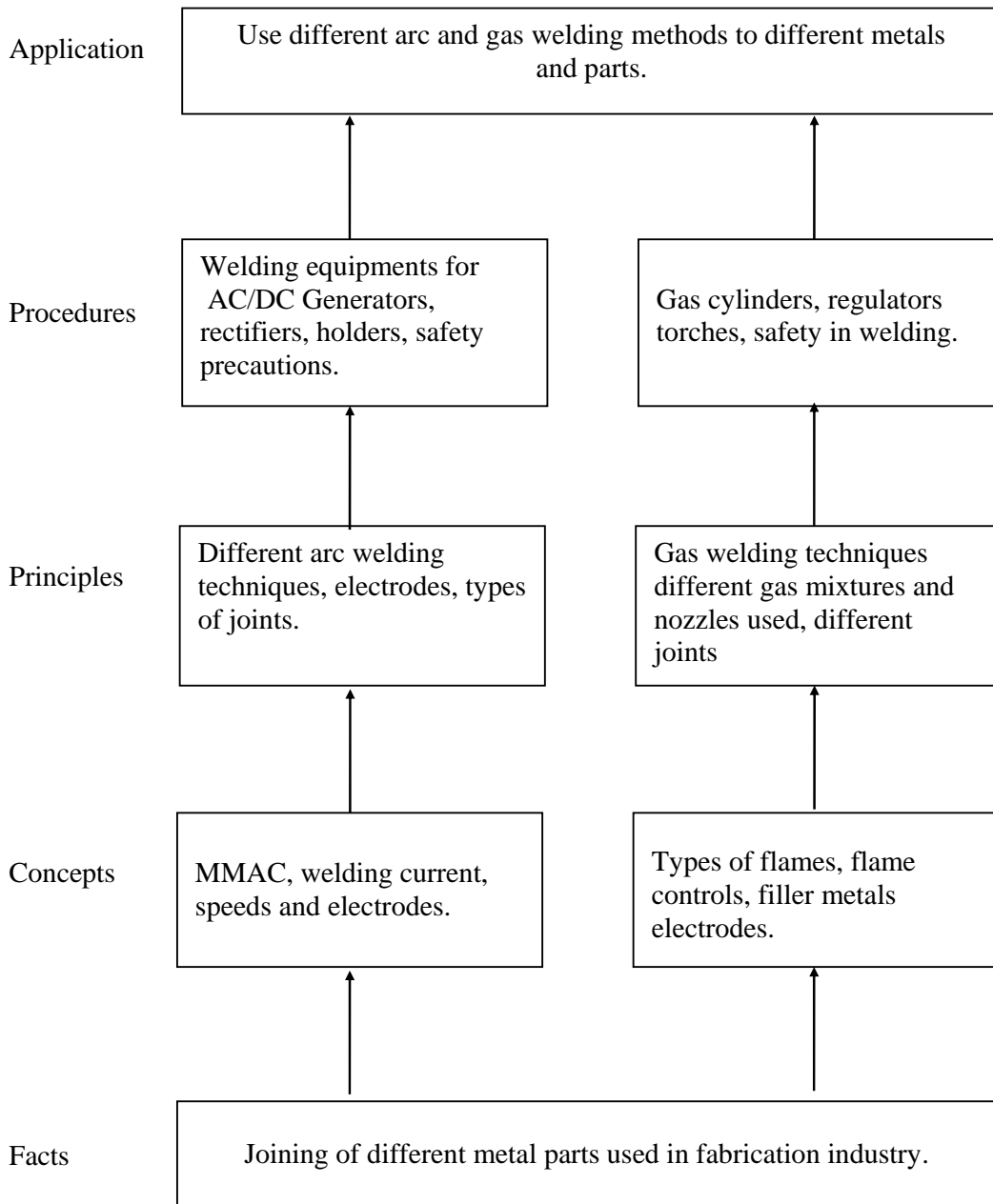
To teach students to understand facts concepts principles and procedures of gas and arc welding, brazing, soldering.

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
1	Gas Welding Theory <ul style="list-style-type: none"> • Types of joints and terminology & symbols of welding • Definition of gas welding. • Oxy acetylene welding. • Types of welding flames. • Gas welding equipment. • Gas welding techniques. • Advantages & limitations of gas welding. • Filler metals and fluxes 	16	08
2	Manual Metal Arc Welding Theory <ul style="list-style-type: none"> • 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 selection of power sources • Polarity, current voltage, electrical travel, arc length • Positions flat, horizontal vertical overhead • Electrodes sizes, composition, coating, classification & coding, manufacturing of electrodes, care & storage of electrodes Practice: <ul style="list-style-type: none"> • Straight line deposition - down hand • But welding - down hand • T-joint - down hand • Straight-line deposition - Vertical • But welding - Vertical • T-joint - Vertical 	24	18
3	Welding of Different Metals Theory <ul style="list-style-type: none"> • Weldability and factors affecting it. • Welding of mild steel & iron- processes used & explanation of metal arc welding. • Welding of cast iron- processes used & explanation of metal arc welding. • Welding of alloy steels, stainless steels- processes used & explanation of oxy acetylene welding. • Welding of aluminum & other non-ferrous metals - processes used & explanation of Tig welding. 	20	08
4	Welding Metallurgy & Weld Defects Theory: <ul style="list-style-type: none"> • Solidification of metals in welding. • Heat affected zone and structure of weld metal for M.S., Copper, and Aluminum etc. 	24	08

	<ul style="list-style-type: none"> • Effect of welding on properties of metals. • Heat treatment used in welding. • Weld defects. <ul style="list-style-type: none"> ✓ Types of defects & their causes ✓ Remedial Procedures 		
5	<p>Brazing & Soldering</p> <p>Theory:</p> <ul style="list-style-type: none"> • Definition of brazing & soldering • Difference between brazing, soldering, welding • Principle of brazing • Filler metals, joint preparation & design • application & limitations • Processes, torch, furnace, vacuum, induction Dip. Resistance, carbon arc etc. of brazing. • Principle of soldering • Soldering joint & design. 	16	06
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 Publication	Publisher & Address
O.P. Khanna	Welding Technology	--	1994	Dhanpatrai & Sons
L. Little	Welding & Welding Technology	10th	1986	TMC, New Delhi
Agarwal & Maghani	Welding Engineering	--	--	--

Course Name : Diploma in Fabrication Technology & Erection Engineering

Course Code : FE/FG

Semester : Fourth

Subject Title : Fabrication Process

Subject Code : 17456

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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:

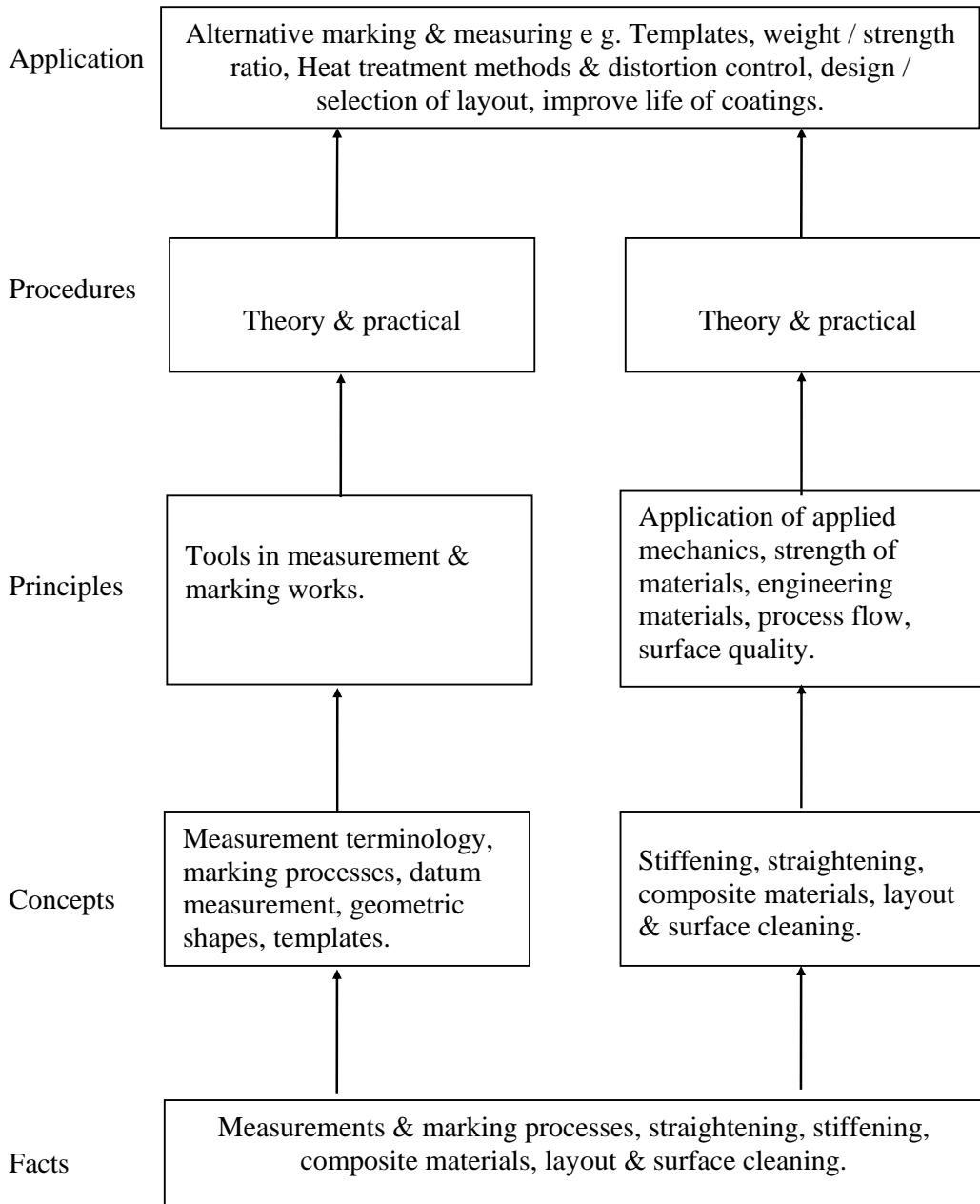
This subject will help the students to know the basic requirements of fabrication & the orderly sequence in which a component is prepared for fabrication.

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
<p>1. Measurement</p> <p>Introduction ----- 04 Marks</p> <ol style="list-style-type: none"> 1. Definition and meaning of : Quantity, measurement, metrology, measure Precision & accuracy, Repeatability, Calibration, Sensitivity & readability 2. Sources of error 3. Classification of measurements <p>Standards of measurements ----- 04 Marks</p> <ol style="list-style-type: none"> 1. Introduction to standards 2. Line standard 3. End standard 4. Angular standard <p>Marking process ----- 16Marks</p> <ol style="list-style-type: none"> 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 <p>Instruments for datum measurements ----- 04 Marks</p> <ol style="list-style-type: none"> 1. Vertical datum- plumb line 2. Horizontal datum- spirit level 3. Alignment testing- use of tensioned wire, surveyor’s level <p>Geometric shape ----- 08 Marks</p> <ol style="list-style-type: none"> 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 <p>Templates ----- 12 Marks</p> <ol style="list-style-type: none"> 1. The need of templates 2. Materials used for templates 3. Information given on templates 4. Use of templates <ul style="list-style-type: none"> • Templates for setting out sheet metal fabrications • 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 	48	28

<ul style="list-style-type: none"> 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 		
<p>2. Straightening Methods</p> <p>Mechanical straightening</p> <ul style="list-style-type: none"> 1. Manual 2. Machine straightening <p>Thermal methods</p> <ul style="list-style-type: none"> 1. Hot shrinking 2. Use of heat strips 3. Use of heat triangles 4. Principle of hot straightening for structural sections 	08	04
<p>3. Stiffening of Fabricated Material</p> <p>Methods of stiffening sheet metal</p> <p>Reasons for stiffening</p> <p style="padding-left: 40px;">Stiffening of large panels</p> <ul style="list-style-type: none"> 1. Use of applied stiffeners 2. Use of angle stiffeners <p>Need for web stiffeners</p>	12	04
<p>4. Composite Materials in Fabrication</p> <p>Introduction to composite material</p> <p>Classification of composites</p> <p>Composition of composites</p> <p>Processing of composites</p> <p>Joining of composites</p> <p>Applications</p>	08	04
<p>5. Surface Cleaning</p> <p>Introduction</p> <p>Need for coating & cleaning</p> <p>Methods of surface cleaning</p> <ul style="list-style-type: none"> 1. Chemical method 2. Mechanical method 3. Thermal method 4. Dry method 	12	04
<p>6. Factory / Workshop Layout</p> <p>Introduction</p> <p>Definition of Factory layout</p> <p>Importance of layout</p> <p>Essentials of layout</p> <p>Types of layout</p> <p>Factors influencing layout</p> <p>Dynamics plant layout</p> <p>Examples</p>	12	04
Total	100	48

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. No.	Author	Title	Publisher & Address
1	Kadam Manish J	Metrology & Quality Control	Everest Pub. House
2	Hume K.J. 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/ Longman	Basic fabrication and welding Engg	Longman Craft Studies.

Course Name : Diploma in Fabrication Technology & Erection Engineering

Course Code : FE/FG

Semester : Fourth

Subject Title : Process Equipment

Subject Code : 17457

Teaching and Examination Scheme

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
04	--	02	03	100	--	--	25@	125

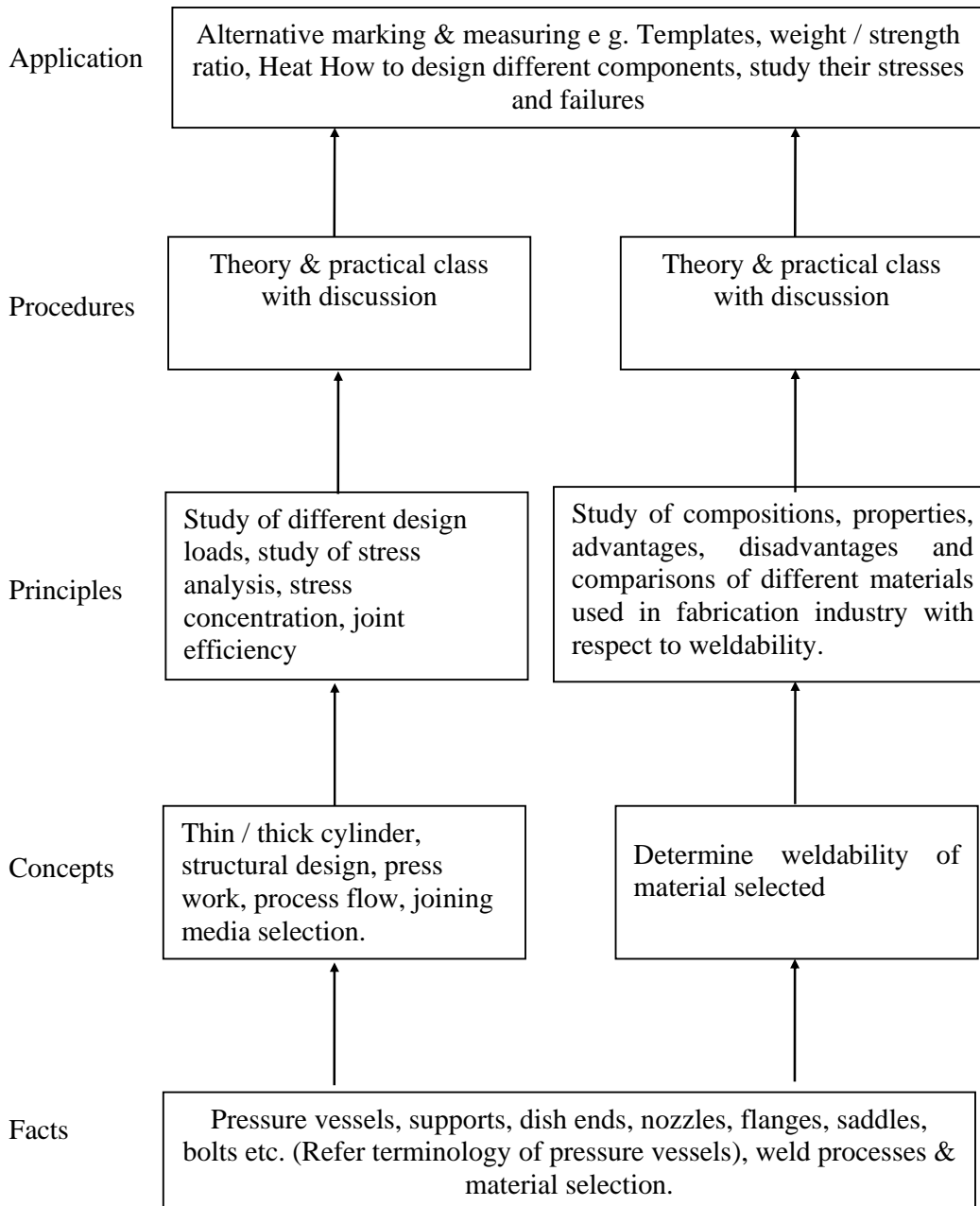
Rationale:

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 Introduction, types, accessories & mountings, terminology.	12	08
Design of Pressure Vessels Introduction, design approach, design pressure design temperature, dead load, wind load, piping load, earthquake loads, and combination of design loads, allowable stress range, general design criterion, stresses in ring, cylinder, sphere, poisson ratio, dilation of pressure vessels, membrane stress, thick cylinder, thick sphere, intersecting sphere, thermal stresses, ultra high pressure vessel , multishell construction, discontinuity stresses in vessels, stresses in bi-metallic joints, deformation and stresses in flanges and flanged 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, torispherical heads, conical heads (simple problems) Supports skirts, support legs, support lugs, anchor bolts, saddles, stiffeners. Design for thickness; shell, dish ends, nozzles, flanges, bolt size & numbers, dilation & ligament efficiency.	24	16
Design Construction Features Stress concentrations, Nozzle reinforcement, placement and shape, fatigue 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. Note: Derivation / Proof of any formula is not expected	12	10
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 Publication	Publisher & Address
Henry H. Bednar	Pressure Vessel design handbook	--	--	--
John F. Harvey	Theory and design of pressure vessel	1st	1987	C.B.S. Pub. Delhi
Eugene F. Megyesy	Pressure Vessel Handbook	--	1992	Press Vessel Handbook Pub. Cl.
--	ASME Boiler & Pressure Vessel Code	--	1992	ASME, New York
--	Boiler & Pressure Vessel Code	--	1980	ASME, USA
--	Unfired Pressure Vessels	--	1946	ASME, New York
Joshi & Mahajan	Process Equipment 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:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

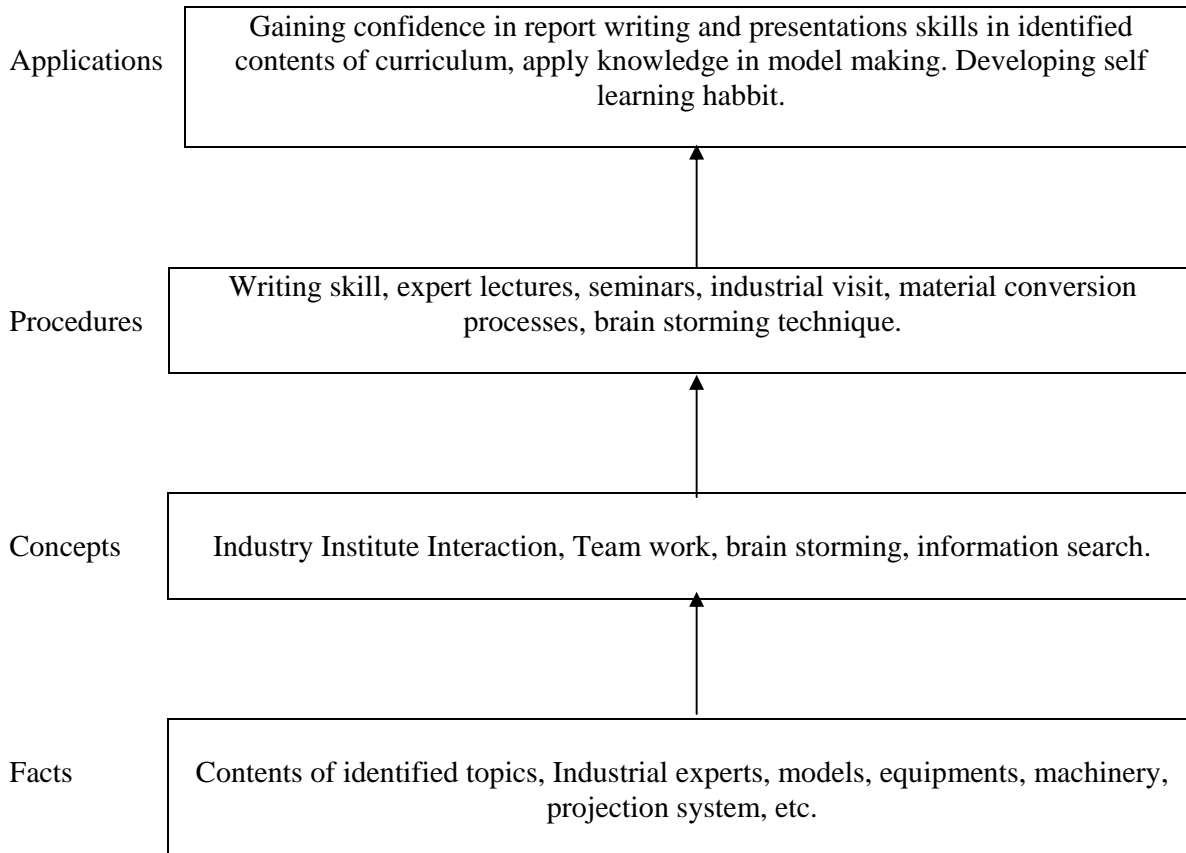
Intellectual Skill:

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
<p>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.</p> <ol style="list-style-type: none"> 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 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. 	10
<p>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.</p> <ol style="list-style-type: none"> 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. 5. Product life cycle. 6. Industrial application of mechatronics. 7. Special features of CNC machines 8. Gear manufacturing & gear teeth finishing processes. 9. Gear boxes-industrial & Automobile applications. 10. super-finishing operation & their industrial applications. 11. processing methods for plastic components. 12. Features of modern boilers 13. Strainers and filters –Types, functions and applications 14. Industrial drives-Types, components, comparison and applications. 15. Introduction to Apprenticeship Training Scheme 	06
<p>3. Seminars: One seminar be arranged on the subjects related to 4th semester. Or topics beyond curriculum.</p>	06

<p>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,</p> <p>Topics suggested for guidance-</p> <ol style="list-style-type: none"> 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. 	
<p>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 :</p> <ul style="list-style-type: none"> ➤ 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 ➤ To observe Tool room, standards room etc. <p>Following types of industries may be visited in & around the institute.</p> <ol style="list-style-type: none"> 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. 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 	08

<p>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)</p> <ol style="list-style-type: none"> 1. Awareness about carbon credit 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) 	06
<p>6. Mini Projects Students, in a group of 4, shall perform any one activity listed below.</p> <ol style="list-style-type: none"> 1. Model making out of card board paper, wood, thermocol, plastics, metal, clay etc <ol style="list-style-type: none"> 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 report (Max. 5 pages) of the mini project. <p style="text-align: center;">OR</p> <p>Modular course:</p> <p>Modular courses on any one of the suggested or equivalent topic be undertaken by a group of 15 to 20 students.</p> <ol style="list-style-type: none"> 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. Piping Technology 8. Modern packaging technology 9. Enterprise Resource Planning 10. Bio-pneumatic Robots 11. Bio-mimicry 	12

Learning Resources:**1. Books:**

Sr. No.	Author	Title	Publisher
01	NRDC, Publication Bi Monthly Journal	Invention Intelligence Journal	National Research Development 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 for All – Ninth Edition	PHI
05	Apprenticeship Training Scheme:- Compiled By – BOAT (Western Region), Mumbai, 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 4th semester examination.

Note:- Examination in Professional Practices of 5th 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.

 MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI 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						
SR. NO	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME									SW (17400)
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)		
								Max	Min	Max	Min	Max	Min	Max	Min	
1	Environmental Studies \$	EST	17401	01	--	02	01	50#*	20	--	--	--	--	25@	10	50
2	Manufacturing Processes β	MPR	17402	03	--	04	03	100	40	25#	10	--	--	50@	20	
3	Fluid Mechanics & Machinery β	FMM	17411	04	--	02	03	100	40	25#	10	--	--	25@	10	
4	Welding Technology	WTE	17455	03	--	02	03	100	40	25#	10	--	--	25@	10	
5	Fabrication Processes	FPR	17456	03	--	02	03	100	40	50#	20	--	--	25@	10	
6	Processes Equipments	PEQ	17457	04	--	02	03	100	40	--	--	--	--	25@	10	
7	Professional Practices-II	PPS	17048	--	--	03	--	--	--	--	--	--	--	50@	20	
TOTAL				18	--	17	--	550	--	125	--	--	--	225	--	50
**	Industrial Training (Optional) Examination in 5th Semester Professional Practices-III															
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, β - 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 5th Semester.																
<ul style="list-style-type: none"> ➤ 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. 																

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 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.

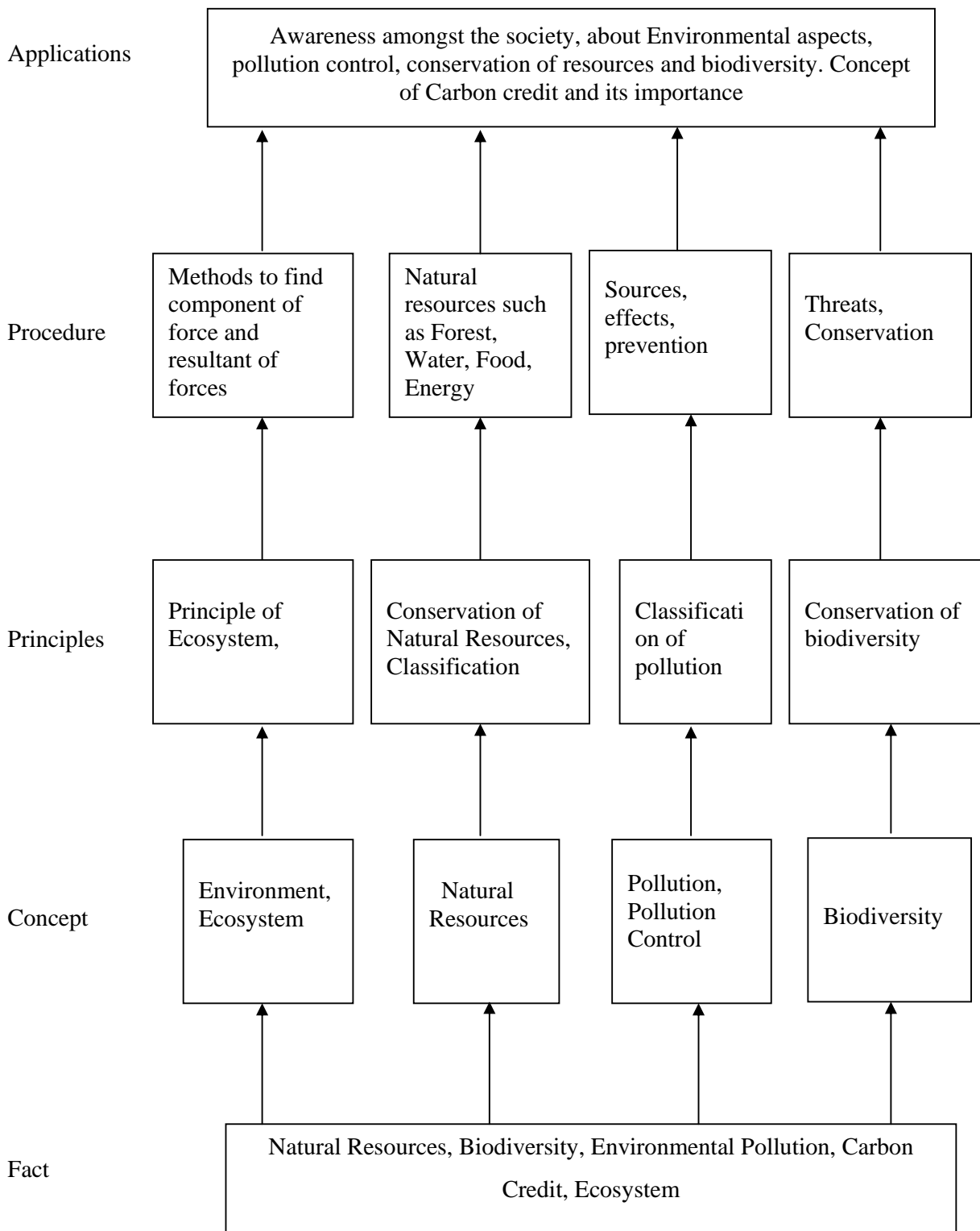
It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

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
<p>Topic 1: Nature of Environmental Studies</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define the terms related to Environmental Studies ➤ State importance of awareness about environment in general public <p>Contents:</p> <ul style="list-style-type: none"> • Definition, Scope and Importance of the environmental studies • Importance of the studies irrespective of course • Need for creating public awareness about environmental issues 	01	04
<p>Topic 2: Natural Resources and Associated Problems</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define natural resources and identify problems associated with them ➤ Identify uses and their overexploitation ➤ Identify alternate resources and their importance for environment <p>Contents:</p> <p>2.1 Renewable and Non renewable resources</p> <ul style="list-style-type: none"> • Definition • Associated problems <p>2.2 Forest Resources</p> <ul style="list-style-type: none"> • General description of forest resources • Functions and benefits of forest resources • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc. <p>2.3 Water Resources</p> <ul style="list-style-type: none"> • Hydrosphere: Different sources of water • Use and overexploitation of surface and ground water • Effect of floods, draught, dams etc. on water resources and community <p>2.4 Mineral Resources:</p> <ul style="list-style-type: none"> • Categories of mineral resources • Basics of mining activities • Mine safety • Effect of mining on environment <p>2.5 Food Resources:</p> <ul style="list-style-type: none"> • Food for all • Effects of modern agriculture • World food problem 	04	10
<p>Topic 3. Ecosystems</p> <ul style="list-style-type: none"> • Concept of Ecosystem • Structure and functions of ecosystem • Energy flow in ecosystem • Major ecosystems in the world 	01	04

Topic 4. Biodiversity and Its Conservation <ul style="list-style-type: none"> • Definition of Biodiversity • Levels of biodiversity • Value of biodiversity • Threats to biodiversity • Conservation of biodiversity 	02	06
Topic 5. Environmental Pollution <ul style="list-style-type: none"> • Definition • Air pollution: Definition, Classification, sources, effects, prevention • Water Pollution: Definition, Classification, sources, effects, prevention • Soil Pollution: Definition, sources, effects, prevention • Noise Pollution: Definition, sources, effects, prevention 	03	08
Topic 6. Social Issues and Environment <ul style="list-style-type: none"> • Concept of development, sustainable development • Water conservation, Watershed management, Rain water 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 	03	10
Topic 7. Environmental Protection Brief description of the following acts and their provisions: <ul style="list-style-type: none"> • Environmental Protection Act • Air (Prevention and Control of Pollution) Act • Water (Prevention and Control of Pollution) Act • Wildlife Protection Act • Forest Conservation Act Population Growth: Aspects, importance and effect on environment <ul style="list-style-type: none"> • Human Health and Human Rights 	02	08
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. No.	Author	Title	Publisher
01	Anindita Basak	Environmental Studies	Pearson Education
02	R. Rajgopalan	Environmental Studies from Crises to Cure	Oxford University Press
03	Dr. R. J. Ranjit Daniels, Dr. 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

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	04	03	100	25#	--	50@	175

Rationale:

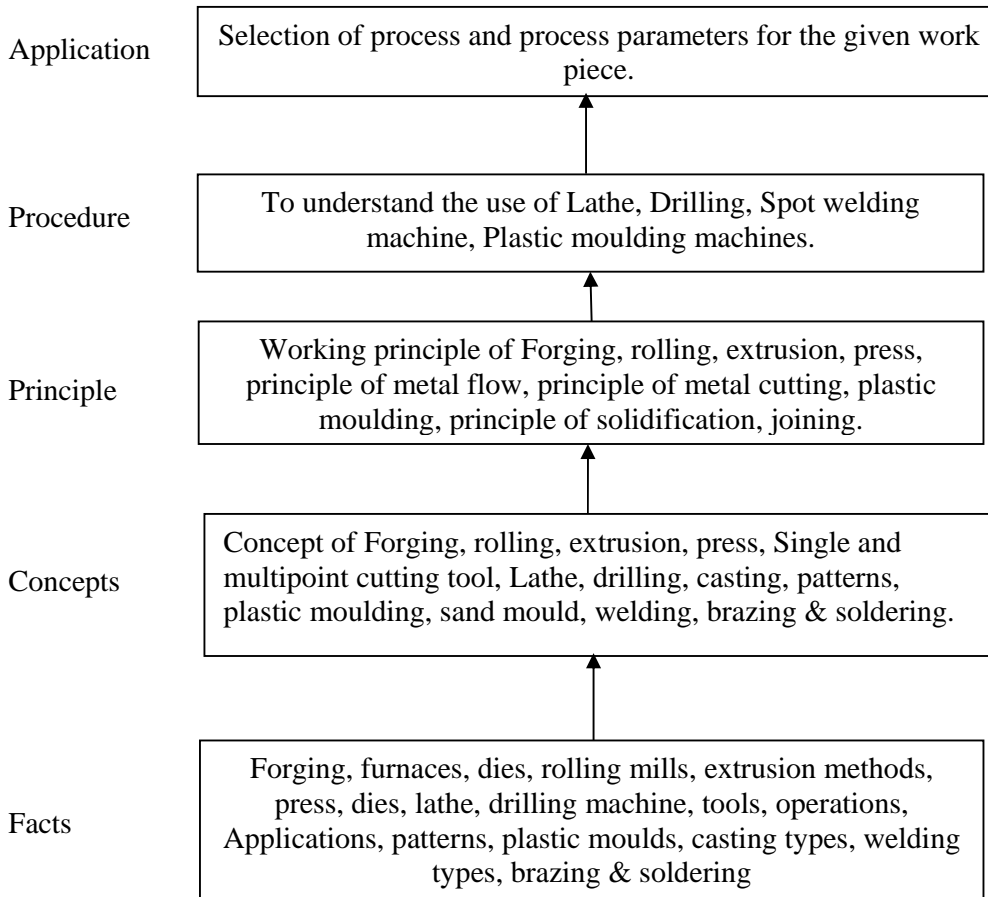
Diploma technician often comes across various types of basic manufacturing processes. He / she is required to select, operate and control the appropriate processes for specific applications. He / she is also required to know about various cutting tools, latest improvements in manufacturing processes. 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:

Topic and Content	Hours	Marks
1:Forming Processes Specific Objectives: <ul style="list-style-type: none"> ➤ 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, 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.	08	18
2. Press working: Specific Objectives: <ul style="list-style-type: none"> ➤ 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 Content 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	08	16
3. Casting Processes: 22 Marks Specific Objectives: <ul style="list-style-type: none"> ➤ 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 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 & 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. 04 Marks	10	22
4. Welding Specific Objectives:	07	14

<ul style="list-style-type: none"> ➤ To define Arc welding and Gas welding Principal. ➤ To state difference between soldering and brazing processes <p>Content</p> <p>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. 10 Marks</p> <p>4.2 Introduction to soldering and brazing – Process, fillers, heating methods & applications. 04 Marks</p>		
<p>5. Machining Operations</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ To state the working principal of lathe and drilling machines. ➤ To list out various operations performed on lathe and drilling machines <p>Content</p> <p>5.1 Lathe Machine: 12 Marks Introduction, classification and basic parts of center lathe & their functions, Lathe operations like facing, plain turning, taper turning, thread cutting, chamfering, grooving, knurling. Cutting tool nomenclature & tool signature, cutting parameters.</p> <p>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.</p>	10	20
<p>6. Plastic Moulding:</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ To state different properties of plastics ➤ To explain various plastic mauling methods like Injection, blow, compression molding <p>Content Introduction, Properties of plastics, types of plastics, plastic moulding methods - compression moulding, injection moulding, blow moulding, extrusion, vacuum forming and calendaring.</p>	05	10
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. No.	Author	Title	Publisher
01	S. K. Hajra Chaudhary, Bose, Roy	Elements of workshop Technology-Volume I & II	Media Promoters and Publishers Limited
02	O. P. Khanna & Lal	Production Technology Volume- I & II	Production Technology Volume- I & II

			Dhanpat Rai Publications
03	W. A. J. Chapman, S. J. Martin	W. A. J. Chapman, S. J. 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 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/FE/FG

Semester : Fourth

Subject Title : Fluid Mechanics and Machinery

Subject Code : 17411

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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).

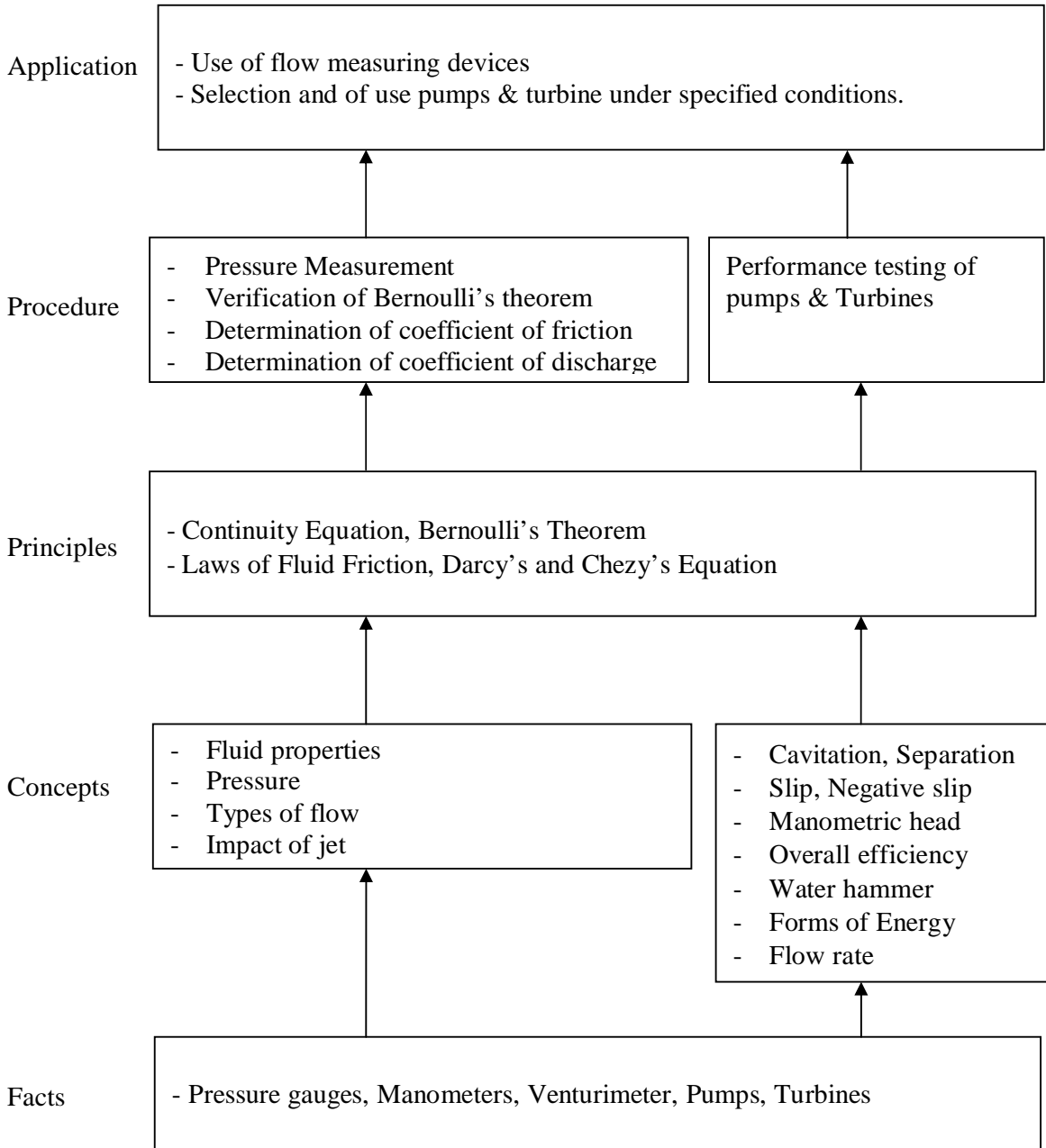
Rationale:

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
<p>1. Properties of fluid and Fluid Pressure</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define fluid properties. ➤ Differentiate between fluid pressure intensity and pressure head. ➤ Solve numerical related to properties of fluid, fluid pressure and manometers. <p>Contents:</p> <p>1.1 Properties of Fluid 06 Marks Density, Specific gravity, Specific volume, Specific Weight, Dynamic viscosity, Kinematic viscosity, Surface tension, Capillarity, Vapour Pressure, Compressibility</p> <p>1.2: Fluid Pressure & Pressure Measurement 14 Marks</p> <ul style="list-style-type: none"> • Fluid pressure, Pressure head, Pressure intensity • Concept of 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 	12	20
<p>2. Fluid Flow</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State Bernoulli's theorem and apply it to venturimeter, orifice and pitot tube. <p>Contents:</p> <ul style="list-style-type: none"> • Types of fluid flows-Laminar, turbulent, steady, unsteady, uniform, non uniform, rotational, irrotational. • Continuity equation, Bernoulli's theorem • 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 	10	14
<p>3. Flow Through Pipes</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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. <p>Contents:</p> <ul style="list-style-type: none"> • Laws of fluid friction (Laminar and turbulent) • 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 	10	14
<p>4. Impact of Jets</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Analyze explain the impact of jet on vanes in various conditions. 	06	10

<p>➤ Solve numerical on impact of jet on vanes in various conditions.</p> <p>Contents:</p> <ul style="list-style-type: none"> • Impact of jet on fixed vertical, moving vertical flat plates. • Impact of jet on curved vanes with special reference to turbines and pumps 		
<p>5. Hydraulic Turbines</p> <p>Specific Objectives:</p> <p>➤ Explain working principle of various hydraulic turbines.</p> <p>➤ Calculate work done, power generated and various efficiencies of hydraulic turbines.</p> <p>Contents:</p> <ul style="list-style-type: none"> • Layout and features of hydroelectric power plant, surge tanks and its need. • 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, • Calculation of Work done, Power, efficiency of turbine 	12	18
<p>6. Pumps</p> <p>Specific Objectives:</p> <p>➤ Explain working of centrifugal, reciprocating and multistage pumps.</p> <p>➤ Explain the concept of cavitation in pumps.</p> <p>➤ Calculate manometric head, work done and various efficiencies related to the pumps.</p> <p>➤ Select the pump for a given application.</p> <p>6.1 Centrifugal Pumps 14 Marks</p> <p>Contents:</p> <ul style="list-style-type: none"> • Construction, principle of working, priming methods and Cavitation • Types of casings and impellers. • Manometric head, Work done, Manometric efficiency, Overall efficiency, NPSH. • Performance Characteristics of Centrifugal pumps. • Trouble Shooting. • Construction, working and applications multistage pumps • Submersible pumps and jet pump <p>6.2 Reciprocating Pump 10 Marks</p> <ul style="list-style-type: none"> • 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. <p>(No numerical on reciprocating pumps)</p>	14	24
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. No	Author	Title	Publication
01	Ojha, Berndtsson, Chnadramouli	Fluid Mechanics and Machinery	Oxford University Press
02	Som S K , Biswas G.	Introduction to Fluid Mechanics and Fluid Machines 3 rd Edition	Tata McGraw-Hill Co. Ltd.
03	Modi P.N. Seth S M	Hydraulics and Fluid Mechanics including Hydraulic Machines	Standard Book House New Delhi
04	Subramanya K.	Fluid Mechanics and Hydraulic Machines: problems and solution	Tata McGraw-Hill Co. Ltd.
05	Product catalogues of various pump manufacturers		

Course Name : Diploma in Fabrication Technology & Erection Engineering

Course Code : FE/FG

Semester : Fourth

Subject Title : Welding Technology

Subject Code : 17455

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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:

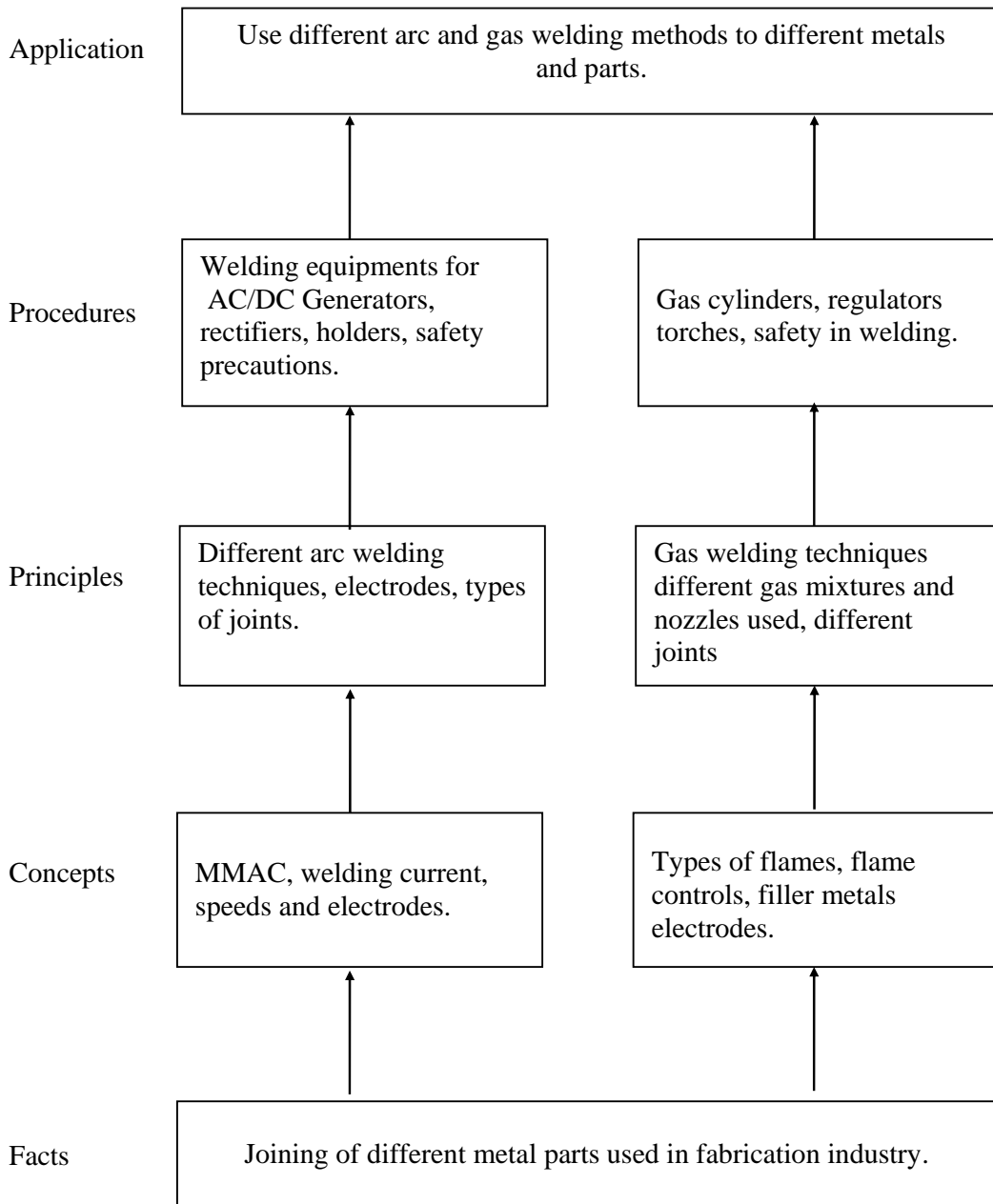
To teach students to understand facts concepts principles and procedures of gas and arc welding, brazing, soldering.

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
1	Gas Welding Theory <ul style="list-style-type: none"> • Types of joints and terminology & symbols of welding • Definition of gas welding. • Oxy acetylene welding. • Types of welding flames. • Gas welding equipment. • Gas welding techniques. • Advantages & limitations of gas welding. • Filler metals and fluxes 	16	08
2	Manual Metal Arc Welding Theory <ul style="list-style-type: none"> • 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 selection of power sources • Polarity, current voltage, electrical travel, arc length • Positions flat, horizontal vertical overhead • Electrodes sizes, composition, coating, classification & coding, manufacturing of electrodes, care & storage of electrodes Practice: <ul style="list-style-type: none"> • Straight line deposition - down hand • But welding - down hand • T-joint - down hand • Straight-line deposition - Vertical • But welding - Vertical • T-joint - Vertical 	24	18
3	Welding of Different Metals Theory <ul style="list-style-type: none"> • Weldability and factors affecting it. • Welding of mild steel & iron- processes used & explanation of metal arc welding. • Welding of cast iron- processes used & explanation of metal arc welding. • Welding of alloy steels, stainless steels- processes used & explanation of oxy acetylene welding. • Welding of aluminum & other non-ferrous metals - processes used & explanation of Tig welding. 	20	08
4	Welding Metallurgy & Weld Defects Theory: <ul style="list-style-type: none"> • Solidification of metals in welding. • Heat affected zone and structure of weld metal for M.S., Copper, and Aluminum etc. 	24	08

	<ul style="list-style-type: none"> • Effect of welding on properties of metals. • Heat treatment used in welding. • Weld defects. <ul style="list-style-type: none"> ✓ Types of defects & their causes ✓ Remedial Procedures 		
5	<p>Brazing & Soldering Theory:</p> <ul style="list-style-type: none"> • Definition of brazing & soldering • Difference between brazing, soldering, welding • Principle of brazing • Filler metals, joint preparation & design • application & limitations • Processes, torch, furnace, vacuum, induction Dip. Resistance, carbon arc etc. of brazing. • Principle of soldering • Soldering joint & design. 	16	06
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 Publication	Publisher & Address
O.P. Khanna	Welding Technology	--	1994	Dhanpatrai & Sons
L. Little	Welding & Welding Technology	10th	1986	TMC, New Delhi
Agarwal & Maghani	Welding Engineering	--	--	--

Course Name : Diploma in Fabrication Technology & Erection Engineering

Course Code : FE/FG

Semester : Fourth

Subject Title : Fabrication Process

Subject Code : 17456

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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:

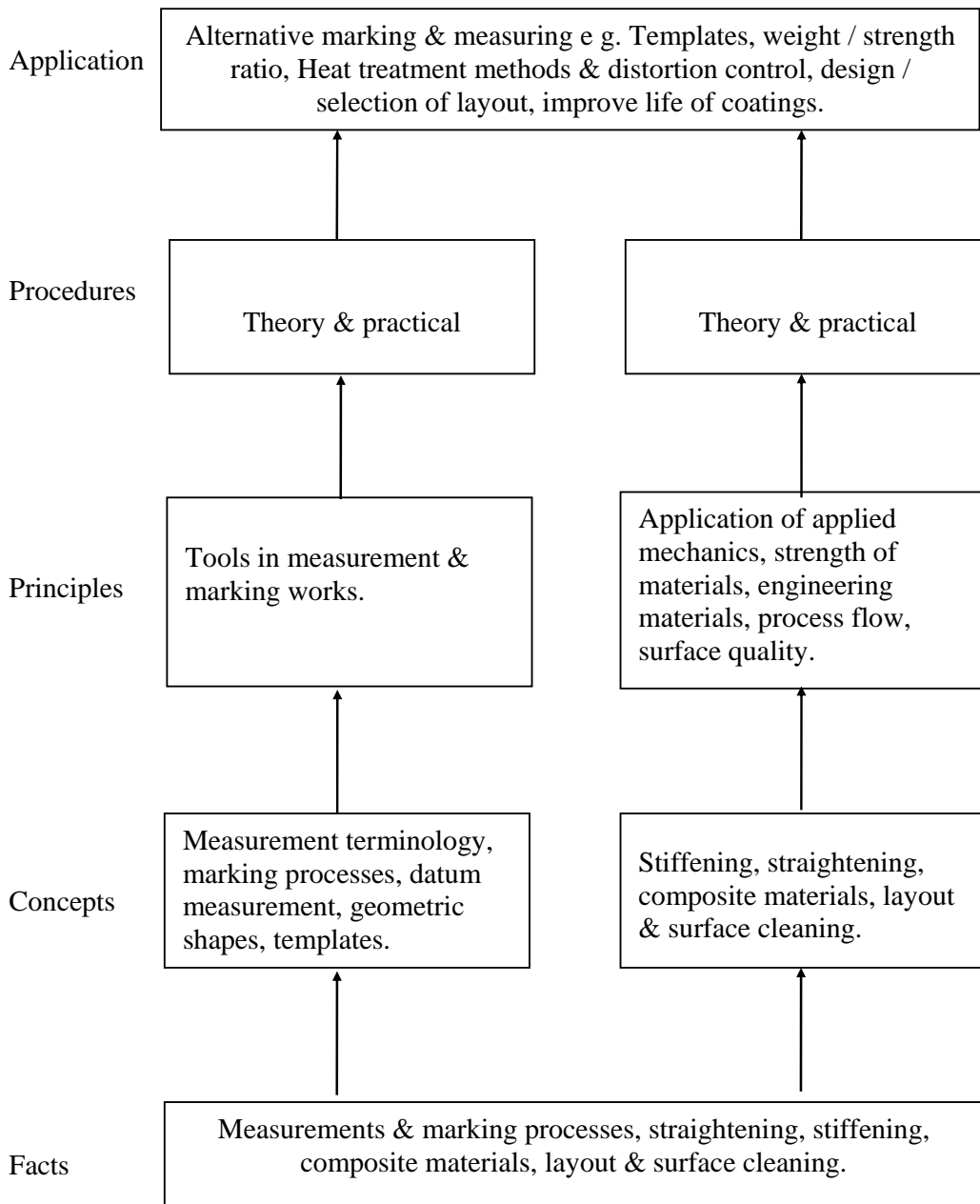
This subject will help the students to know the basic requirements of fabrication & the orderly sequence in which a component is prepared for fabrication.

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
<p>1. Measurement</p> <p>Introduction ----- 04 Marks</p> <ol style="list-style-type: none"> 1. Definition and meaning of : Quantity, measurement, metrology, measure Precision & accuracy, Repeatability, Calibration, Sensitivity & readability 2. Sources of error 3. Classification of measurements <p>Standards of measurements ----- 04 Marks</p> <ol style="list-style-type: none"> 1. Introduction to standards 2. Line standard 3. End standard 4. Angular standard <p>Marking process ----- 16Marks</p> <ol style="list-style-type: none"> 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 <p>Instruments for datum measurements ----- 04 Marks</p> <ol style="list-style-type: none"> 1. Vertical datum- plumb line 2. Horizontal datum- spirit level 3. Alignment testing- use of tensioned wire, surveyor’s level <p>Geometric shape ----- 08 Marks</p> <ol style="list-style-type: none"> 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 <p>Templates ----- 12 Marks</p> <ol style="list-style-type: none"> 1. The need of templates 2. Materials used for templates 3. Information given on templates 4. Use of templates <ul style="list-style-type: none"> • Templates for setting out sheet metal fabrications • 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 	48	28

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. No.	Author	Title	Publisher & Address
1	Kadam Manish J	Metrology & Quality Control	Everest Pub. House
2	Hume K.J. 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/ Longman	Basic fabrication and welding Engg	Longman Craft Studies.

Course Name : Diploma in Fabrication Technology & Erection Engineering

Course Code : FE/FG

Semester : Fourth

Subject Title : Process Equipment

Subject Code : 17457

Teaching and Examination Scheme

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
04	--	02	03	100	--	--	25@	125

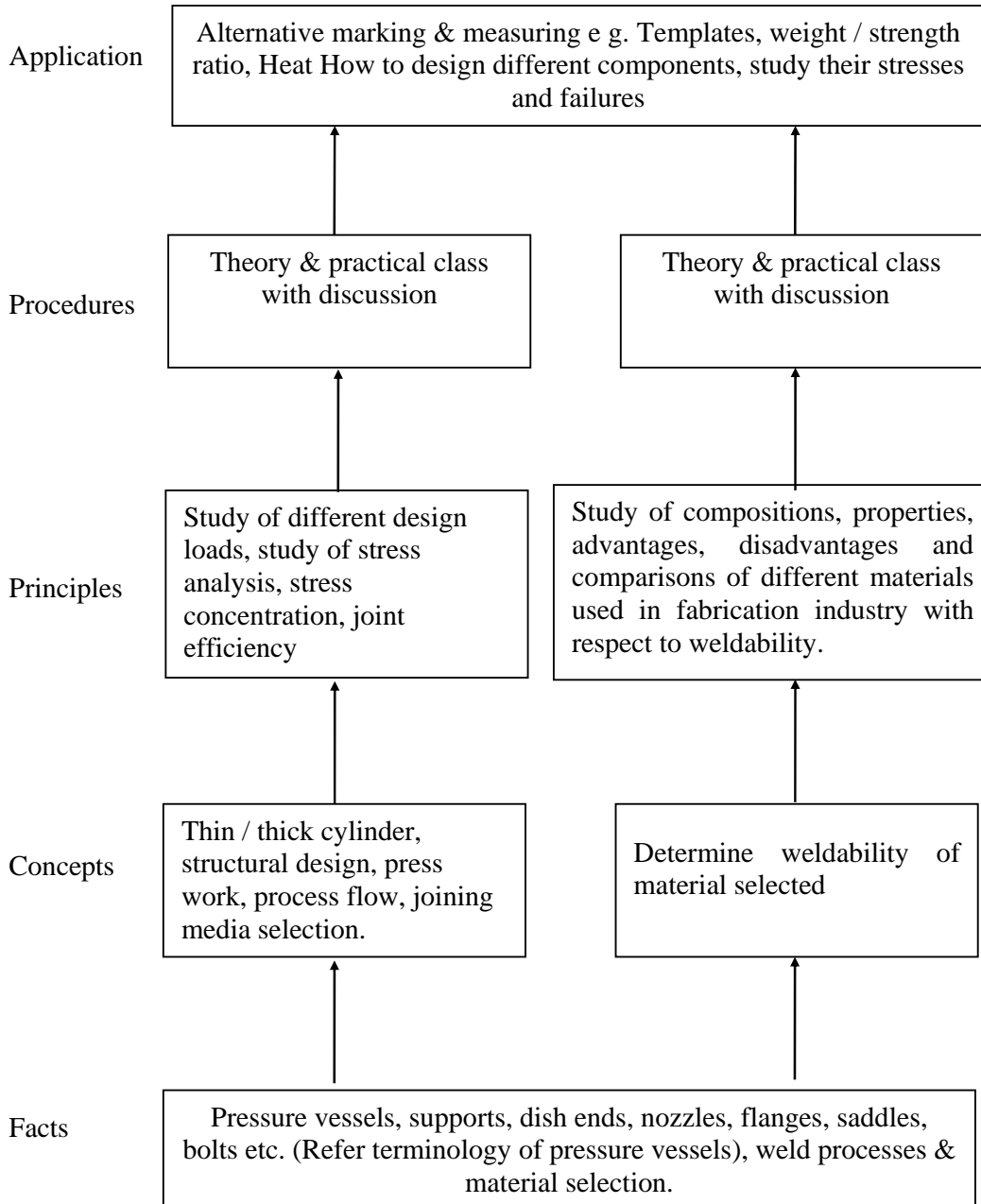
Rationale:

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 Introduction, types, accessories & mountings, terminology.	12	08
Design of Pressure Vessels Introduction, design approach, design pressure design temperature, dead load, wind load, piping load, earthquake loads, and combination of design loads, allowable stress range, general design criterion, stresses in ring, cylinder, sphere, poisson ratio, dilation of pressure vessels, membrane stress, thick cylinder, thick sphere, intersecting sphere, thermal stresses, ultra high pressure vessel , multishell construction, discontinuity stresses in vessels, stresses in bi-metallic joints, deformation and stresses in flanges and flanged 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, torispherical heads, conical heads (simple problems) Supports skirts, support legs, support lugs, anchor bolts, saddles, stiffeners. Design for thickness; shell, dish ends, nozzles, flanges, bolt size & numbers, dilation & ligament efficiency.	24	16
Design Construction Features Stress concentrations, Nozzle reinforcement, placement and shape, fatigue 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. Note: Derivation / Proof of any formula is not expected	12	10
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 Publication	Publisher & Address
Henry H. Bednar	Pressure Vessel design handbook	--	--	--
John F. Harvey	Theory and design of pressure vessel	1st	1987	C.B.S. Pub. Delhi
Eugene F. Megyesy	Pressure Vessel Handbook	--	1992	Press Vessel Handbook Pub. Cl.
--	ASME Boiler & Pressure Vessel Code	--	1992	ASME, New York
--	Boiler & Pressure Vessel Code	--	1980	ASME, USA
--	Unfired Pressure Vessels	--	1946	ASME, New York
Joshi & Mahajan	Process Equipment 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:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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:

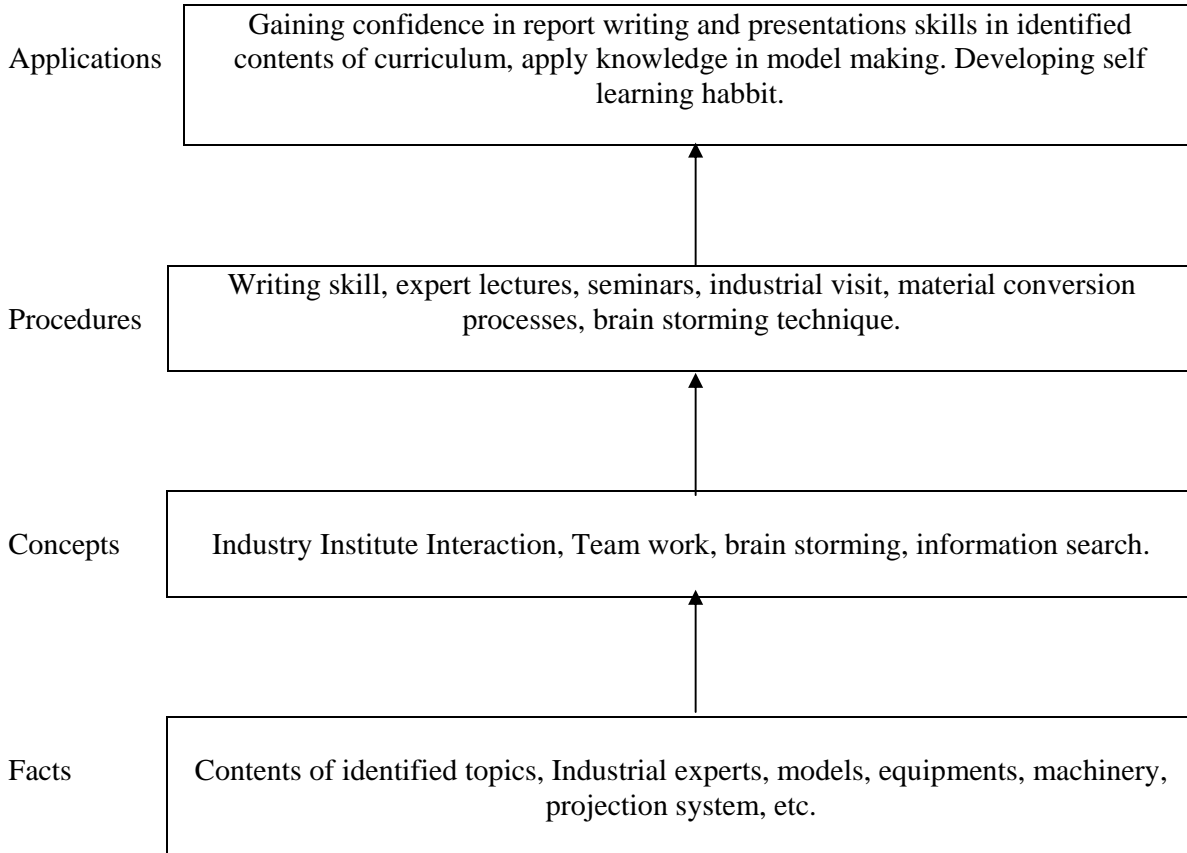
Student will be able to-

- 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
<p>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.</p> <ol style="list-style-type: none"> 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 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. 	10
<p>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.</p> <ol style="list-style-type: none"> 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. 5. Product life cycle. 6. Industrial application of mechatronics. 7. Special features of CNC machines 8. Gear manufacturing & gear teeth finishing processes. 9. Gear boxes-industrial & Automobile applications. 10. super-finishing operation & their industrial applications. 11. processing methods for plastic components. 12. Features of modern boilers 13. Strainers and filters –Types, functions and applications 14. Industrial drives-Types, components, comparison and applications. 15. Introduction to Apprenticeship Training Scheme 	06
<p>3. Seminars: One seminar be arranged on the subjects related to 4th semester. Or topics beyond curriculum.</p>	06

<p>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,</p> <p>Topics suggested for guidance-</p> <ol style="list-style-type: none"> 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. 	
<p>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 :</p> <ul style="list-style-type: none"> ➤ 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 ➤ To observe Tool room, standards room etc. <p>Following types of industries may be visited in & around the institute.</p> <ol style="list-style-type: none"> 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. 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 	08

<p>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)</p> <ol style="list-style-type: none"> 1. Awareness about carbon credit 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) 	06
<p>6. Mini Projects Students, in a group of 4, shall perform any one activity listed below.</p> <ol style="list-style-type: none"> 1. Model making out of card board paper, wood, thermocol, plastics, metal, clay etc <ol style="list-style-type: none"> 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 report (Max. 5 pages) of the mini project. <p style="text-align: center;">OR</p> <p>Modular course:</p> <p>Modular courses on any one of the suggested or equivalent topic be undertaken by a group of 15 to 20 students.</p> <ol style="list-style-type: none"> 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. Piping Technology 8. Modern packaging technology 9. Enterprise Resource Planning 10. Bio-pneumatic Robots 11. Bio-mimicry 	12

Learning Resources:**1. Books:**

Sr. No.	Author	Title	Publisher
01	NRDC, Publication Bi Monthly Journal	Invention Intelligence Journal	National Research Development 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 for All – Ninth Edition	PHI
05	Apprenticeship Training Scheme:- Compiled By – BOAT (Western Region), Mumbai, 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 4th semester examination.

Note:- Examination in Professional Practices of 5th 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.

 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										WITH EFFECT FROM 2012-13							
SEMESTER : FOURTH										DURATION : 16 WEEKS							
PATTERN : FULL TIME - SEMESTER										SCHEME : G							
SR. NO.	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME										SW (17400)
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)			
								Max	Min	Max	Min	Max	Min	Max	Min		
1	Environmental Studies \$	EST	17401	01	--	02	01	50#*	20	--	--	--	--	25@	10	50	
2	Computer Hardware & Maintenance β	CHM	17428	03	--	02	03	100	40	25#	10	--	--	25@	10		
3	Data Communication & Networking	DCN	17430	03	--	02	03	100	40	25#	10	--	--	25@	10		
4	Microprocessor and Programming β	MAP	17431	03	--	02	03	100	40	25#	10	--	--	25@	10		
5	Object Oriented Programming β	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		
TOTAL				13	--	19	--	450	--	175	--	--	--	225	--	50	
**	Industrial Training (Optional)			Examination in 5th Semester Professional Practices-III													
<p>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, β - 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 5th Semester</p> <ul style="list-style-type: none"> ➤ 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/AU**

Semester : Fourth

Subject Title : Environmental Studies

Subject Code : 17401

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

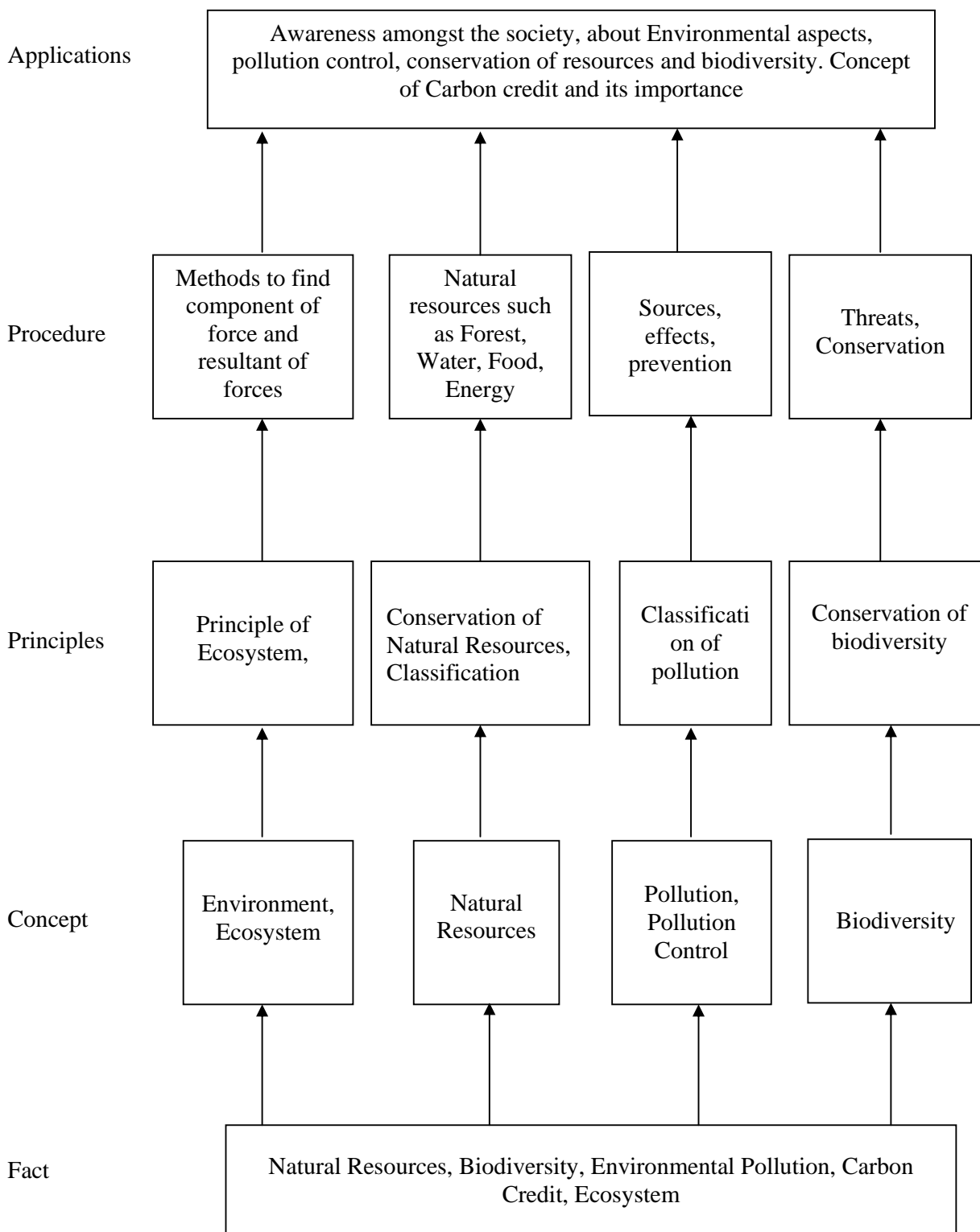
It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

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
<p>Topic 1: Nature of Environmental Studies Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define the terms related to Environmental Studies ➤ State importance of awareness about environment in general public <p>Contents:</p> <ul style="list-style-type: none"> • Definition, Scope and Importance of the environmental studies • Importance of the studies irrespective of course • Need for creating public awareness about environmental issues 	01	04
<p>Topic 2: Natural Resources and Associated Problems Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define natural resources and identify problems associated with them ➤ Identify uses and their overexploitation ➤ Identify alternate resources and their importance for environment <p>Contents:</p> <p>2.1 Renewable and Non renewable resources</p> <ul style="list-style-type: none"> • Definition • Associated problems <p>2.2 Forest Resources</p> <ul style="list-style-type: none"> • General description of forest resources • Functions and benefits of forest resources • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc. <p>2.3 Water Resources</p> <ul style="list-style-type: none"> • Hydrosphere: Different sources of water • Use and overexploitation of surface and ground water • Effect of floods, draught, dams etc. on water resources and community <p>2.4 Mineral Resources:</p> <ul style="list-style-type: none"> • Categories of mineral resources • Basics of mining activities • Mine safety • Effect of mining on environment <p>2.5 Food Resources:</p> <ul style="list-style-type: none"> • Food for all • Effects of modern agriculture • World food problem 	04	10
<p>Topic 3. Ecosystems</p> <ul style="list-style-type: none"> • Concept of Ecosystem • Structure and functions of ecosystem • Energy flow in ecosystem • Major ecosystems in the world 	01	04
<p>Topic 4. Biodiversity and Its Conservation</p> <ul style="list-style-type: none"> • Definition of Biodiversity • Levels of biodiversity • Value of biodiversity 	02	06

<ul style="list-style-type: none"> • Threats to biodiversity • Conservation of biodiversity 		
Topic 5. Environmental Pollution <ul style="list-style-type: none"> • Definition • Air pollution: Definition, Classification, sources, effects, prevention • Water Pollution: Definition, Classification, sources, effects, prevention • Soil Pollution: Definition, sources, effects, prevention • Noise Pollution: Definition, sources, effects, prevention 	03	08
Topic 6. Social Issues and Environment <ul style="list-style-type: none"> • Concept of development, sustainable development • Water conservation, Watershed management, Rain water 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 	03	10
Topic 7. Environmental Protection Brief description of the following acts and their provisions: <ul style="list-style-type: none"> • Environmental Protection Act • Air (Prevention and Control of Pollution) Act • Water (Prevention and Control of Pollution) Act • Wildlife Protection Act • Forest Conservation Act Population Growth: Aspects, importance and effect on environment <ul style="list-style-type: none"> • Human Health and Human Rights 	02	08
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. No.	Author	Title	Publisher
01	Anindita Basak	Environmental Studies	Pearson Education
02	R. Rajgopalan	Environmental Studies from Crises to Cure	Oxford University Press
03	Dr. R. J. Ranjit Daniels, Dr. 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			Examination Scheme					
TH	TU	PR	PAPER 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:

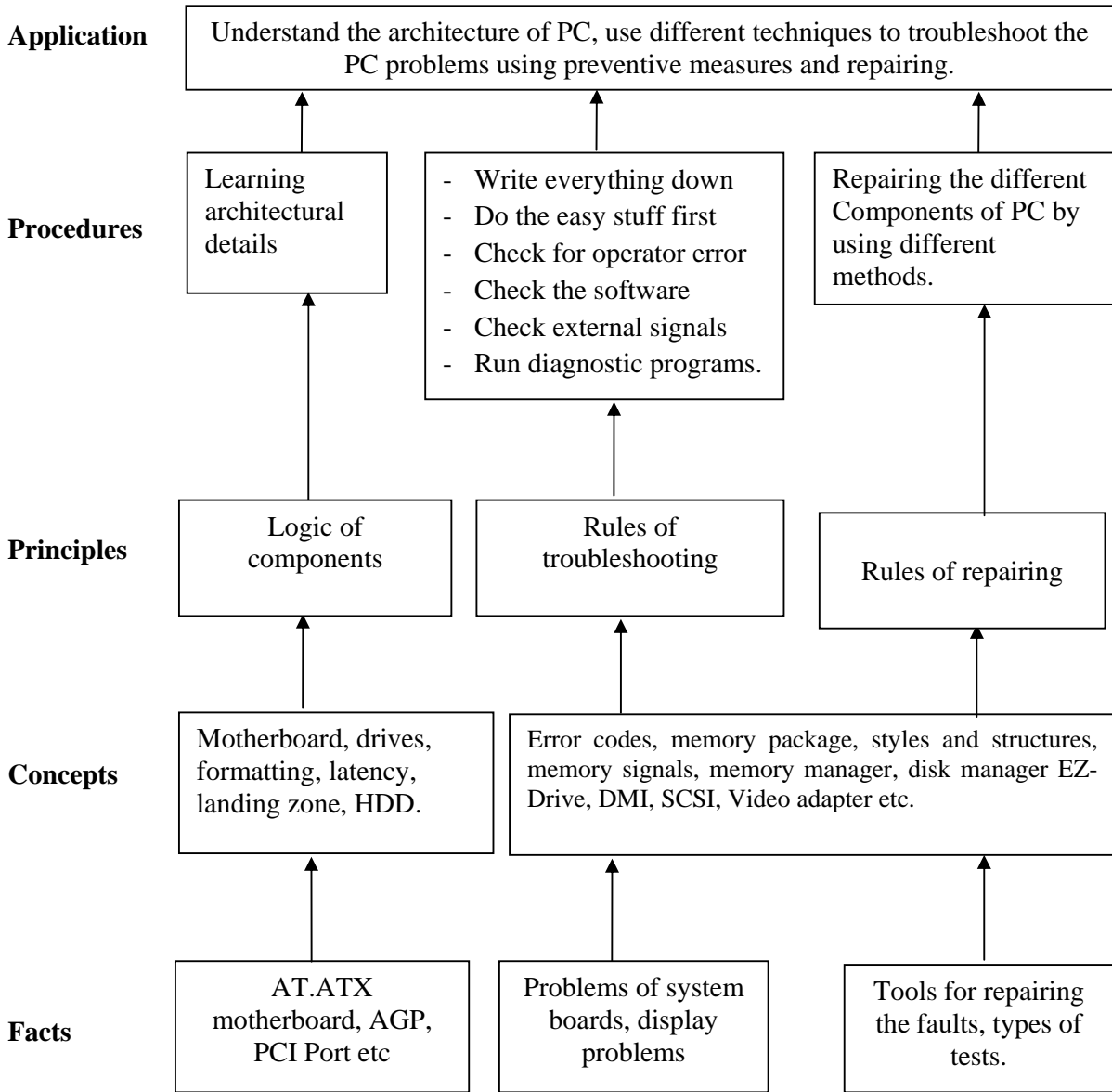
The aim of the subject is to teach the basic working of the computer motherboard, peripherals and add-on cards. The subject helps the students to do the maintenance of the Computer, peripherals and its add-on cards. The students will be able to select the proper peripheral as per their specification 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. No	Theory	Hrs.	Marks
1	<p>Motherboard & Its Component Specific Objectives</p> <ul style="list-style-type: none"> ➤ To Understand the various components of Motherboard. ➤ To Know about the different memories in PC & their usage. ➤ To Understand the selection of different components of PC. <p>1.1 CPU – Concept like address lines, data lines, internal registers. 1.2 Modes of operation of CPU – Real mode, IA-32 mode, IA-32 Virtual Real Mode. 1.3 Process Technologies, Dual Independent Bus Architecture, Hyper Threading Technologies & its requirement. 1.4 Processor socket & slots. 1.5 Chipset basic, chipset Architecture, North / South bridge & Hub Architecture. 1.6 Latest chipset for PC 1.7 Overview & features of PCI, PCI –X, PCI express, AGP bus. 1.8 Logical memory organization conventional memory, extended memory, expanded memory. 1.9 Overview & features of SDRAM, DDR, DDR2, DDR3. 1.10 Concept of Cache memory: 1.11 L1 Cache, L2 Cache, L3 Cache, Cache Hit & Cache Miss. 1.13 BIOS – Basics & CMOS Set Up. 1.14 Motherboard Selection Criteria.</p>	12	24
2	<p>Storage Devices & Interfacing. Objective</p> <ul style="list-style-type: none"> ➤ To understand the Recording techniques in storage devices. ➤ To understand the working of storage devices. <p>2.1 Recording Techniques: FM, MFM , RLL, perpendicular recording 2.2 Hard Disk construction and working. 2.3 Terms related to Hard Disk. Track, sector, cylinder, cluster, landing zone, MBR, zone recording, write pre-compensation. 2.4 Formatting: Low level, High level & partitioning. 2.5 FAT Basics: Introduction to file system, FAT 16, FAT 32, NTFS, 2.6 Hard Disk Interface: Features of IDE, SCSI, PATA, SATA, Cables & Jumpers. 2.7 CD ROM Drive: Construction, recording.(Block diagram) 2.8 DVD: Construction, Recording. (Block Diagram) 2.9 Blue-ray Disc specification.</p>	08	24

3	<p>Display Devices & Interfacing Objective</p> <ul style="list-style-type: none"> ➤ To understand the construction and working of display devices like CRT, LCD. ➤ To understand the Interfacing of above devices to PC. <p>3.1 CRT: - Block diagram & working of monochrome & colour Monitor 3.2 Characteristics of CRT Monitor :- DOT Pitch, Resolution, Horizontal Scanning frequency, Vertical 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</p>	06	12
4	<p>Input and Output Devices Objective</p> <ul style="list-style-type: none"> ➤ To understand the construction and working of Input /Output Devices. ➤ To understand the Interfacing of the above peripherals. <p>4.1 Keyboard: Types of key switches: Membrane, Mechanical, Rubber dome, Capacitive, optoelectronic and interfacing. 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 diagram and specifications.</p>	06	12
5	<p>Power Supplies Objective</p> <ul style="list-style-type: none"> ➤ To understand the working of SMPS. ➤ To understand the power problems. <p>5.1 Block diagram and working of SMPS. 5.2 Signal description and pin-out diagram of AT and ATX connectors 5.3 Power supply characteristics: Rated wattage, Efficiency, Regulation, 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</p>	04	08
6	<p>Interfaces Objective</p> <ul style="list-style-type: none"> ➤ To understand the ports of PC. ➤ To understand interfacing techniques of devices to ports <p>6.1 SCSI, SCSI cables and connectors, SCSI drive configuration. 6.2 USB features. 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</p>	06	12

	PC Troubleshooting, Maintenance and Tools. Objective		
	<ul style="list-style-type: none"> ➤ To understand the preventive maintenance of PC ➤ To understand the diagnostic tools of PC 		
7	7.1 POST: POST sequence, Beep codes, visual display codes.		
	7.2 Preventive maintenance: Active, Passive, periodic maintenance procedure.	06	08
	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 P67 chipset.
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. No.	Author	Title	Publisher
01	Scott Muller	Upgrading & Repairing PCs	Pearson
02	Mark Minasi	The Complete PC Upgrade & Maintenance guide	Wiley India
03	Barry Press and Maricia Press	PC Upgrade and Repair	Wiley India
04	Begelow	Bigelow's Troubleshooting, Maintaining & Repairing PCs	Tata McGraw Hill
05	Mike Meyers Scott 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:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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:

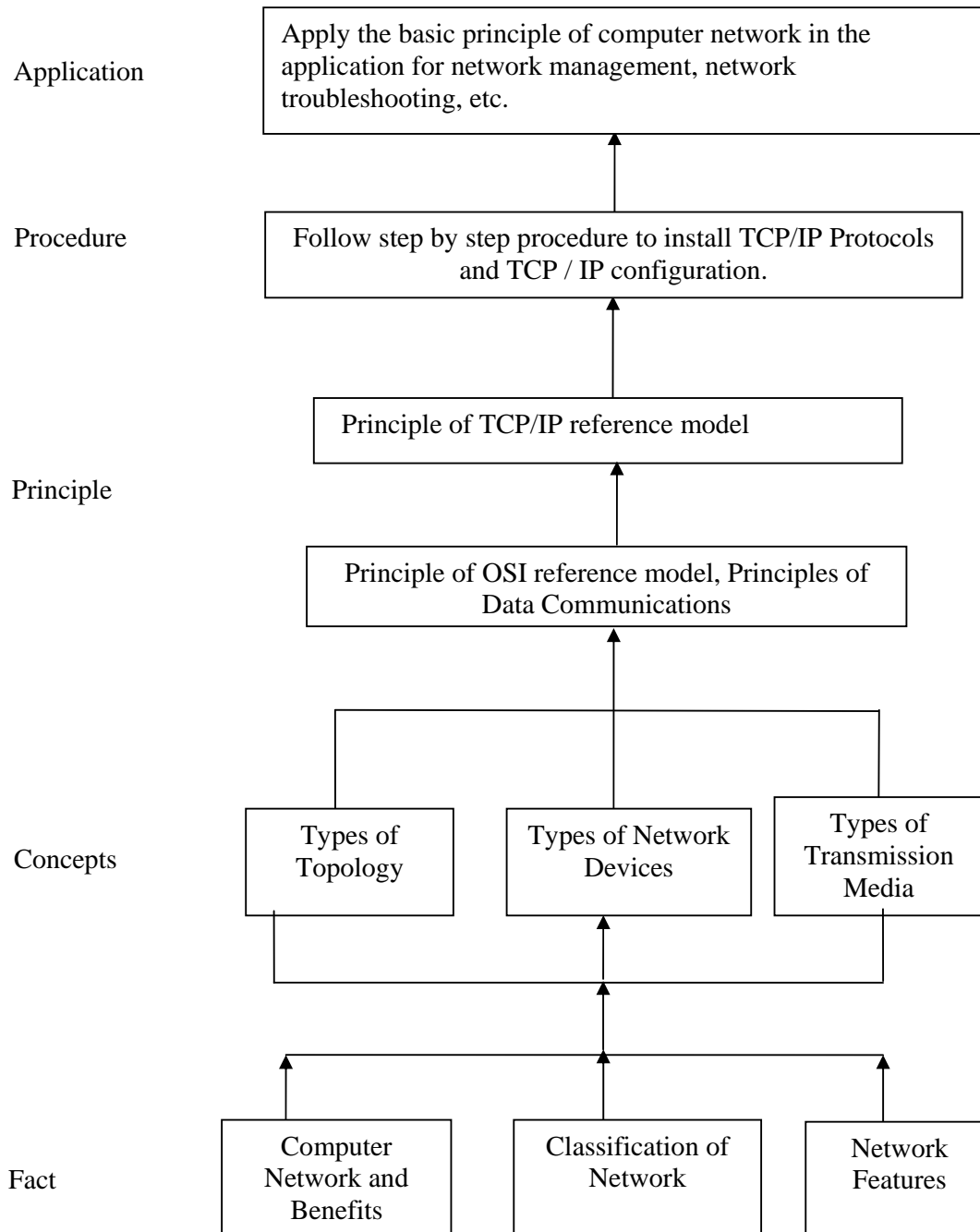
Intellectual Skills:

- 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
01	<p>Introduction to Data Communication and Networking Objectives:-</p> <ul style="list-style-type: none"> ➤ Understand Basic Concept of Data Communication ➤ Understand Analog and Digital Transmission Methods. ➤ Differentiate between Baud rate and Bit rate. <p>1.1 Introduction, Fundamental Concepts, Data Communication, protocols, Standards, Standard organizations, Bandwidth and Data Transmission Rate.</p> <p>1.2 Analog Signal, Analog Transmission, Digital Signal ,Digital Transmission, Digital Signal Analog Transmission, Baud Rate and Bits per second</p> <p>1.3 Modes of Data Transmission and Multiplexing, Parallel and Serial Communication, Asynchronous, Synchronous and Isochronous Communication, Simplex, Half-Duplex, Full Duplex, Multiplexing and Demultiplexing, Types of Multiplexing: TDM, FDM , TDM Vs FDM</p>	10	20
02	<p>Transmission Errors: Detection and Correction, Transmission Media and Network Topologies Objectives:-</p> <ul style="list-style-type: none"> ➤ Understand Errors and Error Correction ➤ Understand Types of Medias. ➤ Understand various Network Topologies and Network Control Devices <p>2.1 Introduction, Error Classification, Types of Errors and Error Detection</p> <p>2.2 Types of Transmission Media- 1) Guided Media: Cable Characteristics, Types of Cable-Twisted Pair Cable, Co-axial Cable, Fiber Optic Cable. 2) Unguided media: Types of Communication Band-Microwave Communication, Radio wave Communication, Satellite Communication, Infrared Communication.</p> <p>2.3 Introduction IEEE Standards for LAN,MAN and WAN 802.1, 802.2, 802.3, 802.4, 802.5, 802.11</p> <p>2.4 Latest Technologies in Wireless Network-Bluetooth Architecture, Wi-Fi, Wi- Max</p> <p>2.5 Cellular (Mobile) Telephone - Band in Cellular Telephony, Calls using Mobile Phones, Transmitting receiving / Handoff operations</p> <p>2.6 Network Topologies, Switching: Packet , Circuit</p> <p>2.7 Introduction Star, Ring, Tree, Bus, Mesh, Hybrid, Basics of Switching, Router.</p>	12	22
03	<p>OSI Model, LAN,WAN,MAN, MAC Sublayer Objectives:-</p> <ul style="list-style-type: none"> ➤ Understand OSI Model ➤ Understand LAN/WAN/MAN <p>3.1 Introduction– Layered Architecture , Peer-to- Peer Processes- Interfaces between Layer, Protocols, Organization of the Layers, Encapsulation.</p>	10	22

	<p>3.2 Layers of the OSI Reference Model (Functions of each Layer & Protocols used) – Physical Layer, Data-Link Layer, Network Layer, Transport Layer, Session Layer, Presentation Layer, Application Layer.</p> <p>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.</p>		
04	<p>Internetworking Concepts, Devices, Internet Basics , History And Architecture Objectives:-</p> <ul style="list-style-type: none"> ➤ Understand Internetworking and Issues ➤ Understand Internetworking Issues ➤ Understand the concept of ISP <p>4.1 Introduction–Why Internetworking, Problems in Internetworking, Dealing with Incompatibility, Vistual Network, Internetworking Devices, Repeaters, Bridges, Routers, Gateways</p> <p>4.2 Brief History of Internet, Growth of Internet, Internet Topology, Internal Architecture of ISP.</p> <p>4.3 Ways of Accessing the Internet : Introduction, Dial Up access for an Individual User, Leased Lines, DSL and Cable Modems</p>	08	18
05	<p>TCP/IP, ARP, RARP and ICMP, TCP vs UDP , DNS, Email , FTP</p> <p>5.1 Introduction, TCP/IP Basics, Why IP addresses, Logical Addresses, Concept of IP Address and IP datagram Packet, ARP, RARP, ICMP, Data Fragmentation and Reassembly, Comparison of OSI and TCP/IP Protocol Suites.</p> <p>5.2 TCP and UDP :Introduction, TCP Basics, Features of TCP, Relationship between TCP and IP, Ports and Sockets, Connections, TCP Connections, Packet Format, Persistent TCP Connection, UDP and UDP Packet .</p> <p>5.3 Introduction DNS, TCP,FTP TFTP</p>	08	18
Total		48	100

List of Practical:

Sr. 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 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 (Ping, Ping ::1, ipconfig, Tracert, Netstat, Wireshark, ARP, 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 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 (Second Edition)	Microsoft Press	PHI(Prentice-Hall of India 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			Examination Scheme					
TH	TU	PR	PAPER 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.

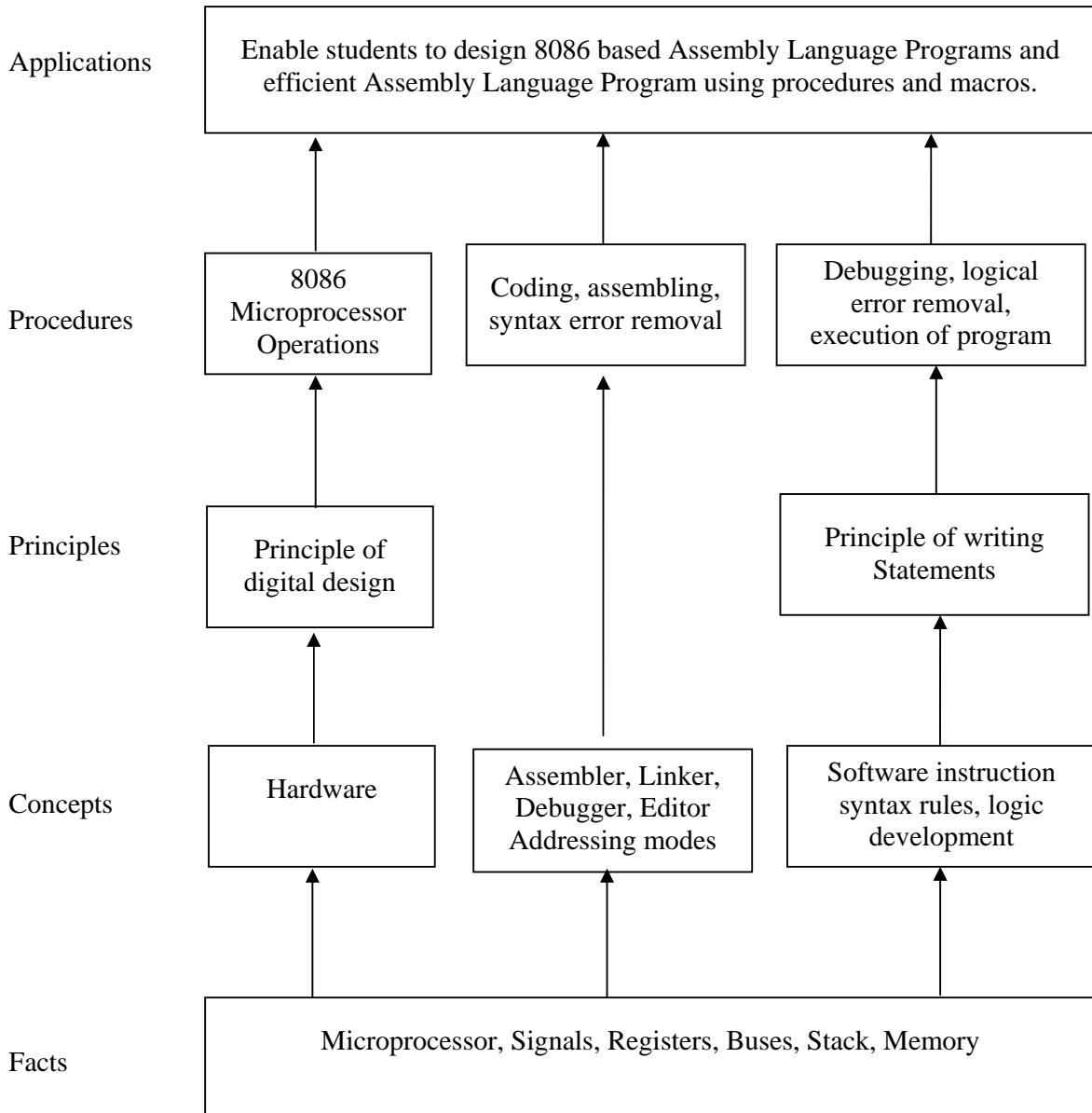
This subject covers Basics of 8085, architecture of 8086 along instruction set. It also covers assembly language programming with effective use of procedure and macros. This will act as base for the advanced assembly language programming for next generation microprocessors.

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
<p>Topic 1: Basics of Microprocessor Specific Objective: Students will be able to</p> <ul style="list-style-type: none"> ➤ Draw the architecture of 8085 ➤ Define the functions of different pins of 8085 ➤ Identify status of different flags <p>1.1 Evolution of Microprocessor and types 1.2 8085 Microprocessor,</p> <ul style="list-style-type: none"> • Salient features • Pin description, • Architecture of 8085 - Functional Block diagram, • Register organization, 	04	08
<p>Topic 2 :16 Bit Microprocessor: 8086 Specific Objective: Students will be able to</p> <ul style="list-style-type: none"> ➤ Define the functions of different pins ➤ Draw functional block diagram of 8086 ➤ Understand the operating modes of 8086 <p>2.1 8086 Microprocessor,</p> <ul style="list-style-type: none"> • Salient features • Pin descriptions • Architecture of 8086 - Functional Block diagram • Register organization, • Concepts of pipelining, • Memory segmentation • Physical memory addresses generation. <p>2.2 Operating Modes of 8086</p> <ul style="list-style-type: none"> • 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 	12	24
<p>Topic 3 : Instruction Set of 8086 Microprocessor Specific Objective: Students will be able to</p> <ul style="list-style-type: none"> ➤ Understand the different types of instructions ➤ Identify the addressing modes of instructions ➤ State the operation of an instructions <p>3.1 Machine Language Instruction format, addressing modes 3.2 Instruction set, Groups of Instructions</p> <ul style="list-style-type: none"> • Arithmetic Instructions • Logical Instructions • Data transfer instructions • Bit manipulation instructions • String Operation Instructions, • Program control transfer or branching Instructions • Process control Instructions 	10	20
Topic 4 :The Art of Assembly Language Programming	04	08

<p>Specific Objective: Students will be able to</p> <ul style="list-style-type: none"> ➤ Know the program development steps ➤ Use the different program development tools ➤ Illustrate the functions of assembler directive and operators <p>4.1 Program development steps</p> <ul style="list-style-type: none"> • Defining problem, • Writing Algorithms • Flowchart • Initialization checklist • Choosing instructions • Converting algorithms to assembly language programs. <p>4.2 Assembly Language Programming Tools</p> <ul style="list-style-type: none"> • Editors • Assembler • Linker • Debugger. <p>4.3 Assembler directives and Operators</p>		
<p>Topic 5: 8086 Assembly Language Programming.</p> <p>Specific Objective: Students will be able to</p> <ul style="list-style-type: none"> ➤ Write a appropriate programs using editor ➤ Run program using assembler and linker ➤ Debug program using debugger <p>5.1 Model of 8086 assembly language programs</p> <p>5.2 Programming using assembler -</p> <ul style="list-style-type: none"> • Arithmetic operations on Hex and BCD numbers - Addition, Subtraction, Multiplication and Division • Sum of Series • Smallest and Largest numbers from array • Sorting numbers in Ascending and Descending order • Finding ODD/EVEN numbers in the array • Finding Positive and Negative Numbers in array • 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 	12	24
<p>Topic 6 : Procedure and Macro in Assembly Language Program</p> <p>Specific Objective: Students will be able to</p> <ul style="list-style-type: none"> ➤ Understand the purpose of procedure and macros ➤ Use procedure and macros <p>6.1 Procedure</p> <ul style="list-style-type: none"> • Defining Procedure - Directives used, FAR and NEAR • CALL and RET instructions. • Reentrant and Recursive procedures. • Assembly Language Programs using Procedure <p>6.2 Defining Macros.</p> <ul style="list-style-type: none"> • Assembly Language Programs using Macros. 	06	16
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. No.	Name of Book	Author	Publication
1.	Microprocessor & interfacing (programming & hardware) Revised Second Edition	Douglas V. Hall	Tata McGraw Hill

2.	Microprocessor Architecture, Programming and Applications with the 8085	Ramesh S. Gaonkar	Penram International Publishing (India)
3.	The 8088 and 8086 Microprocessors	Walter A. Triebel, Avtar Singh	Pearson Publications
4.	The 8086.8088 Family, Design, Programming, and Interfacing	John Uffenback	PHI

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 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:

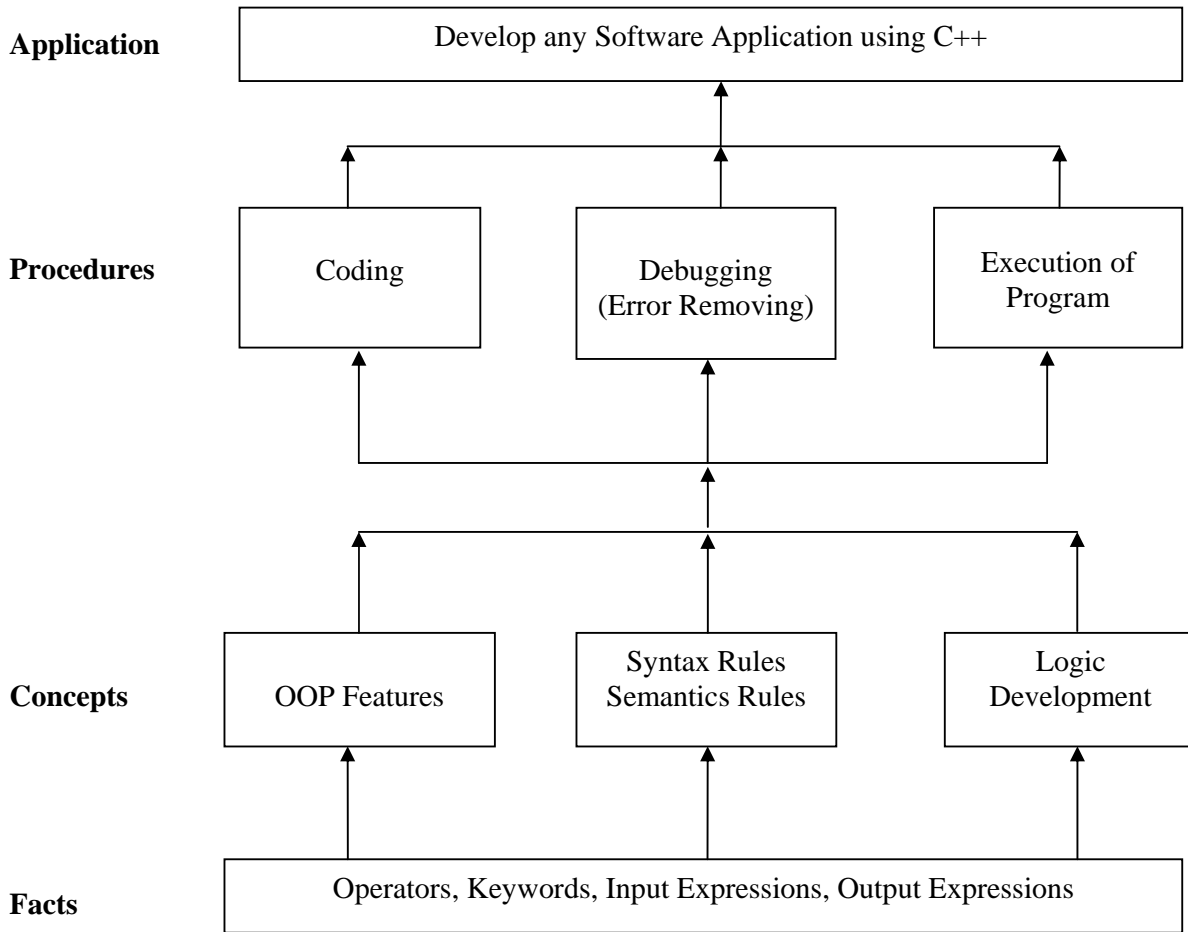
Intellectual Skills:

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.

Learning Structure:



Theory:

Topic No	Contents	Hours	Marks
1	<p>Principles of Object Oriented Programming</p> <p>Objectives:</p> <ul style="list-style-type: none"> ➤ State OOP's basic Concepts. ➤ Difference between OOP & POP. ➤ C++ Programming structure. <p>1.1 Its need & requirement, Procedure Oriented Programming (POP) verses Object Oriented Programming (OOP), Basic concepts of Object Oriented Programming, Object Oriented Languages, Applications of OOP.</p> <p>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.</p>	06	12
2	<p>Classes & Objects:</p> <p>Objectives:</p> <ul style="list-style-type: none"> ➤ Defining classes & objects. ➤ Declaring & using static data member & static member function, friend function. ➤ Programs based on classes & objects. <p>2.1 Structures in C++.</p> <p>2.2 Class & Object: Introduction, specifying a class, access specifiers, defining member functions, creating Objects, memory allocations for objects.</p> <p>2.3 Array of Objects, Object as function arguments.</p> <p>2.4 Static data members, static member function, friend Function</p>	08	20
3	<p>Constructors & Destructors</p> <p>Objectives:</p> <ul style="list-style-type: none"> ➤ State Concepts of constructor & destructor, types of constructor. ➤ Programs based on constructor & destructors <p>3.1 Concepts of Constructors, Types of constructors: Default, Parameterized, Copy.</p> <p>3.2 Overloaded Constructors :Multiple Constructors in a Class, Constructors with default arguments.</p> <p>3.3 Destructors.</p>	08	14
4	<p>Inheritance: Concept of Reusability</p> <p>Objectives:</p> <ul style="list-style-type: none"> ➤ Concept of Inheritance & its types. ➤ Types of Visibility modes. ➤ Programs based on Inheritance. <p>4.1 Introduction, defining a derived class, visibility modes & effects.</p> <p>4.2 Types of Inheritance : Single, multilevel, multiple, hierarchical, hybrid</p> <p>4.3 Virtual base class, abstract class, constructors in derived class.</p>	08	20
5	<p>Pointers in C++</p> <p>Objectives:</p> <ul style="list-style-type: none"> ➤ Declare Pointer & Pointer arithmetic. ➤ Pointer to Arrays, string & Object. 	10	18

	<ul style="list-style-type: none"> ➤ “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.		
6	Polymorphism Objectives: <ul style="list-style-type: none"> ➤ 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. 6.3 Run time polymorphism: Virtual functions, rules for virtual functions, pure virtual function.	08	16
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. Accept and display this data for one object.
3	Write a program to declare a class 'employee' having data members name and age. 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	A. Write a program to find student details using multiple inheritance. B. Write a program to compute total marks of student using virtual base class.
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. 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 th 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.softteam.com

Course Name : Diploma in Information Technology

Course Code : IF

Semester : Fourth

Subject Title : Applied Multimedia Technology

Subject Code : 17041

Teaching and Examination Scheme

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

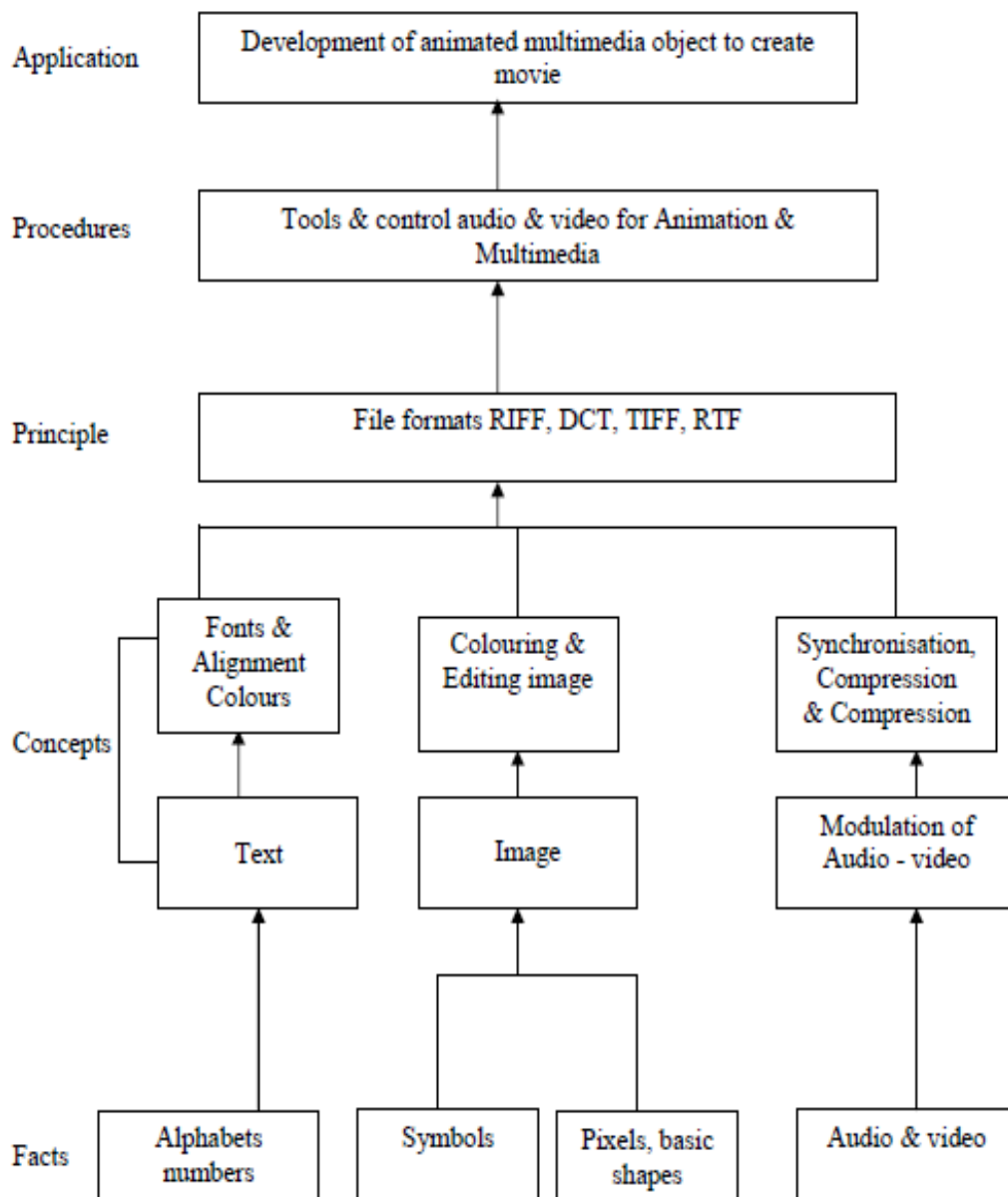
It is a practical oriented subject which provides the students an insight into various fonts, basic shapes, images, audio formats, video formats, animation controls and tools.

General Objectives:

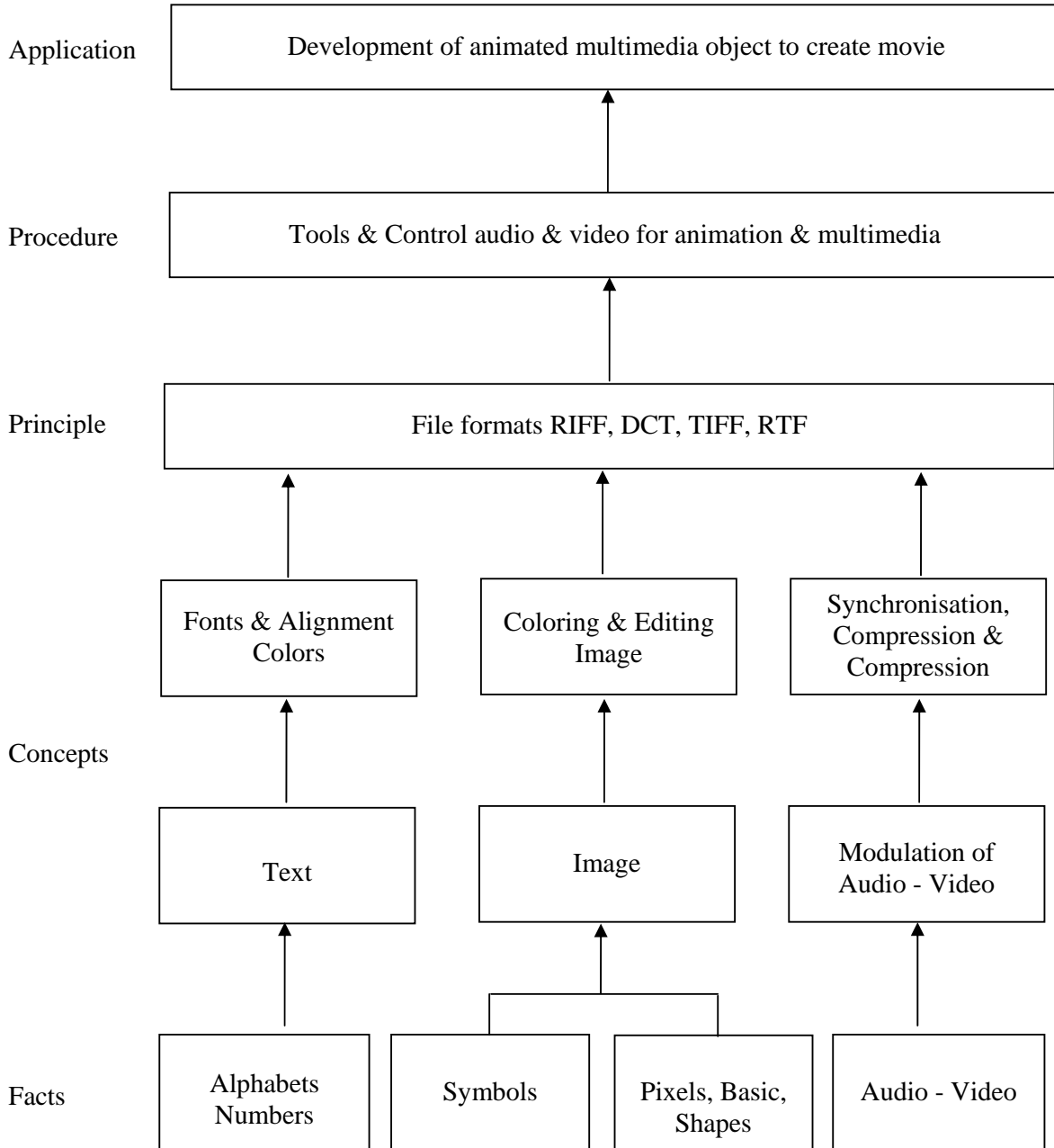
Students will be able to

- 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
1	<p>Introduction to Flash</p> <ul style="list-style-type: none"> • Introduction to Multimedia tool – Flash • Creating & Modifying elements • Line tool, fill/attributes, different shapes, text tools & pen tool <p>Activity: Selecting lines fill with arrow tool, selecting shapes, using lasso tool performing basic editing tools, selecting & deselecting elements, modifying created objects.</p>	04
2	<p>Dream weaver and Firework</p> <p>Activity:</p> <ul style="list-style-type: none"> • To set up website in Dreamweaver. • To create content using Microsoft Word. • To copy content from Word and paste in web page. • To create CSS DIV to hold navigation index. • To create page navigation index. • To link page index to page content using anchors. 	03
3	<p>Theory: compression and Decompression</p> <ul style="list-style-type: none"> • Need , Types , Evaluating & Visibility • Evaluating the Compression System, Types of compression , • Need of Data Compression • Color Gray Scale and Still Video Image • Color Characteristics • Color Model <p>Activity: Find answers through software and try to incorporate in the practicals</p> <ul style="list-style-type: none"> • 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? 	03
4	<p>Theory: Jpeg Architecture. Formats</p> <p>Activity: Use theory concepts in the practicals</p>	02
5	<p>Theory: Mpeg architecture and File format</p> <ul style="list-style-type: none"> • MPEG-objectives, Architecture, BIT stream syntax performance • MPEG2 & MPEG4 	02
6	<p>Theory: Revision of Basic tag , Cascaded , Inline and Embedded style , Javascript for Client side validation like Blank check , String check for name, Numeric check for telephone number , validate email address , date of birth</p> <p>Activity: Construction of website using text , picture/Graphics / Audio /Video using flash, HTML, DHMTL, CSS, Scripts</p>	02

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: Button, Label ,Text box control of VB, How use OCX control in VB , 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. 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:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

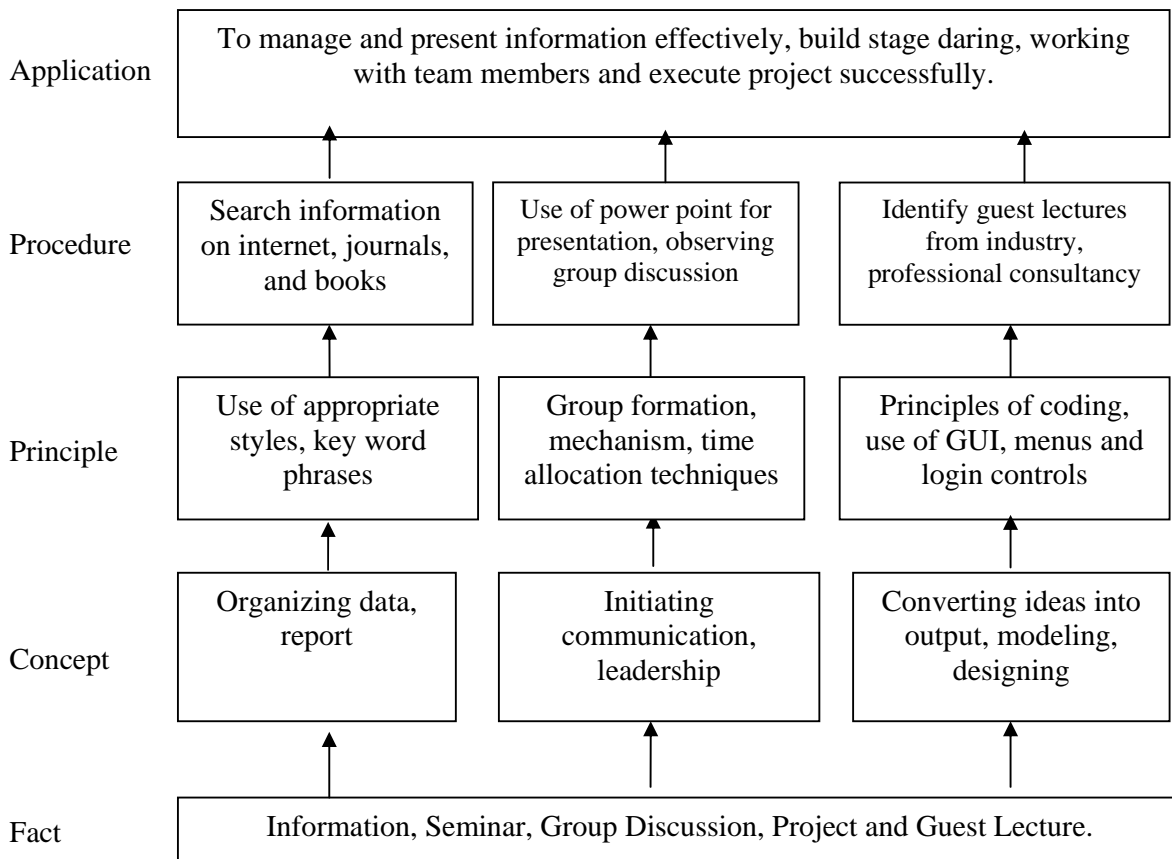
Objectives:

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
1	<p>Lectures by professional, industrial experts to be organized from following or any other suitable technical areas. [Any two]: -</p> <ol style="list-style-type: none"> 1. Advanced technical writing skill 2. SAP modules and career. 3. Career trends in computer / IT field 4. Intelligent computer system. 5. Advanced trends in hardware technology. 6. Advanced programming languages in IT field. 7. Introduction to Apprenticeship Training Scheme 	04
2	<p>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.</p> <ol style="list-style-type: none"> 1. Human machine interface 2. Dynamic languages 3. Robotic surgery 4. Virtual keyboard 5. Wireless USB 6. Concept of cloud computing 7. Bubble sensing 8. Blu – ray disc 9. Or any other suitable topic 	06
3	<p>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.</p> <ol style="list-style-type: none"> 1. Trouble shooting methods for various computer peripherals. 2. Viruses / antivirus and firewalls [checkpoints] 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. 	16
4	<p>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.</p> <ol style="list-style-type: none"> 1. Is china a threat to the Indian software industry? 2. Education is only business in these days. 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? 	12

	7. Or any other topic.	
5	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. <ol style="list-style-type: none"> 1. Web site development system. 2. Database management system project 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. 	10
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 4th semester examination.

Note:- Examination in Professional Practices of 5th 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.

 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																	
DURATION OF COURSE : 6 SEMESTERS for IE/IS/IC and 8 SEMESTERS for IU WITH EFFECT FROM 2012-13																	
SEMESTER : FOURTH DURATION : 16 WEEKS																	
FULL TIME / PART TIME : FULL TIME SCHEME : G																	
SR. NO.	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME										SW (17400)
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)			
								Max	Min	Max	Min	Max	Min	Max	Min		
1	Environmental Studies \$	EST	17401	01	--	02	01	50#*	20	--	--	--	--	25@	10	50	
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		
5	Principles of Communication Systems	PCS	17472	03	--	02	03	100	40	25#	10	--	--	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)			Examination in 5th Semester Professional Practices-III													
<p>Student Contact Hours Per Week: 30 Hrs.</p> <p>THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.</p> <p>Total Marks : 800</p> <p>@- Internal Assessment, # - External Assessment, No Theory Examination, \$ - Common to all branches, #* - Online Theory Examination, β - Common to DE / EV / MU</p> <p>Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work.</p> <p>** Industrial Training (Optional) - Student can undergo Industrial Training of four weeks after fourth semester examination during summer vacation.</p> <p>Assessment will be done in Fifth semester under Professional Practices-III. They will be exempted from activities of Professional Practices-III of 5th Semester.</p> <ul style="list-style-type: none"> ➤ 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/AU**

Semester : Fourth

Subject Title : Environmental Studies

Subject Code : 17401

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

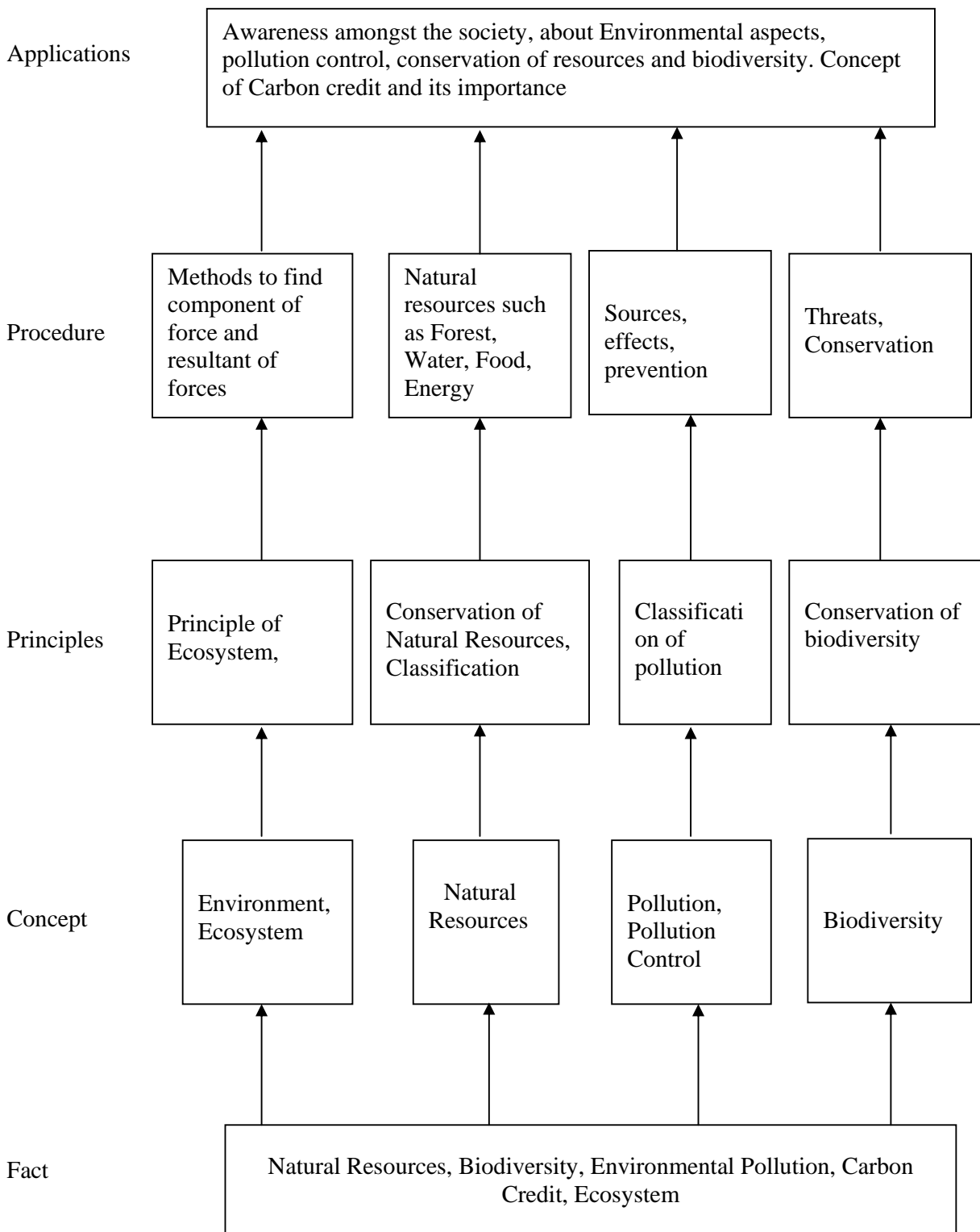
It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

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
<p>Topic 1: Nature of Environmental Studies</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define the terms related to Environmental Studies ➤ State importance of awareness about environment in general public <p>Contents:</p> <ul style="list-style-type: none"> • Definition, Scope and Importance of the environmental studies • Importance of the studies irrespective of course • Need for creating public awareness about environmental issues 	01	04
<p>Topic 2: Natural Resources and Associated Problems</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define natural resources and identify problems associated with them ➤ Identify uses and their overexploitation ➤ Identify alternate resources and their importance for environment <p>Contents:</p> <p>2.1 Renewable and Non renewable resources</p> <ul style="list-style-type: none"> • Definition • Associated problems <p>2.2 Forest Resources</p> <ul style="list-style-type: none"> • General description of forest resources • Functions and benefits of forest resources • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc. <p>2.3 Water Resources</p> <ul style="list-style-type: none"> • Hydrosphere: Different sources of water • Use and overexploitation of surface and ground water • Effect of floods, draught, dams etc. on water resources and community <p>2.4 Mineral Resources:</p> <ul style="list-style-type: none"> • Categories of mineral resources • Basics of mining activities • Mine safety • Effect of mining on environment <p>2.5 Food Resources:</p> <ul style="list-style-type: none"> • Food for all • Effects of modern agriculture • World food problem 	04	10
<p>Topic 3. Ecosystems</p> <ul style="list-style-type: none"> • Concept of Ecosystem • Structure and functions of ecosystem • Energy flow in ecosystem • Major ecosystems in the world 	01	04
<p>Topic 4. Biodiversity and Its Conservation</p> <ul style="list-style-type: none"> • Definition of Biodiversity • Levels of biodiversity 	02	06

<ul style="list-style-type: none"> • Value of biodiversity • Threats to biodiversity • Conservation of biodiversity 		
Topic 5. Environmental Pollution <ul style="list-style-type: none"> • Definition • Air pollution: Definition, Classification, sources, effects, prevention • Water Pollution: Definition, Classification, sources, effects, prevention • Soil Pollution: Definition, sources, effects, prevention • Noise Pollution: Definition, sources, effects, prevention 	03	08
Topic 6. Social Issues and Environment <ul style="list-style-type: none"> • Concept of development, sustainable development • Water conservation, Watershed management, Rain water 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 	03	10
Topic 7. Environmental Protection Brief description of the following acts and their provisions: <ul style="list-style-type: none"> • Environmental Protection Act • Air (Prevention and Control of Pollution) Act • Water (Prevention and Control of Pollution) Act • Wildlife Protection Act • Forest Conservation Act Population Growth: Aspects, importance and effect on environment <ul style="list-style-type: none"> • Human Health and Human Rights 	02	08
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. No.	Author	Title	Publisher
01	Anindita Basak	Environmental Studies	Pearson Education
02	R. Rajgopalan	Environmental Studies from Crises to Cure	Oxford University Press
03	Dr. R. J. Ranjit Daniels, Dr. 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:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

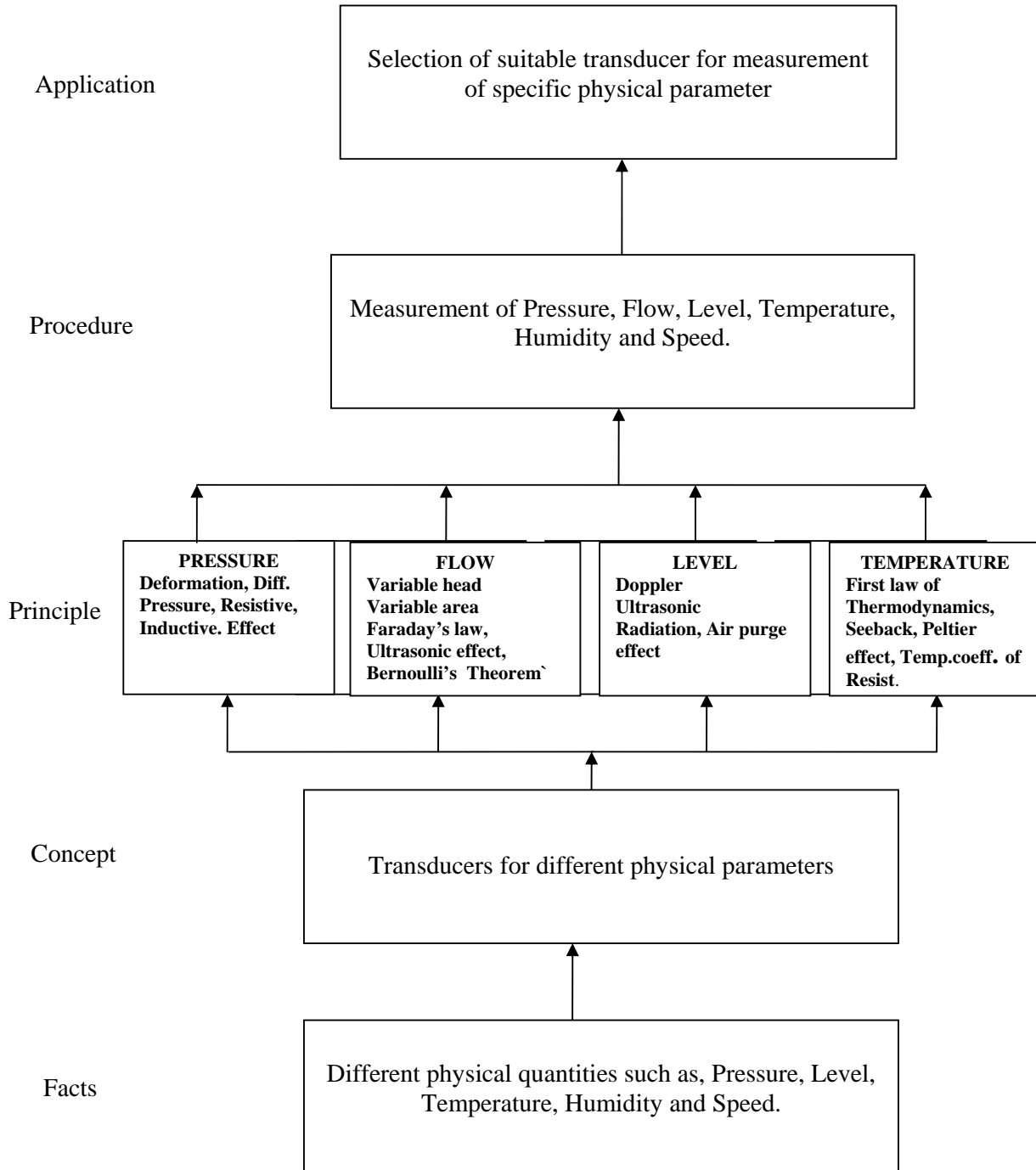
With the background of measuring instruments, this subject deals with measurement of different physical parameters like temperature, pressure etc. covering the entire gamut of industrial measurement. Different types of transducers used for measurement of different physical quantities with their construction, 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 No	Theory	Hrs.	Marks
1	<p>Transducers: Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw and describe the block diagram of Instrumentation system. ➤ Compare different Transducers ➤ Draw and describe different Electronic Transducers. <p>Contents</p> <ul style="list-style-type: none"> • Instrumentation System: 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 Digital, Primary and Secondary. • Electrical Transducers: Resistive transducers- Linear & Angular potentiometers Capacitive transducer Inductive transducer –LVDT, RVDT (As a displacement transducer) Piezoelectric transducer (Principle of operation and applications of above) • Selection criterion of transducers 	08	16
2	<p>Pressure measurement</p> <ul style="list-style-type: none"> ➤ Draw and describe the non-elastic and elastic pressure transducers. ➤ Draw and describe electronic pressure transducers. ➤ Write procedure of calibration of elastic pressure gauges using dead weight tester. <p>Contents</p> <ul style="list-style-type: none"> • Pressure: Definition Types - Absolute, Gauge, Atmospheric, Vacuum(Definition, Units) • Classification of Pressure measuring devices • Non elastic pressure transducer: U tube Inclined Tube Well type manometer • Elastic pressure transducer: Bourdon Tube Bellows Diaphragm Capsule • Electronic pressure transducers: Bourdon tube with LVDT Diaphragm with Strain gauge 	08	20

	<ul style="list-style-type: none"> • Calibration of pressure gauge using dead weight tester <p>Note: Each transducer should be studied on the basis of working principle, construction, advantages, disadvantages and applications.</p>		
3	<p>Flow Measurement</p> <ul style="list-style-type: none"> ➤ List Of different types of flow. ➤ List of different types of flow measuring transducers. ➤ Draw and describe construction and working of different Flow measuring transducers. <p>Contents</p> <ul style="list-style-type: none"> • Flow: <ul style="list-style-type: none"> Definition Types of Flow –Laminar, turbulent , Reynolds number • Classification of flow measuring transducers : <ul style="list-style-type: none"> Variable head flow meter- Venturimeter, orifice plate meter Variable area flow meter – Rota meter Electromagnetic Flow meter Ultrasonic flow meter- Time difference and Doppler Type <p>Note: Each transducer should be studied on the basis of working principle, construction, advantages, disadvantages and applications.</p>	06	14
4	<p>Level Measurement</p> <ul style="list-style-type: none"> ➤ State the need of level measurement. ➤ List of different level measuring methods. ➤ Draw the construction and describe working of Level measuring transducers. <p>Contents</p> <ul style="list-style-type: none"> • Level: <ul style="list-style-type: none"> Definition Need of level measurement • Classification of level measurement methods: <ul style="list-style-type: none"> Float type – linear & rotary potentiometer (Contact type) Capacitive type (Contact type) Ultrasonic type (Non-contact type) Radiation type (Non-contact type) RADAR type (Non-contact type) <p>Note: Each transducer should be studied on the basis of working principle, construction, advantages, disadvantages and applications.</p>	08	16
5	<p>Temperature measurement</p> <ul style="list-style-type: none"> ➤ List different temperature measuring scales and its conversions. ➤ List different temperature measuring transducers. ➤ Draw the construction and describe working of different temperature transducers. <p>Contents</p> <ul style="list-style-type: none"> • Temperature : <ul style="list-style-type: none"> Definition and units First law of thermodynamics Different temperature scales & their conversions • Classification of temperature measuring transducers: 	10	20

	<p>Filled system type thermometer. Bimetallic thermometer 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) Pyrometer - Optical, Radiation</p> <p>Note: Each transducer should be studied on the basis of working principle, construction, advantages, disadvantages and applications.</p>		
6	<p>Special Transducers and Measurements</p> <ul style="list-style-type: none"> ➤ List different types of humidity and its units. ➤ Draw the construction and describe working of Humidity transducers. ➤ Draw the construction and describe working of Speed measuring transducers. <p>Contents</p> <ul style="list-style-type: none"> • Humidity: Definition Types - Absolute, relative • Humidity measurement devices: Psychrometer - Dry & wet Bulb thermometer type Hygrometer- hair type , capacitive , resistive type • Speed Definition Classification of speed measurement methods Photoelectric pick-up (Non contact type) Magnetic pick-up (Non contact type) • pH Measurement <p>Note: Each transducer should be studied on the basis of working principle, construction, advantages, disadvantages and applications.</p>	08	14
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. No.	Author	Title	Publisher
01	A.K.Sawhney	Electrical and Electronic Measurements and Instrumentation	Dhanpat Rai & Sons.
02	S.K.Singh	Industrial Instrumentation & Control	Tata McGraw Hill Publishing Co. Ltd; N. Delhi
03	D. Patranabis	Principles of Industrial Instrumentation	Tata McGraw Hill Publishing Co. Ltd; N. Delhi
04	Rangan Mani Sharma	Instrumentation Systems and Devices	Tata McGraw Hill Publishing Co. Ltd; N. Delhi
05	Bela Liptak Kriszta Venczel	Process Measurement Instrument Engineers Handbook	Chilton Book Co.
06	B.C.Nakra K.K.Chaudhry	Instrumentation Measurement and Analysis	Tata McGraw Hill Publishing 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 Scheme					
TH	TU	PR	PAPER 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.

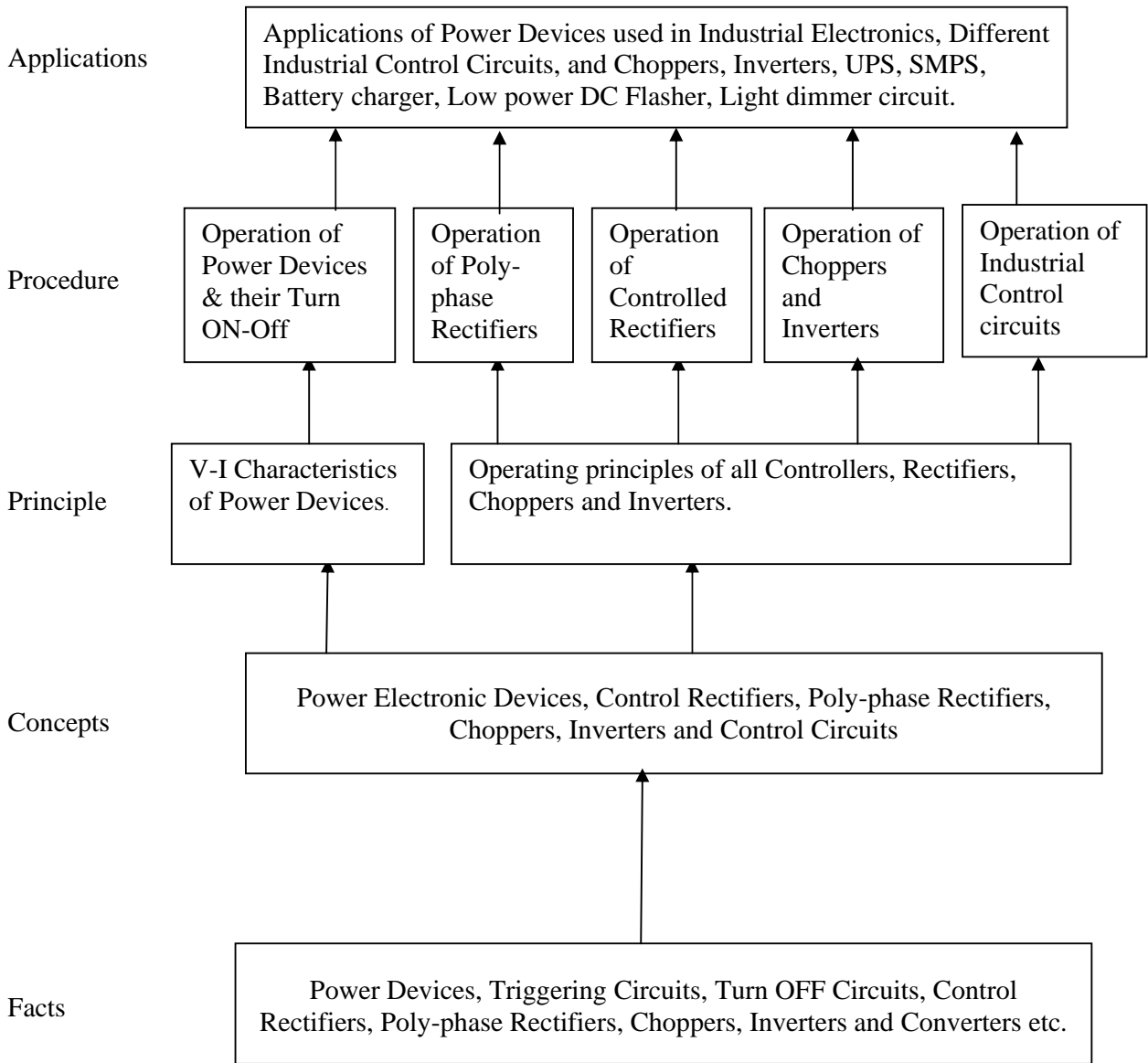
Concepts of electronic devices and circuits along with their applications are necessary. Industrial electronic is the foundation subject to study industrial drives, and advanced industrial electronics.

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 No	Contents	Hours	Marks
1	<p>Power Electronics</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Realize construction, working principle of different Power Devices. ➤ To select proper power device for particular applications. <p>Contents:</p> <ul style="list-style-type: none"> • Introduction to power electronics. • Power transistor: Construction, Operating Principle, V-I characteristics and Uses of power transistors. • Power MOSFET- Construction, Operating Principle, V-I characteristics and Uses of Depletion and Enhancement type power MOSFET. • IGBT- Construction, Operating Principle, V-I characteristics and Uses of IGBT. 	04	10
2	<p>Thyristor Family Devices</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Classify different power devices. ➤ Identify thyristors and triggering devices. ➤ Describe the operation of thyristor. ➤ Interpret V-I characteristics of different power devices. <p>Contents:</p> <ul style="list-style-type: none"> • SCR: Construction, Operating Principle with Two transistor analogy, V-I characteristics, Latching Current (I_L) and Holding Current (I_H). Applications of SCR, LASCR, SCS, GTO and TRIAC. • Thyristor family devices LASCR, SCS, GTO and TRIAC: Construction, Operating Principle, V-I characteristics and applications. • Triggering Devices- Construction, Operating Principle, V-I characteristics and applications of UJT, PUT, SUS, SBS and DIAC. 	10	20
3	<p>Turn ON and Turn OFF methods of SCR</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Classify Turn ON and Turn OFF circuits. ➤ Compare low power and high power triggering circuits <p>Contents:</p> <ul style="list-style-type: none"> • Concept of Turn ON mechanism of SCR: High Voltage triggering, thermal triggering, Illumination triggering, dv/dt triggering Gate triggering of SCR. • Gate trigger circuits –Resistance triggering circuit, Resistance 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- 	08	16

	Series resonant commutation circuit, Class B-Shunt resonant commutation circuit, Class C-Complimentary Symmetry commutation circuit		
4	<p>Phase controlled Rectifiers Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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. <p>Contents:</p> <ul style="list-style-type: none"> • Concept of phase control. (Firing Angle α and conduction angle \emptyset) • Circuit diagram, working, equations for and Waveforms of V_{DC} of following rectifiers. • 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. 	16	24
5	<p>Converters Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Understand the concept of Chopper. ➤ Realize the concept of Inverter. ➤ Explain operation of Chopper and Inverter. ➤ List different applications of Chopper and Inverter. <p>Contents:</p> <ul style="list-style-type: none"> • Concept of Choppers • Chopper: basic circuit and its operation using MOSFET • Step Up and Step down Chopper using MOSFET basic circuits. • 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. 	04	14
6	<p>Industrial Control Circuits. Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Understand the concept of Industrial Control Circuits. ➤ Draw the Circuit diagram and explain working of Industrial control circuits. ➤ Draw the Block diagram and explain working of SMPS and UPS. <p>Contents: Circuit diagram, working and applications of :</p> <ul style="list-style-type: none"> • Low power DC flasher. • Light dimmer circuit using DIAC-TRIAC. • Electronic timer using SCR. 	06	16

	<ul style="list-style-type: none"> • Battery charger using SCR. • Emergency Lighting System. • 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. No	Author	Title	Publisher
01	Alok Jain	Power Electronics and Its Applications	Penram International Publishing (India) Pvt. Ltd.
02	S. K. Bhattacharya	Fundamentals of Power Electronics	ISTE Learning materials centre.
03	M D Singh K B Khanchandani	Power Electronics	Tata McGraw-Hill
04	Muhammad H. Rashid	Power Electronics Circuits 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			Examination Scheme					
TH	TU	PR	PAPER 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:

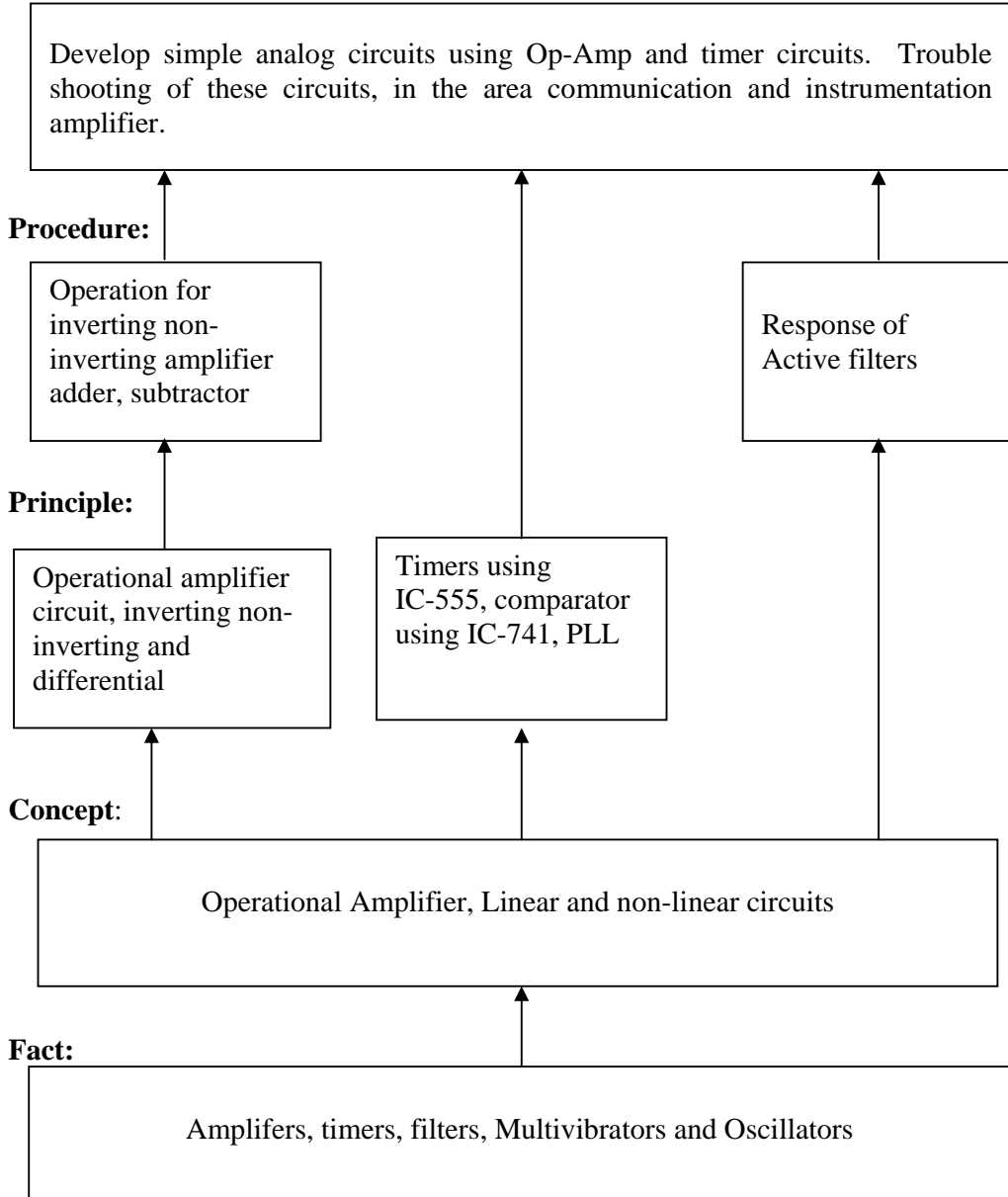
Students will be able to:

- 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
1	<p>Operational Amplifier (Op-Amp): Specific Objectives :</p> <ul style="list-style-type: none"> ➤ Draw labeled block diagram of Op-Amp ➤ Specify and define Different parameters of Op-Amp ➤ Interpret ideal transfer characteristics of Op-Amp <p>Contents:</p> <ul style="list-style-type: none"> • 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 push-pull amplifier. Equivalent Circuit, Circuit Symbols And 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. 	12	10
2	<p>Op-Amp Configuration: Specific Objectives: Students will be able to</p> <ul style="list-style-type: none"> ➤ Differentiate open and close loop configuration. ➤ Identify inverting and non-inverting configuration. ➤ Construct integrator and differentiator. <p>2.1 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, differential amplifier, unity gain amplifier (voltage follower), inverter(sign changer)</p> <p>2.2 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.</p>	12	18
3	<p>Applications of Op-Amp: Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Compute component values for instrumentation amplifier. ➤ Explain IC LM-324 ➤ Explain different applications of Op-Amp. <p>3.1 Need for signal conditioning and signal processing. [08]</p>	12	22

	<p>Circuit diagram, operation, derivation of output voltage Equation. advantages and applications of Instrumentation amplifier. Pin diagram pin functions and specifications of IC LM 324 Voltage to current converter (with floating load, with grounded load) Current to voltage converter.</p> <p>3.2 Sample and hold circuit. [16]</p> <p>Logarithmic and antilogarithmic amplifiers (using Diodes) Analog divider and analog multiplier Comparator: Circuit diagrams and operation of</p> <ul style="list-style-type: none"> • Zero crossing detector, • Schmitt trigger, • Window detector, • Phase detector, • Active peak detector, • Peak to peak detector 		
4	<p>Filters: Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Distinguish the types of filter ➤ Explain active and passive filter ➤ Explain different parameters of filter. <p>Contents:</p> <ul style="list-style-type: none"> • Introduction to filters ,Classification of filters, • Concept of passive and active filters • Merits and demerits of active filters over passive filters • 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. 	10	16
5	<p>Timers Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw block diagram of IC 555 ➤ Understand industrial applications of IC 555 ,565 <p>5.1 Introduction to timer IC 555 [10]</p> <ul style="list-style-type: none"> • Block diagram of IC 555 and its pin diagram and function of each pin. • Concepts of different timer circuits used in industries: water level controller, Touch plate switch, frequency divider. • Numericals based on timers. <p>5.2 Phase Lock Loop</p> <ul style="list-style-type: none"> • Principle of operation, block diagram of PLL. [08] • Applications of PLL as multiplier, FM demodulator. • Pin diagram and pin functions of IC 565(PLL) 	10	18

6	Oscillators: Specific Objectives: <ul style="list-style-type: none"> ➤ Explain concept of oscillators ➤ Explain different types of oscillators ➤ Develop multivibrators and oscillators for given values. Contents: <ul style="list-style-type: none"> • Concept of oscillators, • 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. 	08	16
	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: <ul style="list-style-type: none"> • Input Offset Voltage (V_{io}) • Output Offset Voltage (V_{oo}) • 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.
04	Verify the working of active integrator and differentiator circuits using op-amp IC 741 for following inputs: <ul style="list-style-type: none"> • Sine waveform • Square waveform • Rectangular waveform
05	Assemble V to I converter and I to V converter using IC 741 and measure the respective output.
06	Verify the working of following comparator circuits using op-amp IC 741 and draw the input-output waveforms <ul style="list-style-type: none"> • Zero crossing detector • Active peak detector
07	Assemble first order low pass Butterworth filter using op-amp and plot the frequency 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.
09	Assemble Monostable multivibrator circuit using IC 555. Plot the output waveform 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. 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 Analog Integrated Circuit	Tata-McGraw Hill
04	Willam D. Stanley	Operation Amplifier with Linear Integrated Circuit	Person

Course Name : Industrial Electronics, Instrumentation, Instrumentation & Control

Course Code : IE/IS/IC/IU

Semester : Fourth

Subject Title : Principles of Communication Systems

Subject Code : 17472

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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).**

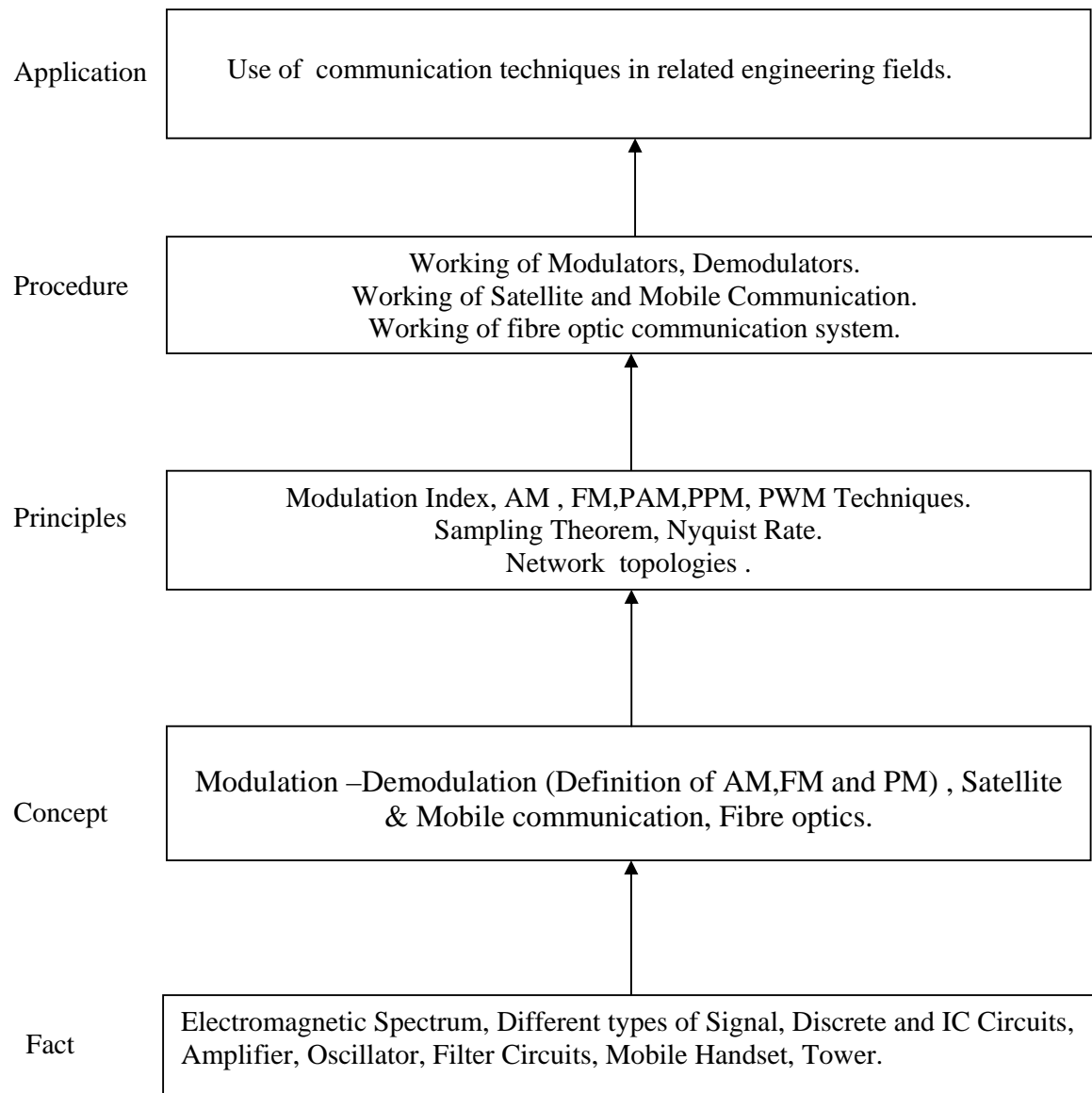
Rationale:

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.

Learning Structure:

Theory Contents:

Topic No	Theory	Hrs.	Marks
1	<p>Fundamentals of Electronic Communication</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> ➤ State basic terminology concepts regarding Electronic Communication. ➤ Know different techniques of analog communication. <p>Contents:</p> <p>1.1 Basics of communication system [12]</p> <ul style="list-style-type: none"> • Block diagram of communication system. • Electromagnetic spectrum • Concept of decibel bandwidth, information capacity in communication. <p>Terminology related to noise</p> <ul style="list-style-type: none"> • sources of noise • Effects of noise. • Signal to noise ratio(SNR) • Noise voltage • Noise factor • Noise figure • Noise temperature. <p>Modulation-demodulation</p> <ul style="list-style-type: none"> • 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. <p>1.2 Pulse Modulation [06]</p> <ul style="list-style-type: none"> • Sampling theorem, nyquist criteria (only statement), <p>Pulse analog modulation</p> <ul style="list-style-type: none"> • Block diagram for generation waveforms, working, principle, advantages, disadvantages & applications of PAM,PWM & PPM. (No Numericals) • Advantages of pulse modulation over AM. 	10	18
2	<p>Digital Communication</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> ➤ Describe PCM ➤ Describe digital modulation techniques & multiplexing techniques <p>Contents:</p> <p>2.1 Fundamental Of Digital Communication [16]</p> <ul style="list-style-type: none"> • Block diagram for generation, working principle, waveforms, advantages, disadvantage and application of ASK, FSK, BPSK, QPSK, DPSK. 	12	24

	<ul style="list-style-type: none"> Block diagram, working principle, waveforms, advantages, disadvantages & application of PCM, delta modulation, and adaptive delta modulation. <p>2.2 Multiplexing & Data Encoding Techniques. [08]</p> <ul style="list-style-type: none"> Multiplexing technique: Definitions, schematic diagram, principle, application, advantages & disadvantage of TDM, FDM and WDM Data encoding techniques Unipolar –NRZ, Polar –NRZ, RZ, Manchester (split phase), differential Manchester Bipolar RZ (Pseudo ternary or AMI) and their waveforms. 		
3	<p>Satellite Communication.</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> ➤ State basic concept regarding satellite communication. ➤ Define terms related to satellite communication <p>Contents:</p> <ul style="list-style-type: none"> History of satellite. Terminology related to satellite communication: satellite orbits, elevation angle, azimuth angle, foot print, station keeping, altitude, geostationary satellite. 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 TDMA, FDMA, CDMA 	06	14
4	<p>Topic 4) Mobile Communication</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> ➤ State the terminology related to cellular phone ➤ State the different concepts related to cell, interference, base station etc. <p>Contents:</p> <ul style="list-style-type: none"> Evolution of cellular telephone Concept of cell pattern, frequency reuse, interference - co channel & adjacent channel, cell splitting, sectoring, segmentation & dualization, roaming & handoffs. Block diagram and working of mobile communication Cellular telephone call processing <ul style="list-style-type: none"> ▪ Mobile (cellular) to wire line (PSTN) call procedure ▪ Mobile (cellular) to mobile (cellular) call procedure. ▪ Wire line (PSTN) to mobile (cellular) call procedure. 	06	12

5	<p>Data Communication & Networking</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> ➤ Describe modes of data transmission ➤ Describe the concepts of network topologies, types of network and the network models. <p>Contents:</p> <p>5.1 Modes of transmission, topologies, categories and models of network. [14]</p> <ul style="list-style-type: none"> • Modes of data transmission serial, parallel, synchronous, asynchronous • Network topologies Diagram, working, advantage, disadvantages and application of mesh, star, bus, ring • Network categories Fundamentals of LAN,WAN,MAN • Network models Architecture of OSI model, TCP/IP model • RS-232 (9 pin) standard for communication <p>5.2 Connecting devices and network security [06]</p> <ul style="list-style-type: none"> • 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, message authentication, digital signature, entity authentication 	08	20
6	<p>Topic 6) Fiber Optics</p> <p>Specific objectives</p> <ul style="list-style-type: none"> ➤ Draw the fiber optic communication link ➤ State the fiber power losses ➤ Differentiate between single mode and multimode fibers. ➤ Identify the optical transmitters and receivers <p>Contents</p> <p>6.1 Optical fiber cable [6]</p> <ul style="list-style-type: none"> • Advantages of optical fiber cable • Propagation of energy in fiber: Total internal reflection, acceptance angle and numerical aperture. • 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. <p>6.2 Fiber Optic Communication System [6]</p> <ul style="list-style-type: none"> • Block diagram of optical communication system • Optical Transmitters: LED and LASER (specifications) • Optical Receivers: PIN photodiode and avalanche photodiode 	06	12
Total		48	100

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. No.	Title	Author	Publisher
1	Electronic Communication System (V th 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/TU/ED/EI

Semester : Fourth

Subject Title : Visual Basic

Subject Code : 17043

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

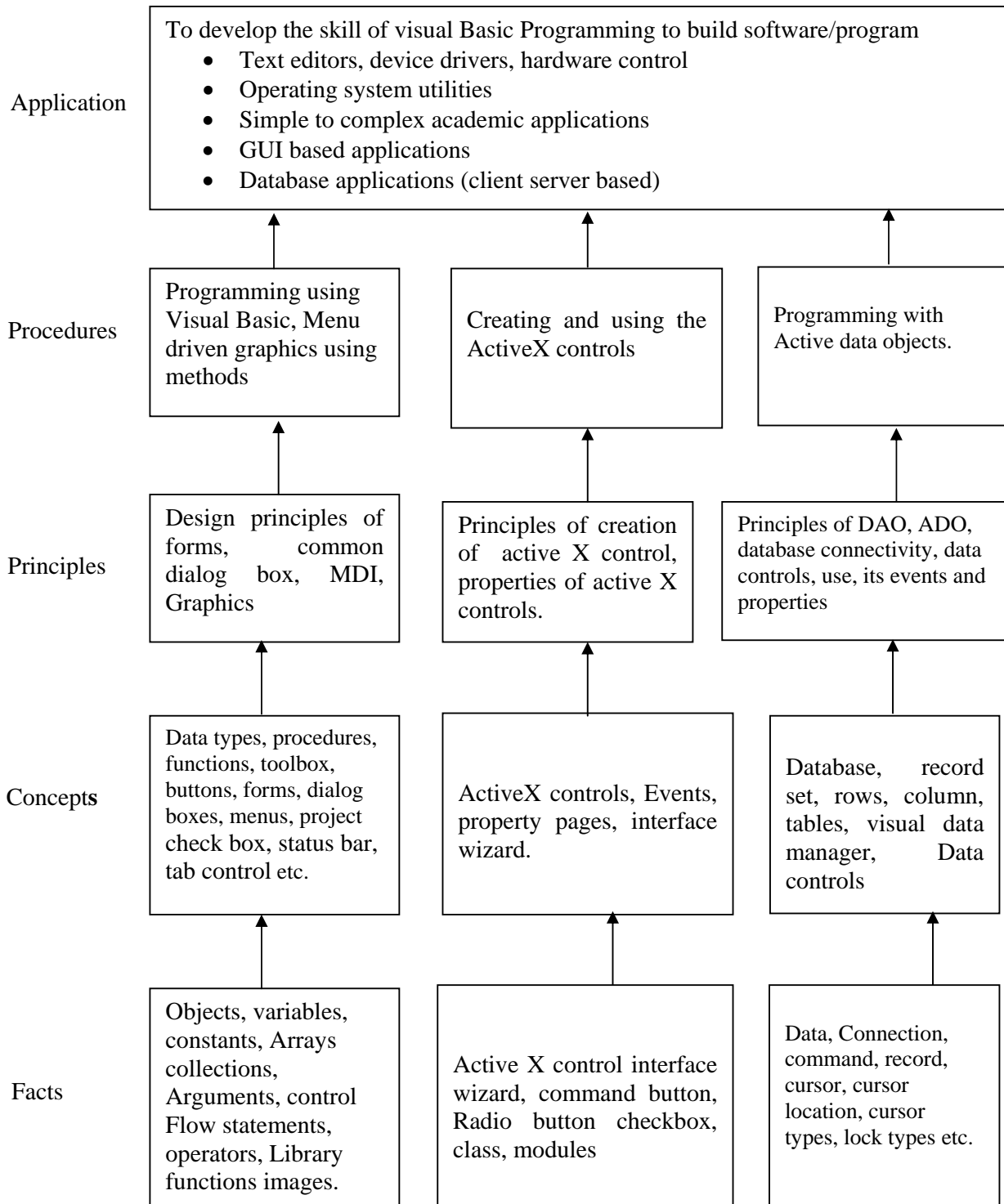
This course will lay the basic foundation of visual programming which will enable students to develop simple to complex programmable systems interfaces in the real world of work

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
<p>Topic 1] Introduction to Visual Environment Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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 ➤ Create objects, place them on forms <p>Contents:</p> <p>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.</p>	02
<p>Topic 2] Introduction to Visual Basic Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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 ➤ Use Inputbox and MsgBox functions <p>Contents:</p> <p>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 ().</p>	02
<p>Topic 3] Controls and Events Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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 <p>Contents:</p> <p>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.</p>	02
<p>Topic 4] Advance Controls & Events Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Add extrinsic controls in an application ➤ Use common dialog box control and its properties such open, save as, font, color, print and help ➤ 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 	03

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: <ul style="list-style-type: none"> ➤ 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 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.	03
Topic 6] Database and Report Specific Objectives: <ul style="list-style-type: none"> ➤ 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: 6.1 Concept of database, Record, Record set, Data control & its important properties 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	04
Total	16

TERM WORK:-

Sr No.	Name of the Experiments
1	a) Study and Understand Visual Basic Environment 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 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	a) Design Color box using RGB function to observe color change using H- scroll bar. b) Design project to demonstrate file, folder & drive controls to explore drive & folders.
7	Design GUI for Testing AC series Circuit
	Practice Experiment / Exercise
8	a) Design project to implement Common Dialog box controls such as open, save, Color, Font, Printer & Help b) Design a menu structure like notepad using menu editor
9	Design MDI application with 4 child forms & arrange forms with cascade, Tile Horizontal, 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. No.	Author	Title	Publisher
01	MSDN library on Line Reference	--	From Microsoft MSDN Library
02	Evangelos Petroustus	Mastering VB6	WILEY India
03	Steven Holzner	Visual basic 6	Dream Tech. Press
04	Content Development Group	Visual Basic 6.0 Programming	Tata McGraw Hill
05	Mohammed Azam	Programming with visual basic 6.0	Vikas Publishers
06	Nel Jerka	The complete reference VB6	Tata McGraw Hill Publishing

Course Name : Electronics Engineering Group

Course Code : ET/EJ/EN/EX/IE/IS/IC/DE/EV/MU/TU/ED/EI

Semester : Fourth

Subject Title : Professional Practices-II

Subject Code : 17044

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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:

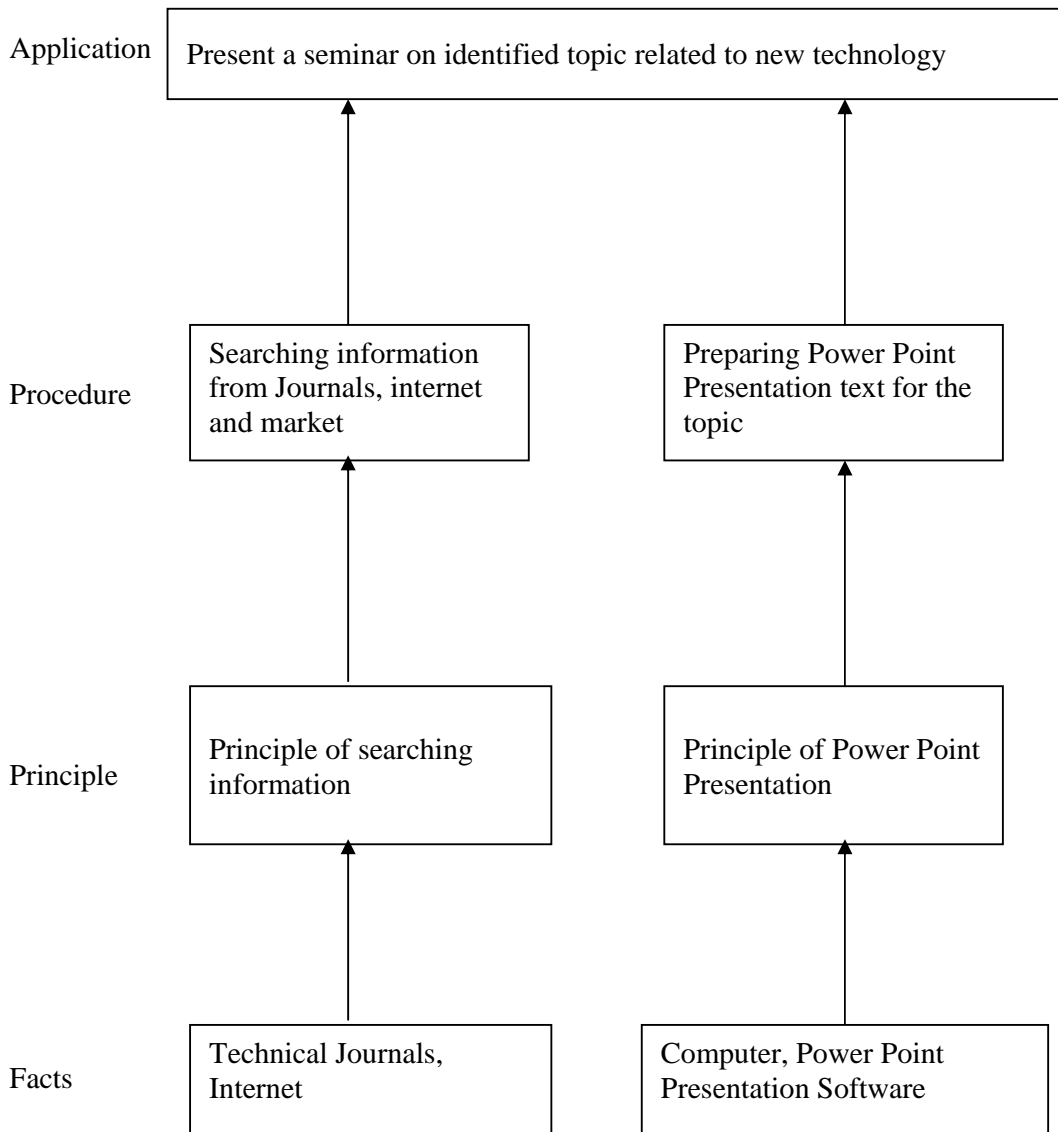
Intellectual skills:

- 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	<p>Industrial Visits 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. Minimum two industrial visits may be arranged in the following areas/ industries :</p> <ul style="list-style-type: none"> i) Electronic equipment manufacturing unit ii) Resistance welding unit iii) Industrial automation unit iv) Sugar mill, Paper mill, Cement Industry. v) Railway station control room. vi) Telephone Exchange. vii) Any other suitable Industry. 	16
2	<p>Lectures by Professional / Industrial Expert to be organized from any of the following areas (Any three)</p> <ul style="list-style-type: none"> i) Cyber laws. ii) Fiber optics communication system iii) Disaster management iv) Atomic energy v) Industrial Safety vi) Computer security systems/Ethical hacking. vii) Any other suitable topic viii) Introduction to Apprenticeship Training Scheme 	08
3	<p>Information Search : Information search can be done through manufacturers, catalogue, internet, magazines; books etc. and submit a report on one of the following topics:</p> <ul style="list-style-type: none"> 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 	06
4	<p>Seminar : 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)</p>	10
5	<p>Group Discussion: 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.</p>	08
Total		48

Learning Resources:**1. Books:**

Sr. 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 for All – Ninth Edition	PHI
05	Apprenticeship Training Scheme:- Compiled By – BOAT (Western Region), Mumbai, 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 4th semester examination.

Note:- Examination in Professional Practices of 5th 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.

 MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES																	
COURSE NAME : MECHANICAL ENGINEERING GROUP																	
COURSE CODE : ME / MI / MH																	
DURATION OF COURSE : 6 SEMESTERS for ME (8 SEMESTERS for MH/MI)											WITH EFFECT FROM 2012-13						
SEMESTER : FOURTH											DURATION : 16 WEEKS						
PATTERN : FULL TIME - SEMESTER											SCHEME : G						
SR. NO	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME										SW (17400)
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)			
								Max	Min	Max	Min	Max	Min	Max	Min		
1	Environmental Studies \$	EST	17401	01	--	02	01	50#*	20	--	--	--	--	25@	10	50	
2	Manufacturing Processes β	MPR	17402	03	--	04	03	100	40	25#	10	--	--	50@	20		
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		
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)			Examination in 5th Semester Professional Practices-III													
<p>Student Contact Hours Per Week: 34 Hrs.</p> <p>THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.</p> <p>Total Marks : 900</p> <p>@ - Internal Assessment, # - External Assessment, No Theory Examination, \$ - Common to all branches, #* - Online Examination, β - Common to AE, PG, PT, FE, FG</p> <p>Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work</p> <p>** Industrial Training (Optional) - Student can undergo Industrial Training of four weeks after fourth semester examination during summer vacation.</p> <p>Assessment will be done in Fifth semester under Professional Practices-III. They will be exempted from activities of Professional Practices-III of 5th Semester.</p> <ul style="list-style-type: none"> ➤ 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:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

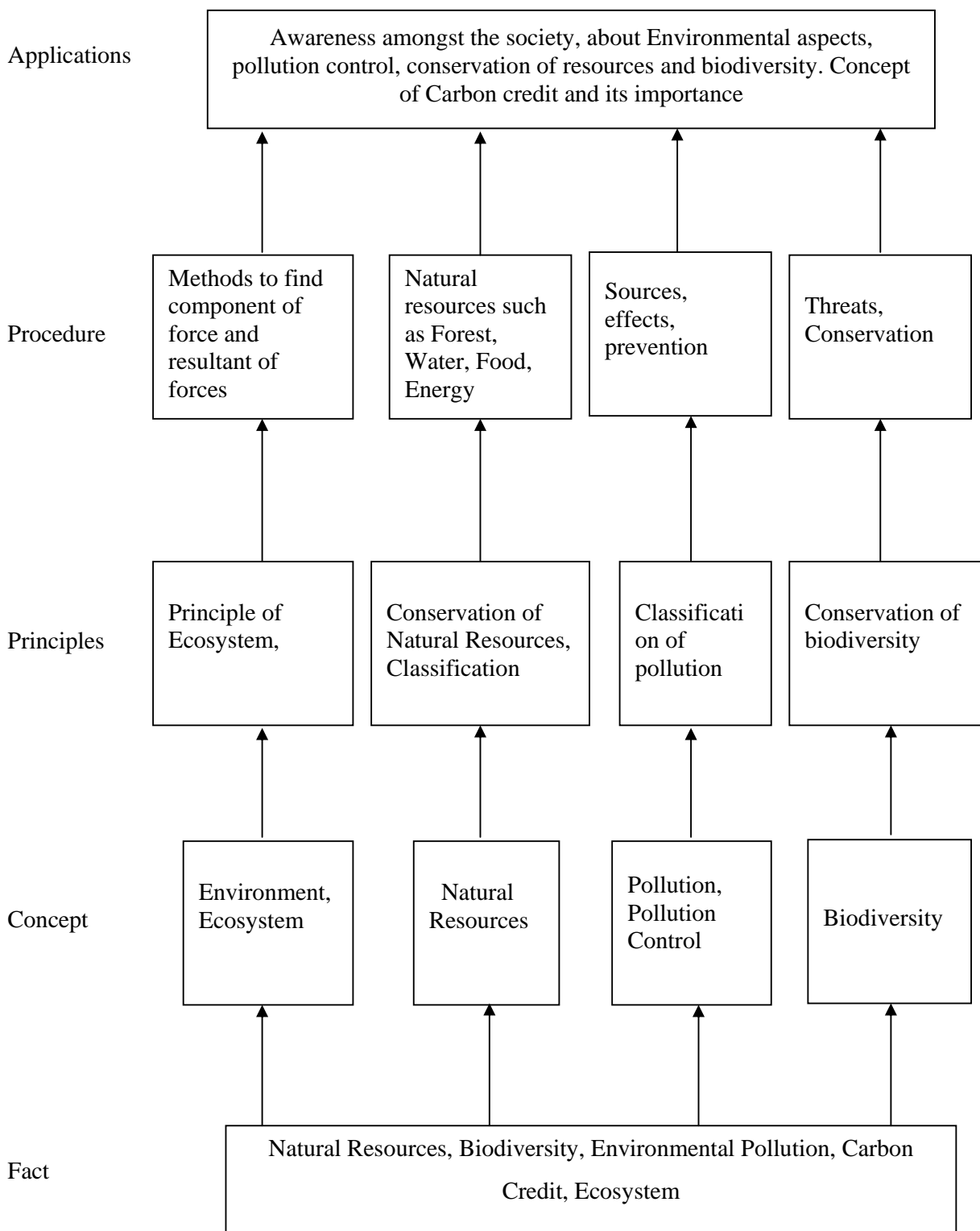
It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

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
<p>Topic 1: Nature of Environmental Studies</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define the terms related to Environmental Studies ➤ State importance of awareness about environment in general public <p>Contents:</p> <ul style="list-style-type: none"> • Definition, Scope and Importance of the environmental studies • Importance of the studies irrespective of course • Need for creating public awareness about environmental issues 	01	04
<p>Topic 2: Natural Resources and Associated Problems</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define natural resources and identify problems associated with them ➤ Identify uses and their overexploitation ➤ Identify alternate resources and their importance for environment <p>Contents:</p> <p>2.1 Renewable and Non renewable resources</p> <ul style="list-style-type: none"> • Definition • Associated problems <p>2.2 Forest Resources</p> <ul style="list-style-type: none"> • General description of forest resources • Functions and benefits of forest resources • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc. <p>2.3 Water Resources</p> <ul style="list-style-type: none"> • Hydrosphere: Different sources of water • Use and overexploitation of surface and ground water • Effect of floods, draught, dams etc. on water resources and community <p>2.4 Mineral Resources:</p> <ul style="list-style-type: none"> • Categories of mineral resources • Basics of mining activities • Mine safety • Effect of mining on environment <p>2.5 Food Resources:</p> <ul style="list-style-type: none"> • Food for all • Effects of modern agriculture • World food problem 	04	10
<p>Topic 3. Ecosystems</p> <ul style="list-style-type: none"> • Concept of Ecosystem • Structure and functions of ecosystem • Energy flow in ecosystem • Major ecosystems in the world 	01	04
<p>Topic 4. Biodiversity and Its Conservation</p> <ul style="list-style-type: none"> • Definition of Biodiversity • Levels of biodiversity 	02	06

<ul style="list-style-type: none"> • Value of biodiversity • Threats to biodiversity • Conservation of biodiversity 		
Topic 5. Environmental Pollution <ul style="list-style-type: none"> • Definition • Air pollution: Definition, Classification, sources, effects, prevention • Water Pollution: Definition, Classification, sources, effects, prevention • Soil Pollution: Definition, sources, effects, prevention • Noise Pollution: Definition, sources, effects, prevention 	03	08
Topic 6. Social Issues and Environment <ul style="list-style-type: none"> • Concept of development, sustainable development • Water conservation, Watershed management, Rain water 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 	03	10
Topic 7. Environmental Protection Brief description of the following acts and their provisions: <ul style="list-style-type: none"> • Environmental Protection Act • Air (Prevention and Control of Pollution) Act • Water (Prevention and Control of Pollution) Act • Wildlife Protection Act • Forest Conservation Act Population Growth: Aspects, importance and effect on environment <ul style="list-style-type: none"> • Human Health and Human Rights 	02	08
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. No.	Author	Title	Publisher
01	Anindita Basak	Environmental Studies	Pearson Education
02	R. Rajgopalan	Environmental Studies from Crises to Cure	Oxford University Press
03	Dr. R. J. Ranjit Daniels, Dr. 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			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	04	03	100	25#	--	50@	175

Rationale:

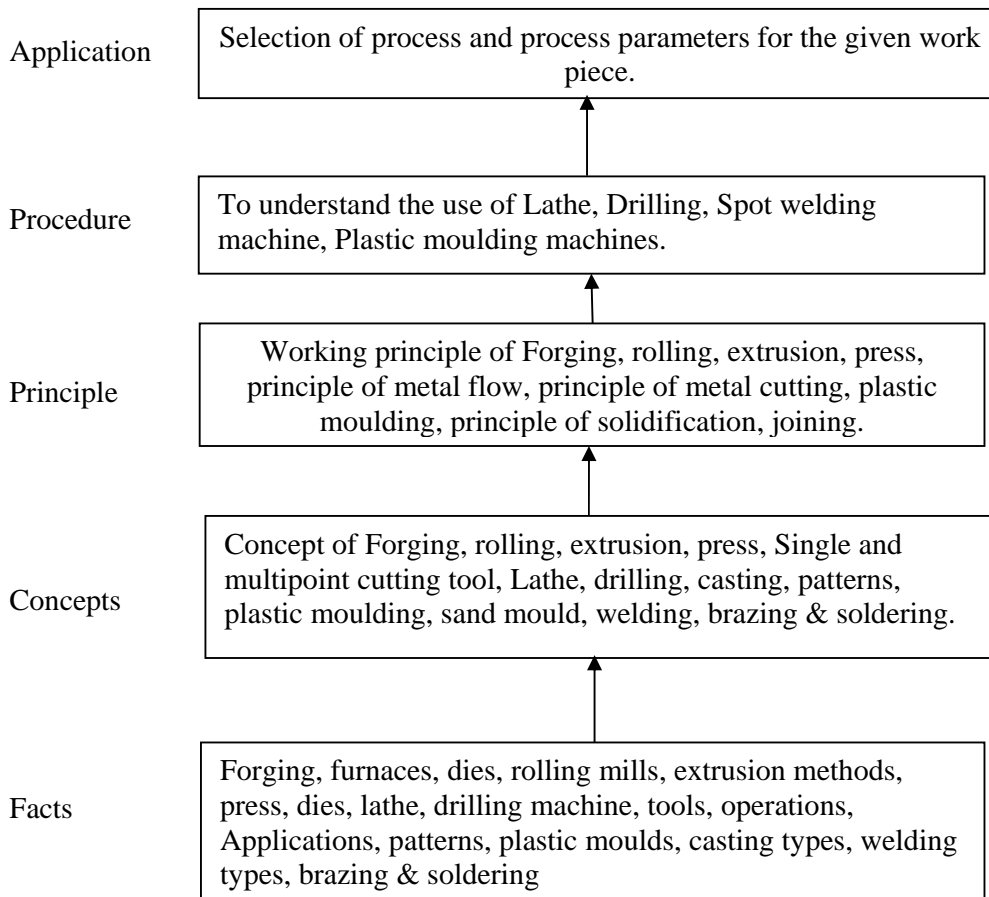
Diploma technician often comes across various types of basic manufacturing processes. He / she is required to select, operate and control the appropriate processes for specific applications. He / she is also required to know about various cutting tools, latest improvements in manufacturing processes. 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:

Topic and Content	Hours	Marks
1:Forming Processes Specific Objectives: <ul style="list-style-type: none"> ➤ 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, 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.	08	18
2. Press working: Specific Objectives: <ul style="list-style-type: none"> ➤ 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 Content 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	08	16
3. Casting Processes: Specific Objectives: <ul style="list-style-type: none"> ➤ 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 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 & 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. 04 Marks	10	22
4. Welding Specific Objectives:	07	14

<ul style="list-style-type: none"> ➤ To define Arc welding and Gas welding Principal. ➤ To state difference between soldering and brazing processes <p>Content</p> <p>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. 10 Marks</p> <p>4.2 Introduction to soldering and brazing – Process, fillers, heating methods & applications. 04 Marks</p>		
<p>5. Machining Operations</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ To state the working principal of lathe and drilling machines. ➤ To list out various operations performed on lathe and drilling machines <p>Content</p> <p>5.1 Lathe Machine: 12 Marks Introduction, classification and basic parts of center lathe & their functions, Lathe operations like facing, plain turning, taper turning, thread cutting, chamfering, grooving, knurling. Cutting tool nomenclature & tool signature, cutting parameters.</p> <p>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.</p>	10	20
<p>6. Plastic Moulding:</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ To state different properties of plastics ➤ To explain various plastic mauling methods like Injection, blow, compression molding <p>Content Introduction, Properties of plastics, types of plastics, plastic moulding methods - compression moulding, injection moulding, blow moulding, extrusion, vacuum forming and calendaring.</p>	05	10
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. No.	Author	Title	Publisher
01	S. K. Hajra Chaudhary, Bose, Roy	Elements of workshop Technology-Volume I & II	Media Promoters and Publishers Limited
02	O. P. Khanna & Lal	Production Technology Volume- I & II	Production Technology Volume- I & II

			Dhanpat Rai Publications
03	W. A. J. Chapman, S. J. Martin	W. A. J. Chapman, S. J. 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 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			Examination Scheme					
TH	TU	PR	PAPER 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:

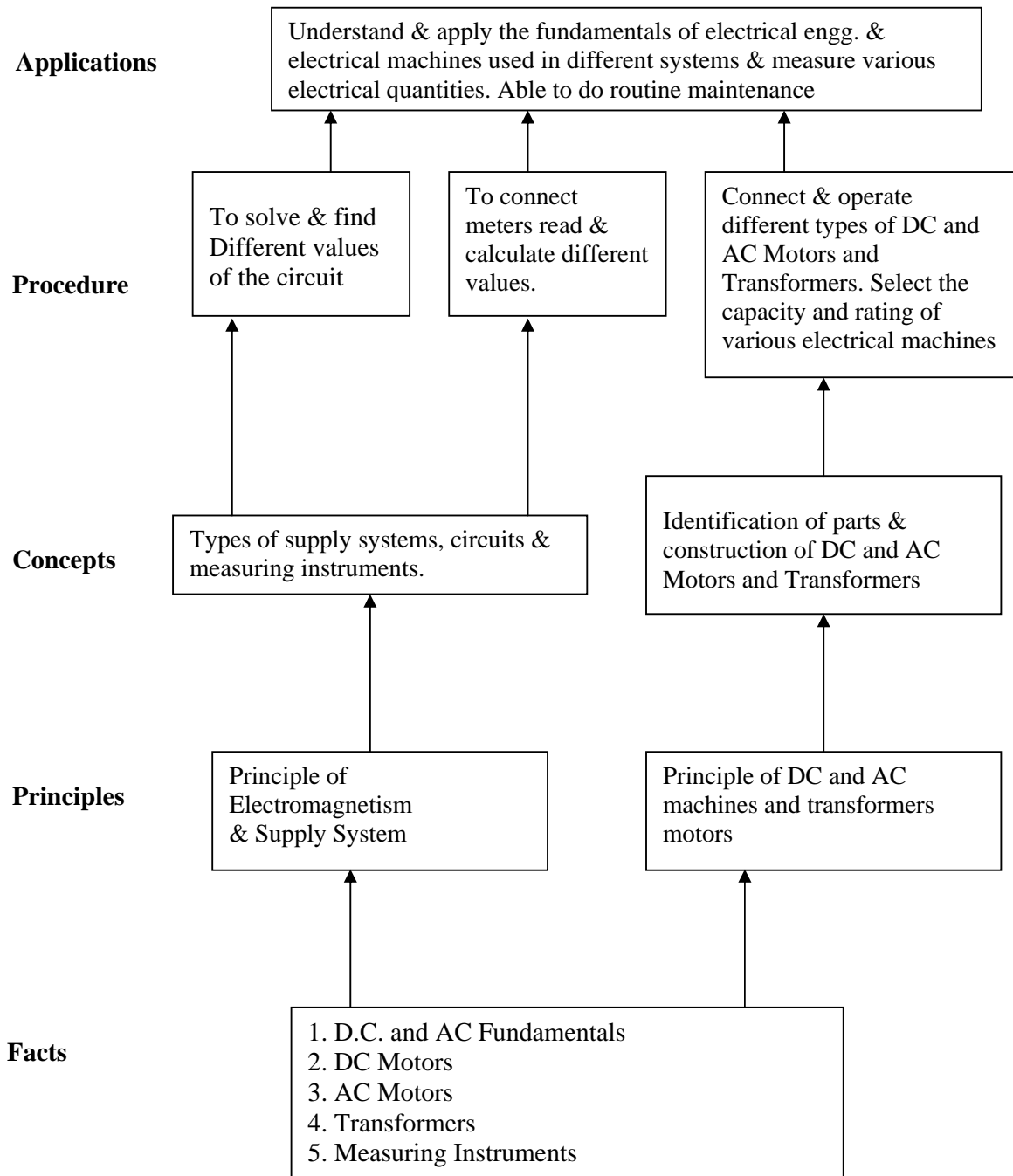
This subject is introduced with intention to teach students of mechanical branch facts, concepts, principles and procedure of operating electrical machines, circuits and systems and their applications. This subject is most important in regards to selection of electrical drives for various applications 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
<p>1. Introduction to Electric Power System and A. C. Supply 20 Marks</p> <p>Specific Objectives: Student will be able to :</p> <ul style="list-style-type: none"> ➤ 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 and R-C circuits. ➤ Calculate line and phase quantities and various powers in three phase circuit <p>Contents: Introduction 04 Marks</p> <p>1.1 Electrical power supply system generation, transmission, distribution. AC supply & DC Supply.</p> <p>AC Fundamentals: 08 Marks</p> <p>1.2 Definitions; cycle, frequency, phase, period, maximum value, average value, r.m.s. value. (Simple Numericals)</p> <p>1.3 Concept of current, voltage, power & energy in series R-L and R-C circuits. (Simple Numericals)</p> <p>Three phase supply: 08 Marks</p> <p>1.4 Star and Delta circuit, 1.5 Line and Phase relationship, power equation.(No Derivation, Simple Numericals)</p>	10	20
<p>2.Measuring Instruments: 06 Marks</p> <p>Specific Objectives: Student will be able to :</p> <ul style="list-style-type: none"> ➤ Differentiate between ac and dc meters. ➤ Use multimeter for measurements of current, voltage and passive parameter. <p>Contents:</p> <p>2.1 Introduction to construction, operation and use of AC and DC ammeter, voltmeter (PMMC and MI meters only).</p> <p>2.2 Electro-dynamic wattmeter, energy meter and digital multimeter, Clip on meter.</p>	04	06
<p>3. DC Motor 04 Marks</p> <p>Specific Objectives: Student will be able to :</p> <ul style="list-style-type: none"> ➤ State working principle of d.c. motor. ➤ Select type of d.c. motor as per requirement. <p>Contents:</p> <p>3.1 Construction and principle of operation.</p> <p>3.2 Speed-torque characteristics. D.C. shunt, series and compound motors. Their specifications and applications.</p>	02	04
<p>4. Transformer: 14 Marks</p> <p>Specific Objectives: Student will be able to :</p> <ul style="list-style-type: none"> ➤ State the working principle of transformer. ➤ Calculate transformation ratio, efficiency and regulation from direct load test. <p>Contents:</p>	06	14

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 : <ul style="list-style-type: none"> ➤ 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 <ul style="list-style-type: none"> ➤ 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 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 style="list-style-type: none"> ➤ Universal motor ➤ Servo motor ➤ Stepper motor 5.4 Alternator: 04 Marks Construction, principle of operation & applications. Self and separate excitation.	10	24
6.Utilization of Electrical Energy: 18 Marks Specific Objectives: Student will be able to : <ul style="list-style-type: none"> ➤ 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 <ul style="list-style-type: none"> ➤ 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. <ul style="list-style-type: none"> ➤ Electrical machines used in electro-agro systems. 	08	18
7.Electric Wiring, Illumination, Electric Safety, Tariff & Power Conservation : 14 Marks Specific Objectives:	08	14

<p>Student will be able to :</p> <ul style="list-style-type: none"> ➤ 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. <p>Contents:</p> <p>7.1 Introduction to switches used in mechanical machines. Simple Electric Installations with 2 sockets, 2 fans, 2 lamps, with switches and fuses</p> <p>7.2 Introduction to different accessories like MCB, ELCB, wires & cables.</p> <p>7.3 Fluorescent, CFL and LED lamps with their ratings and applications.</p> <p>7.4 Concept of energy conservation and energy audit</p> <p>7.5 Necessity of earthing, type, safety tools, first aid.</p> <p>7.6 Types of tariff, pf improvement only methods.</p> <p>7.7 Fire extinguishing methods adopted in electrical engineering</p> <p>7.8 Trouble shooting electrical installations and machines.</p>		
Total	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.

Learning Resources:

1. Books:

Sr.No.	Author	Title Of Book	Edition	Publisher
01	B.L. Theraja	Electrical Technology (Vol. I and IV)	Multicolour Edition 2005 And Subsequent Reprint	S.Chand & Co. Ramnagar New Delhi
02	E. Hughes	Electrical Technology	Second Edition	ELBS/Pearson
03	R.S. Ananda Murthy	Basic Electrical Engineering	Second Edition	Pearson
04	Theodore Wildi	Electrical Machines, Drives and Power Systems	Sixth Edition	Pearson
05	Sunil T. Gaikwad	Basic Electrical Engineering	First Edition	WILEY India

2. Websites:

www.wikipedia.com
www.youtube.com
www.narosa.com
www.dreamtechpress.com

List of Equipments

Sr 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			Examination Scheme					
TH	TU	PR	PAPER 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.

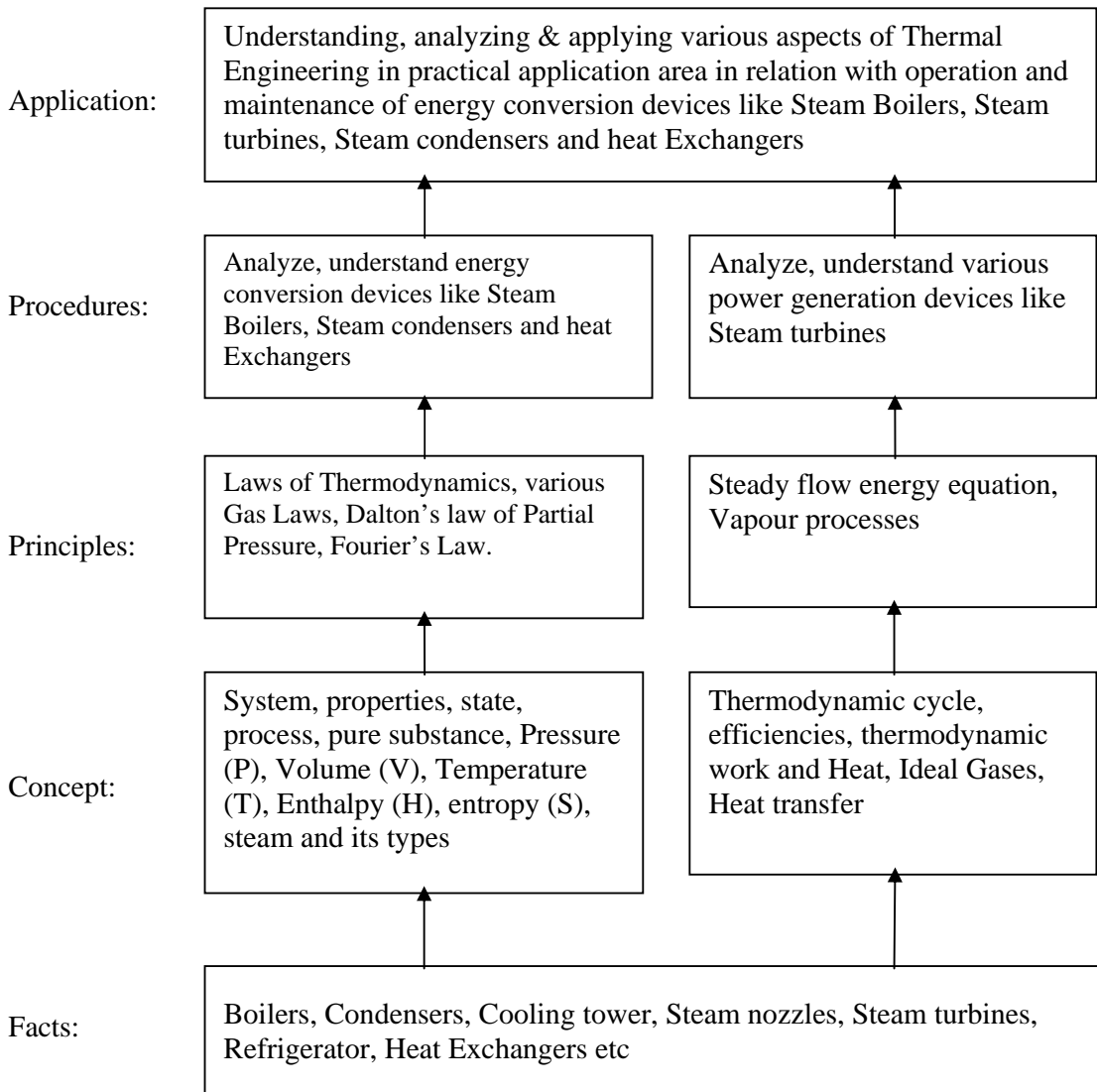
The subject is a related to Power Engineering and other related subjects in which the application of fundamental concepts of Thermal Engineering are included.

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.

Learning Structure:



Theory Content:

Topic and Contents	Hours	Marks
<p>1. Fundamentals of Thermodynamics -----20 Marks Specific objectives:</p> <ul style="list-style-type: none"> ➤ Define fundamental concepts of Thermodynamics ➤ Apply first law of thermodynamics to various thermodynamic devices. ➤ Apply second law of thermodynamic. <p>Contents</p> <p>1.1 Concepts of pure substance, types of systems , properties of systems- Extensive and Intensive properties, processes and cycles, Quasi-static process, flow and non flow process, Thermodynamic equilibrium, Point and path function. 04 Marks</p> <p>1.2 Work, Heat Transfer and Energy. Thermodynamic definition of work & heat, Difference between heat and work. Energy –Potential Energy, Kinetic Energy, Internal Energy, Flow Work, concepts of enthalpy & entropy. 04 Marks</p> <p>1.3 Laws of Thermodynamics- Zeroth Law, principle of law of conservation of energy First law of Thermodynamics, Second Law of Thermodynamics- Kelvin Planks, Clausius statements and their equivalence, Clausius inequality, Concept of perpetual motion machine of first and second kind. 06 Marks</p> <p>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. 06 Marks</p>	12	20
<p>2. Ideal Gases -----12 Marks Specific objectives:</p> <ul style="list-style-type: none"> ➤ State ideal gas laws ➤ Represent various ideal gas processes on P-V and T-S diagrams <p>Contents</p> <p>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. 04 Marks</p> <p>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</p>	08	12
<p>3. Steam and Steam Boiler -----20 Marks Specific objectives:</p> <ul style="list-style-type: none"> ➤ State the concept of Steam generation. ➤ Use of steam tables and Mollier chart. ➤ Explain construction and working of different types of boilers and function of mountings & accessories <p>Contents</p> <p>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</p>	12	20

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. Steam Nozzles and Turbines -----16 Marks			
Specific objectives:			
<ul style="list-style-type: none"> ➤ Define Mach number & critical pressure. ➤ State the application of steam nozzles. ➤ Explain the principle of working of steam turbine 			
Contents			
4.1	Steam nozzle: - Continuity equation, types of nozzles, concept of Mach number, critical pressure, application of steam nozzles. 04 Marks	10	16
4.2	Steam turbine: - Classification of turbines, Construction and working of Impulse and Reaction turbine. 06 Marks		
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). 06 Marks		
5. Steam Condensers and Cooling Towers -----16 Marks			
Specific objectives:			
<ul style="list-style-type: none"> ➤ Apply Dalton's law to condenser. ➤ Explain construction and working of condensers and cooling towers. ➤ State the effect of air leakages in condenser 			
Contents			
5.1	Dalton's law of partial pressure, function and classification of condensers, construction and working of surface condensers. 04 Marks	12	16
5.2	Sources of air leakage and its effect, concept of condenser efficiency, vacuum efficiency (Simple numerical). 06 Marks		
5.3	Cooling Towers.-Construction and working of forced, natural and induced draught cooling tower. 06 Marks		
6. Heat Transfer -----16 Marks			
Specific objectives:			
<ul style="list-style-type: none"> ➤ Describe various modes of heat transfer. ➤ Describe construction and working of different types of Heat exchangers. 			
Contents			
6.1	Modes of heat transfer: - Conduction, convection and radiation. Conduction :- 08 Marks Fourier's law, thermal conductivity, conduction through cylinder, thermal resistance, composite walls (Simple numerical) 04 Marks	10	16
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. 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 Delhi
5	B. K. Sarkar	Thermal Engineering	Tata McGraw –Hill, New 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:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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).**

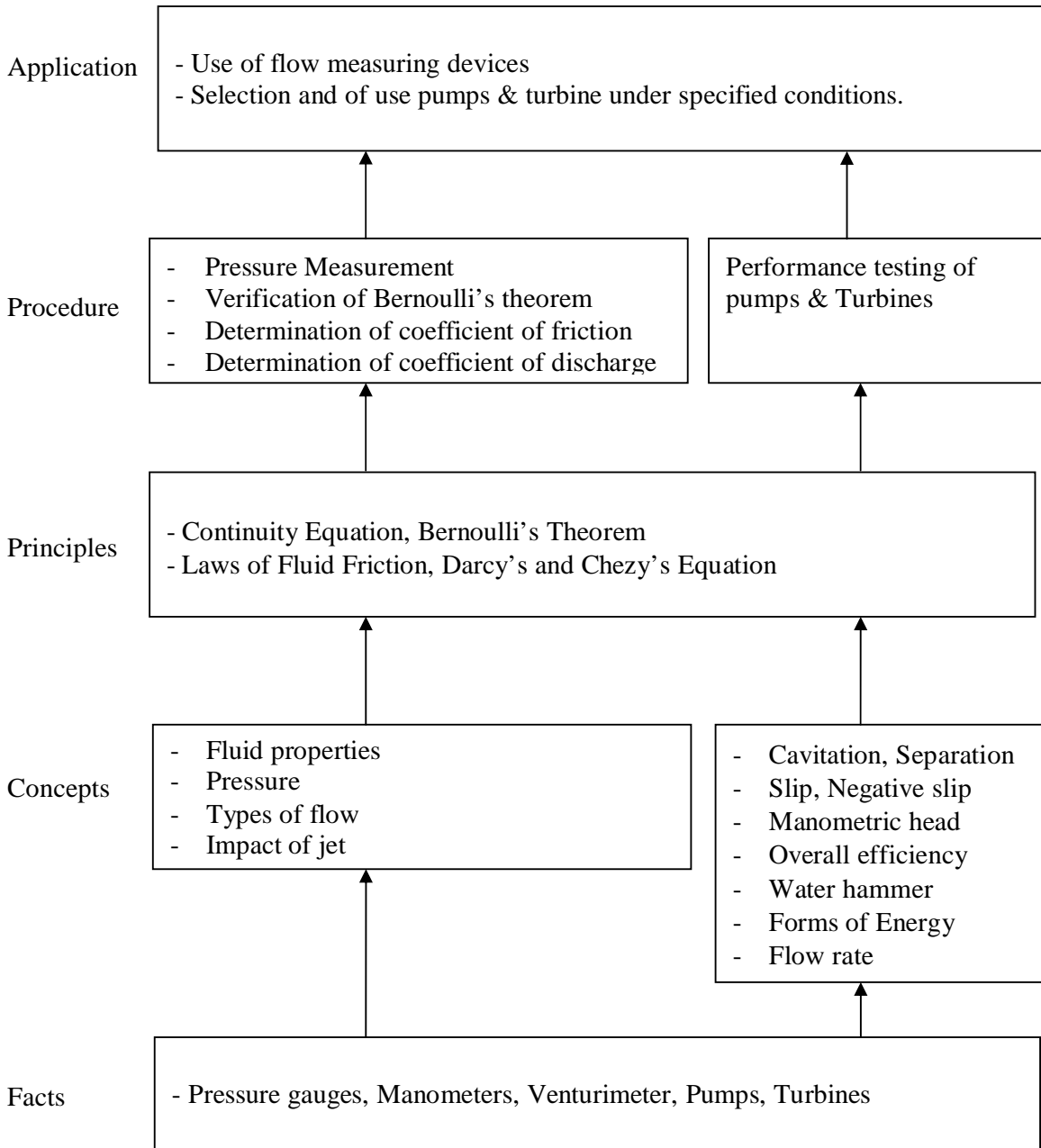
Rationale:

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
<p>1. Properties of fluid and Fluid Pressure</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define fluid properties. ➤ Differentiate between fluid pressure intensity and pressure head. ➤ Solve numerical related to properties of fluid, fluid pressure and manometers. <p>Contents:</p> <p>1.1 Properties of Fluid 06 Marks Density, Specific gravity, Specific volume, Specific Weight, Dynamic viscosity, Kinematic viscosity, Surface tension, Capillarity, Vapour Pressure, Compressibility</p> <p>1.2: Fluid Pressure & Pressure Measurement 14 Marks</p> <ul style="list-style-type: none"> • Fluid pressure, Pressure head, Pressure intensity • Concept of 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 	12	20
<p>2. Fluid Flow</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State Bernoulli's theorem and apply it to venturimeter, orifice and pitot tube. <p>Contents:</p> <ul style="list-style-type: none"> • Types of fluid flows-Laminar, turbulent, steady, unsteady, uniform, non uniform, rotational, irrotational. • Continuity equation, Bernoulli's theorem • 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 	10	14
<p>3. Flow Through Pipes</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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. <p>Contents:</p> <ul style="list-style-type: none"> • Laws of fluid friction (Laminar and turbulent) • 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 	10	14
<p>4. Impact of Jets</p> <p>Specific Objectives:</p>	06	10

<p>➤ Explain the impact of jet on vanes in various conditions.</p> <p>➤ Solve numerical on impact of jet on vanes in various conditions.</p> <p>Contents:</p> <ul style="list-style-type: none"> • Impact of jet on fixed vertical, moving vertical flat plates. • Impact of jet on curved vanes with special reference to turbines and pumps 		
<p>5. Hydraulic Turbines</p> <p>Specific Objectives:</p> <p>➤ Explain working principle of various hydraulic turbines.</p> <p>➤ Calculate work done, power generated and various efficiencies of hydraulic turbines.</p> <p>Contents:</p> <ul style="list-style-type: none"> • Layout and features of hydroelectric power plant, surge tanks and its need. • 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, • Calculation of Work done, Power, efficiency of turbine 	12	18
<p>6. Pumps</p> <p>Specific Objectives:</p> <p>➤ Explain working of centrifugal, reciprocating and multistage pumps.</p> <p>➤ Explain the concept of cavitation in pumps.</p> <p>➤ Calculate manometric head, work done and various efficiencies related to the pumps.</p> <p>➤ Select the pump for a given application.</p> <p>6.1 Centrifugal Pumps 14 Marks</p> <p>Contents:</p> <ul style="list-style-type: none"> • Construction, principle of working, priming methods and Cavitation • Types of casings and impellers. • Manometric head, Work done, Manometric efficiency, Overall efficiency, NPSH. • Performance Characteristics of Centrifugal pumps. • Trouble Shooting. • Construction, working and applications multistage pumps • Submersible pumps and jet pump <p>6.2 Reciprocating Pump 10 Marks</p> <ul style="list-style-type: none"> • 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. <p>(No numerical on reciprocating pumps)</p>	14	24
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. No	Author	Title	Publication
01	Ojha, Berndtsson, Chnadramouli	Fluid Mechanics and Machinery	Oxford University Press
02	Som S K , Biswas G.	Introduction to Fluid Mechanics and Fluid Machines 3 rd Edition	Tata McGraw-Hill Co. Ltd.
03	Modi P.N. Seth S M	Hydraulics and Fluid Mechanics including Hydraulic Machines	Standard Book House New Delhi
04	Subramanya K.	Fluid Mechanics and Hydraulic Machines: problems and solution	Tata McGraw-Hill Co. Ltd.
05	Product catalogues of various pump manufacturers		

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			Examination Scheme					
TH	TU	PR	PAPER 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.

Theory:

Topic and Content	Hours	Marks
<p>1. Fundamentals and type of Mechanisms</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> ➤ Define various terms related to mechanisms. ➤ Explain construction and working of various mechanisms <p>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</p> <p>1.2 Inversion of Kinematic Chain</p> <ul style="list-style-type: none"> • 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 Coupling -----8 Marks 	07	16
<p>2. Velocity and Acceleration in Mechanisms</p> <p>Specific objectives</p> <ul style="list-style-type: none"> ➤ Draw velocity and acceleration diagram for given mechanism <p>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.</p> <p>2.2 Analytical method (No derivation) and Klein's construction to determine velocity and acceleration of different links in single slider crank mechanism. -----8 Marks</p> <p>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 Coriolis component of acceleration) ----- 8 Mark</p>	08	16
<p>3. Cams and Followers</p> <p>Specific objectives</p> <ul style="list-style-type: none"> ➤ Define the terms related to Cam ➤ Classify Cams and Followers ➤ Draw cam profile as per the given applications <p>3.1 Concept, definition and applications of Cams and Followers. Cam terminology</p> <p>3.2 Classification of Cams and Followers.</p> <p>3.3 Different follower motions and their displacement diagrams - Uniform velocity, Simple harmonic motion, uniform acceleration and Retardation. ---- 4 Marks</p> <p>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</p>	06	12
<p>4. Power Transmission</p> <p>Specific objectives</p> <ul style="list-style-type: none"> ➤ Give State broad classification of Drives. ➤ Select Suitable Drives and Mechanisms for a particular application ➤ Calculate various quantities like velocity ratio, belt tensions, slip, angle of 	10	20

<p>contact, power transmitted in belt drives</p> <p>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</p> <p>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</p> <p>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</p>		
<p>5. Flywheel and Governors ----- 8 Marks</p> <p>Specific objectives</p> <ul style="list-style-type: none"> ➤ Differentiate between flywheel and governor ➤ Explain with neat sketch the construction and working of various governors <p>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) Coefficient of fluctuation of energy, coefficient of fluctuation of speed and its significance.</p> <p>5.2 Governors- Types, concept, function and application & Terminology of Governors.</p> <p>5.3 Comparison between Flywheel and Governor.</p>	04	08
<p>6. Brakes and Dynamometers. ----- 10Marks</p> <p>Specific objectives</p> <ul style="list-style-type: none"> ➤ 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 <p>6.1 Function of brakes and Dynamometers, Type of brakes & Dynamometers, comparison between brakes & Dynamometer.</p> <p>6.2 Construction and working i) shoe brake, ii) Band brake iii) Internal expanding shoe brake iv) Disc Brake</p> <p>6.3 Numerical problems to find braking force and braking torque and power for shoe and band brake.</p> <p>6.4 Construction and working of i) Rope brake Dynamometer ii) Hydraulic Dynamometer iii) Eddy current Dynamometer.</p>	05	10
<p>7. Clutches and Bearings.</p> <p>Specific objectives</p> <ul style="list-style-type: none"> ➤ 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 overcome friction and power lost in friction in clutches and footstep bearings <p>7.1 Clutches- Uniform pressure and Uniform Wear theories. Function of Clutch and its application, Construction and working of i) Single plate clutch, ii) Multiplate clutch, iii) Centrifugal Clutch iv) Cone clutch v) Diaphragm</p>	06	12

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 ➤ Find balancing mass and position of plane, analytically and graphically. 8.1 Concept of balancing. Balancing of single rotating mass. Analytical/Graphical methods for balancing of several masses revolving in same plane.	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.

Learning Resources:**Books:**

Sr. 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:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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:

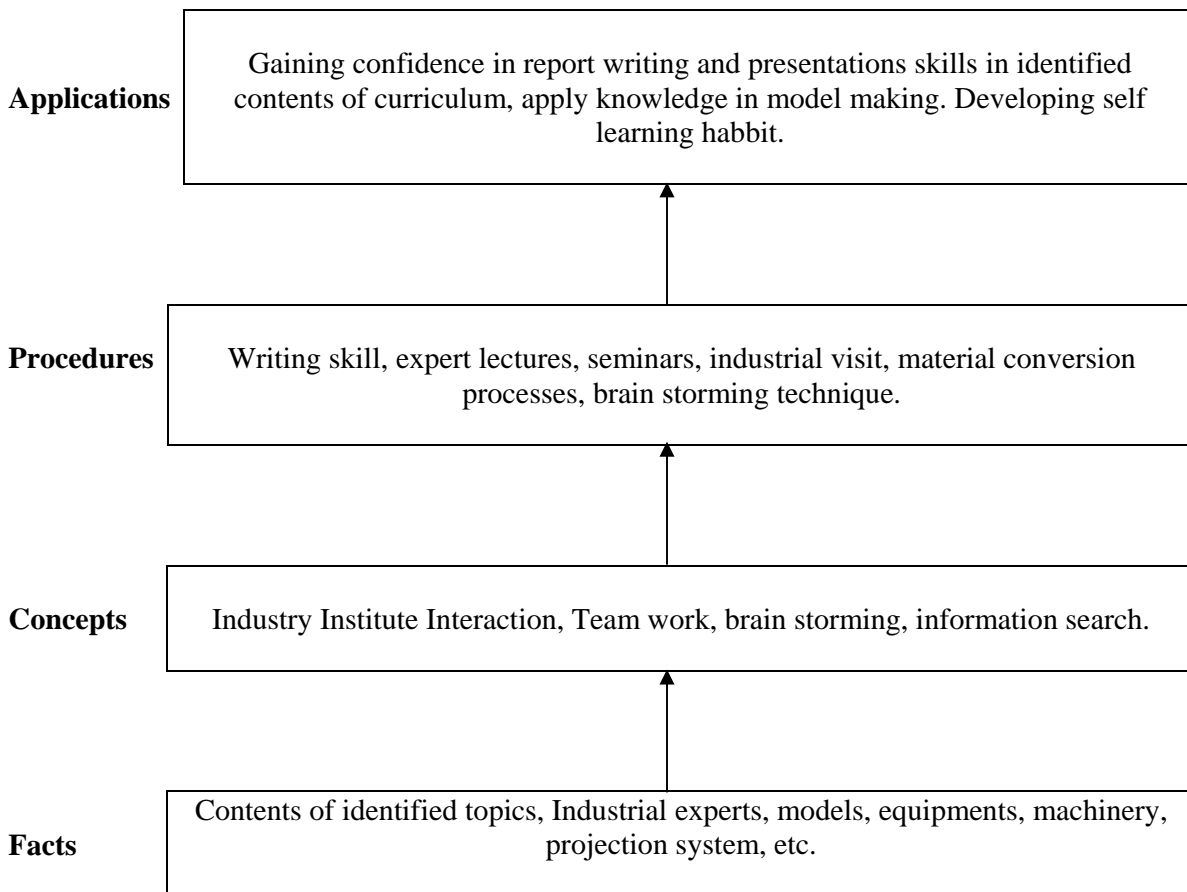
Student will be able to:

- 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	Hours
<p>1: Information Search –</p> <p>Specific objectives: at the end of this chapter student will able to;</p> <p>1] List various sources for information collection.</p> <p>2] Collect information and arrange it and produce in the useful form of report</p> <p>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.</p> <p>Following topics are suggested, any other equivalent topics may be selected.</p> <ul style="list-style-type: none"> 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 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. 	06
<p>2. Lectures by professionals/Industry Experts-</p> <p>Specific objectives: at the end of this chapter student will able to;</p> <p>1] Identify and arrange the lectures of professionals/Industry Experts.</p> <p>2] Interact with the expert to gather specific information needed by him.</p> <p>3] Solve the problems through assistance of expert.</p> <p>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.</p> <p>Students shall prepare a brief report of each lecture as a part of their term work.</p> <ul style="list-style-type: none"> 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. vi) Industrial application of mechatronics. vii) Special features of CNC machines viii) Gear manufacturing & gear teeth finishing processes. ix) Gear boxes-industrial & Automobile applications. 	04

<ul style="list-style-type: none"> 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 	
<p>3. Seminars: Specific objectives: at the end of this chapter student will able to; 1] Collect and present information thorough seminar method. 2] Use A/V aids effectively for delivering seminars. 3] Interact with speaker for solving his difficulties in a conducting atmosphere.</p> <p>One seminar be arranged on the subjects related to 4th semester. Or topics beyond 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-</p> <ul style="list-style-type: none"> 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. 	04

<p>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.</p> <p>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 :</p> <ul style="list-style-type: none"> ➤ 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 ➤ To observe Tool room, standards room etc. <p>Following types of industries may be visited in & around the institute.</p> <ol style="list-style-type: none"> 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 	04
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<p>5. Socially Relevant Activities</p> <p>Specific objectives: at the end of this chapter student will able to;</p> <p>1] Develop awareness about recent trends in general industries</p> <p>2] Appreciate and value the activities for development of positive attitude in the area of Environmental protection, Sustainable Development and critical social issues.</p> <p>3] Gain knowledge through training or by completing modular courses of recent technology.</p> <p>Conduct any one activity through active participation of students and write the report. Group of students- maximum 4 Report- Not more than 6 pages</p> <p>List of suggested activities- (activities may be thought in terms of campus improvement)</p> <ol style="list-style-type: none"> i) Awareness about carbon credit ii) Anticorruption movement 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) 	04
<p>6. Mini Projects</p> <p>Students, in a group of 4, shall perform any one activity listed below.</p> <ol style="list-style-type: none"> i) Model making out of card board paper ,wood ,thermocool, plastics, metal, clay etc <ol style="list-style-type: none"> 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 v) 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. <p>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.</p> <p style="text-align: center;">OR</p> <p>Modular course:</p> <p>Modular courses on any one of the suggested or equivalent topic be undertaken by a group of 15 to 20 students.</p> <ol style="list-style-type: none"> i) Advance features in CAD ii) Meshing of solid model using any suitable software iii) Developing Unfold Sheet or Hyperblank by using Blanking Software iv) CAM Software v) Basics of PLC programming vi) Applications of mechatronics vii) Piping Technology 	10

viii) Modern packaging technology ix) Enterprise Resource Planning x) Bio-pneumatic Robots xi) Bio-mimicry	
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. No.	Author	Title	Publisher
01	NRDC, Publication Bi Monthly Journal	Invention Intelligence Journal	National Research Development 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 for All – Ninth Edition	PHI
05	Apprenticeship Training Scheme:- Compiled By – BOAT (Western Region), Mumbai, 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 4th semester examination.

Note:- Examination in Professional Practices of 5th 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.
- Their 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.

 MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI 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							
SR. NO.	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME										SW (17400)
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)			
								Max	Min	Max	Min	Max	Min	Max	Min		
1	Environmental Studies \$	EST	17401	01	--	02	01	50#*	20	--	--	--	--	25@	10	50	
2	Human Biology	HBI	17436	04	--	02	03	100	40	--	--	25#	10	25@	10		
3	Communication Techniques	CTE	17438	03		02	03	100	40	--	--	--	--	25@	10		
4	Biosensor	BIO	17442	03	--	02	03	100	40	25#	10	--	--	25@	10		
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				16	--	15	--	450	--	75	--	25	--	200	--	50	
**	Industrial Training (Optional)			Examination in 5th Semester Professional Practices-III													
<p>Student Contact Hours Per Week: 31 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 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 5th Semester.</p> <ul style="list-style-type: none"> ➤ 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			Examination Scheme					
TH	TU	PR	PAPER 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.

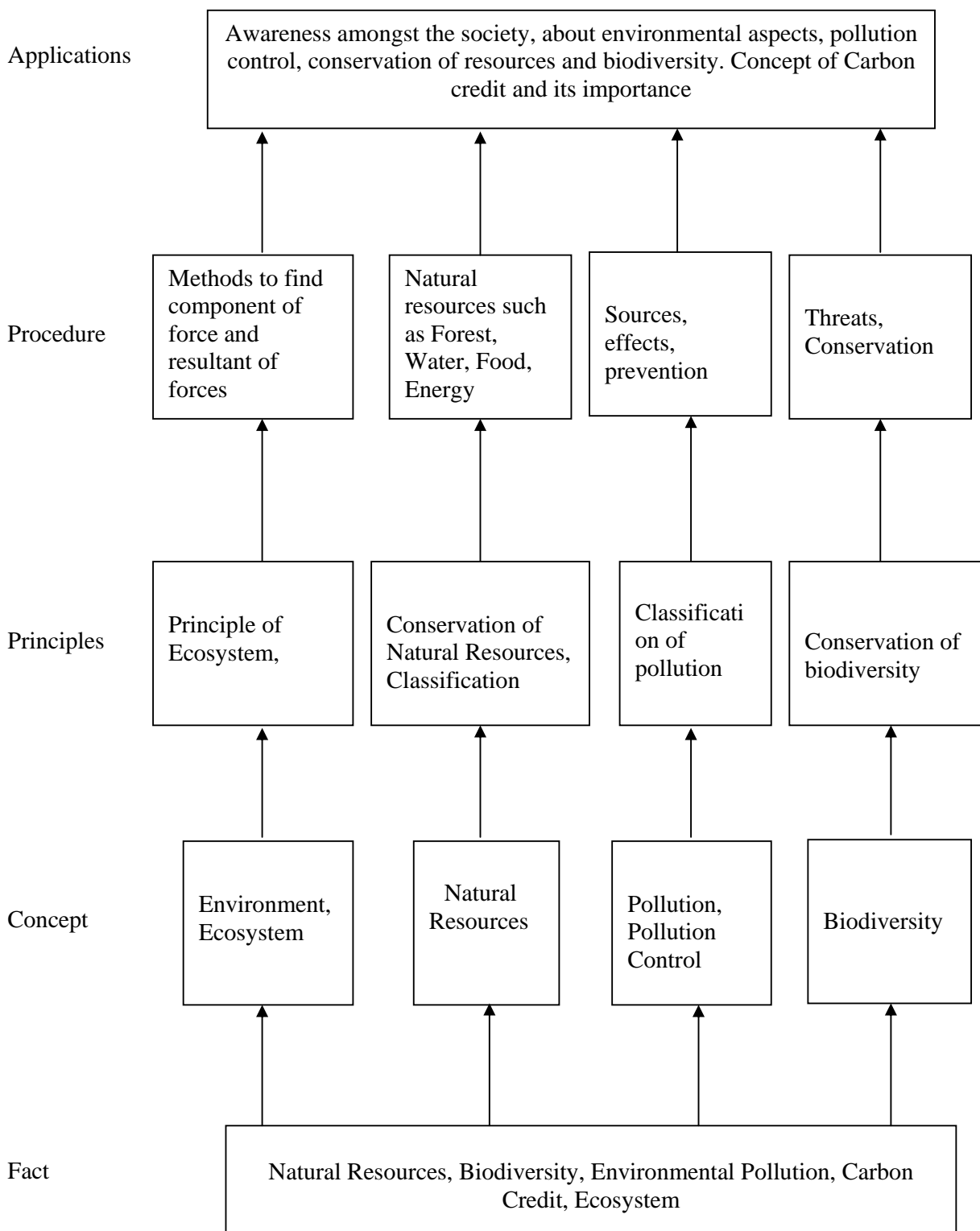
It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

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
<p>Topic 1: Nature of Environmental Studies</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define the terms related to Environmental Studies ➤ State importance of awareness about environment in general public <p>Contents:</p> <ul style="list-style-type: none"> • Definition, Scope and Importance of the environmental studies • Importance of the studies irrespective of course • Need for creating public awareness about environmental issues 	01	04
<p>Topic 2: Natural Resources and Associated Problems</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define natural resources and identify problems associated with them ➤ Identify uses and their overexploitation ➤ Identify alternate resources and their importance for environment <p>Contents:</p> <p>2.1 Renewable and Non renewable resources</p> <ul style="list-style-type: none"> • Definition • Associated problems <p>2.2 Forest Resources</p> <ul style="list-style-type: none"> • General description of forest resources • Functions and benefits of forest resources • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc. <p>2.3 Water Resources</p> <ul style="list-style-type: none"> • Hydrosphere: Different sources of water • Use and overexploitation of surface and ground water • Effect of floods, draught, dams etc. on water resources and community <p>2.4 Mineral Resources:</p> <ul style="list-style-type: none"> • Categories of mineral resources • Basics of mining activities • Mine safety • Effect of mining on environment <p>2.5 Food Resources:</p> <ul style="list-style-type: none"> • Food for all • Effects of modern agriculture • World food problem 	04	10
<p>Topic 3. Ecosystems</p> <ul style="list-style-type: none"> • Concept of Ecosystem • Structure and functions of ecosystem • Energy flow in ecosystem • Major ecosystems in the world 	01	04
<p>Topic 4. Biodiversity and Its Conservation</p> <ul style="list-style-type: none"> • Definition of Biodiversity • Levels of biodiversity 	02	06

<ul style="list-style-type: none"> • Value of biodiversity • Threats to biodiversity • Conservation of biodiversity 		
Topic 5. Environmental Pollution <ul style="list-style-type: none"> • Definition • Air pollution: Definition, Classification, sources, effects, prevention • Water Pollution: Definition, Classification, sources, effects, prevention • Soil Pollution: Definition, sources, effects, prevention • Noise Pollution: Definition, sources, effects, prevention 	03	08
Topic 6. Social Issues and Environment <ul style="list-style-type: none"> • Concept of development, sustainable development • Water conservation, Watershed management, Rain water 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 	03	10
Topic 7. Environmental Protection Brief description of the following acts and their provisions: <ul style="list-style-type: none"> • Environmental Protection Act • Air (Prevention and Control of Pollution) Act • Water (Prevention and Control of Pollution) Act • Wildlife Protection Act • Forest Conservation Act Population Growth: Aspects, importance and effect on environment <ul style="list-style-type: none"> • Human Health and Human Rights 	02	08
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. No.	Author	Title	Publisher
01	Anindita Basak	Environmental Studies	Pearson Education
02	R. Rajgopalan	Environmental Studies from Crises to Cure	Oxford University Press
03	Dr. R. J. Ranjit Daniels, Dr. Jagdish Krishnaswamy	Environmental Studies	Wiley India

Course Name : Diploma in Medical Electronics

Course Code : MU

Semester : Fourth

Subject Title : Human Biology

Subject Code : 17436

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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:

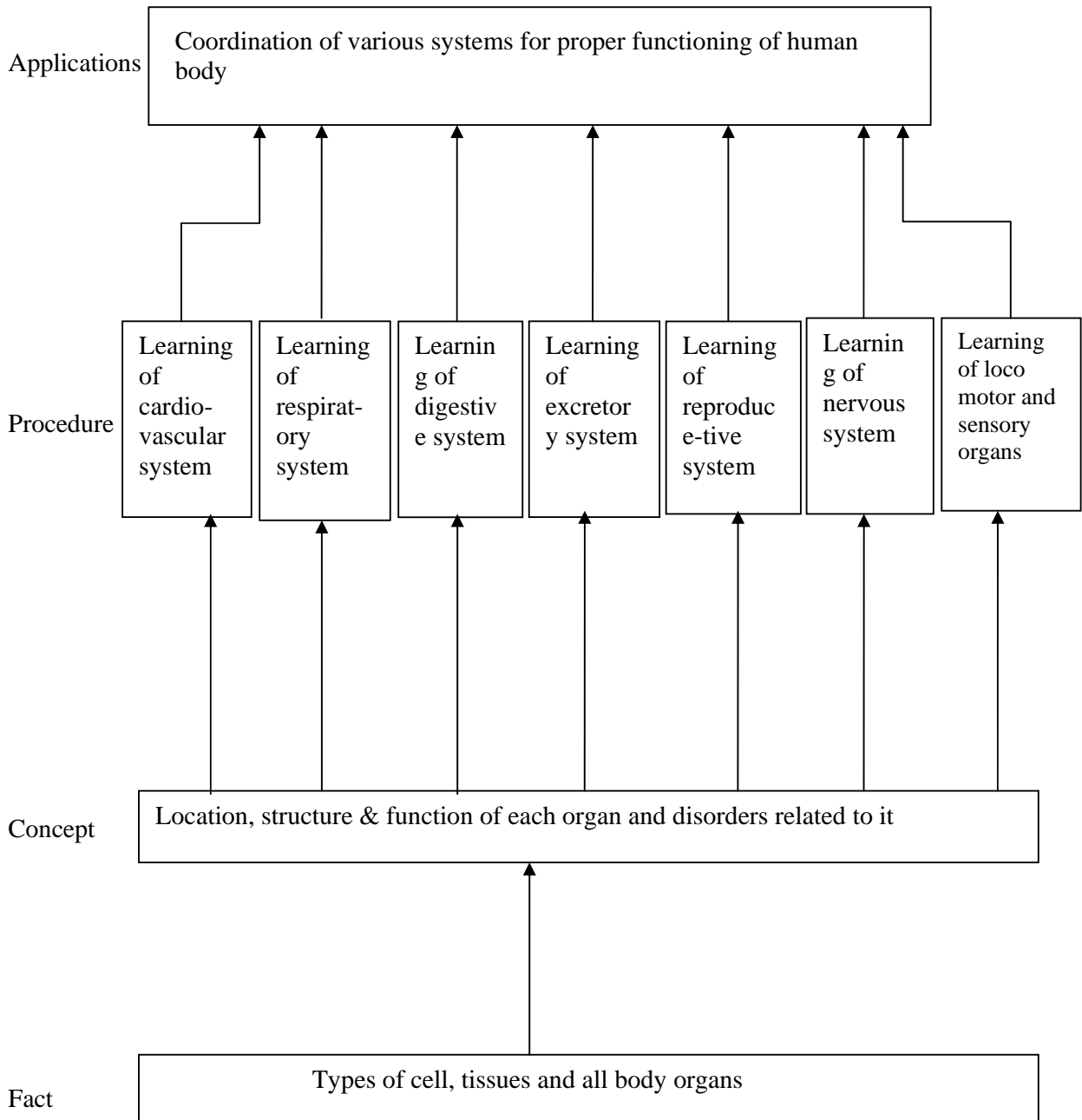
Human biology is a core subject to understand the anatomy & physiology of human body. Each system of the human body is explained step by step, in different chapters. Human Biology is a prerequisite for all subjects of Medical Electronics.

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 No	Theory	Hrs.	Marks
1	<p>Cell , Tissues, Blood and Skeleton System Specific Objectives</p> <ul style="list-style-type: none"> ➤ Describe structure and function of cell organelles and different types of tissues. ➤ Discuss functions of blood and list its components. ➤ Classify blood group, bones, joints and muscles. <p>Contents:</p> <p>1.1 Cell, Tissues and Blood [12]</p> <ul style="list-style-type: none"> • Structure & function of cell organelles, Cell electrophysiology- repolarization, depolarization, characteristics, resting membrane potential, action potential • Different types of tissues & their function • Composition of blood, cellular contents, Blood function, Blood groups <p>1.2 Skeletal System [08]</p> <ul style="list-style-type: none"> • Classification of bone, joints and muscles, Function of bone, joints and skeletal muscle 	11	20
2	<p>Cardiovascular System Specific Objectives</p> <ul style="list-style-type: none"> ➤ Describe anatomy and physiology of heart ➤ Outline the conduction system of heart ➤ Describe the main parameters of cardiac blood flow <p>Contents:</p> <ul style="list-style-type: none"> • Anatomy of heart, cardiac muscle & its properties, Blood vessels & circulation of blood, Conduction system • Blood pressure, blood flow, cardiac output, heart rate and pulse rate, List of instruments related to heart 	10	16
3	<p>Respiratory System Specific Objectives</p> <ul style="list-style-type: none"> ➤ Describe the location and gross anatomy of respiratory organ and functions of each. ➤ Describe the mechanism by which respiration is controlled ➤ Define the respiratory parameters <p>Contents:</p> <ul style="list-style-type: none"> • Anatomy of respiratory system, nose, pharynx, larynx, trachea, bronchi & lungs, • Mechanism of respiration, gases exchange, Respiratory parameters: lung volumes & capacities, List of instruments related to respiration 	10	12
4	<p>Digestive and Urinary System Specific Objectives</p>	14	20

	<ul style="list-style-type: none"> ➤ Describe and outline structure of digestive organs ➤ Describe the functions of various organs of digestive system and their respective secretion ➤ Outline the structure of urinary system and describe its function ➤ Describe the processes involved in formation of urine and function of kidney <p>Contents:</p> <p>4.1 Digestive System [10]</p> <ul style="list-style-type: none"> • Organs of digestive system, Juices secreted by various digestive organs & their functions, • List of instruments related to digestive system <p>4.2 Urinary System [10]</p> <ul style="list-style-type: none"> • Anatomy of urinary system –kidney, ureter, urinary bladder, urethra, Formation of urine & function of kidney, • Structure and function of skin, • List of instruments related to urinary system 		
5	<p>Reproductive System Specific Objectives</p> <ul style="list-style-type: none"> ➤ Outline the structure of male and female reproductive system ➤ Describe the actions of androgens, oestrogens and progesterone <p>Contents:</p> <ul style="list-style-type: none"> • Male reproductive system, Hormones secreted & their functions, Female reproductive systems, Hormones secreted & their functions 	04	08
6	<p>Nervous System and Special Senses Specific Objectives</p> <ul style="list-style-type: none"> ➤ Classify nervous system ➤ Describe the position and function of all parts of nervous system ➤ Sketch the structure of eye and ear and describe its physiology <p>Contents:</p> <p>6.1 Nervous System [12]</p> <ul style="list-style-type: none"> • Neurons, Central Nervous System (CNS), Brain, Spinal cord, Peripheral Nervous System, Autonomic Nervous System (ANS) Instruments related to nervous system. <p>6.2 Special Senses [08]</p> <ul style="list-style-type: none"> • Anatomy of Ear & its function (hearing mechanism) • Anatomy of eye and its function (image formation) 	12	20
7	<p>Endocrine system Specific Objectives</p> <ul style="list-style-type: none"> ➤ List and explain structure and functions of various endocrine glands <p>Contents:</p> <ul style="list-style-type: none"> • Structure and position of endocrine glands, Functions of each gland 	03	04
Total		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. No.	Title	Author	Publisher
01	Ross & Wilson Anatomy & Physiology In Health & Illness	Anne Waugh, Allison Grant	Elsevier Churchill Livingstone International Edition
02	Human Physiology an Integrated Approach	Dee Unglaub Silverthron	EEE (PHI)
03	Human Biology for A2	Mary Jones, Geoff Jones	Cambridge
04	Medical Instrumentation- Application & Design	John G. Webster, Editor	John Wiley And Sons (Asia) Pvt. Ltd.

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)

Course Name : Diploma in Medical Electronics
Course Code : MU
Semester : Fourth
Subject Title : Communication Techniques
Subject Code : 17438

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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).**

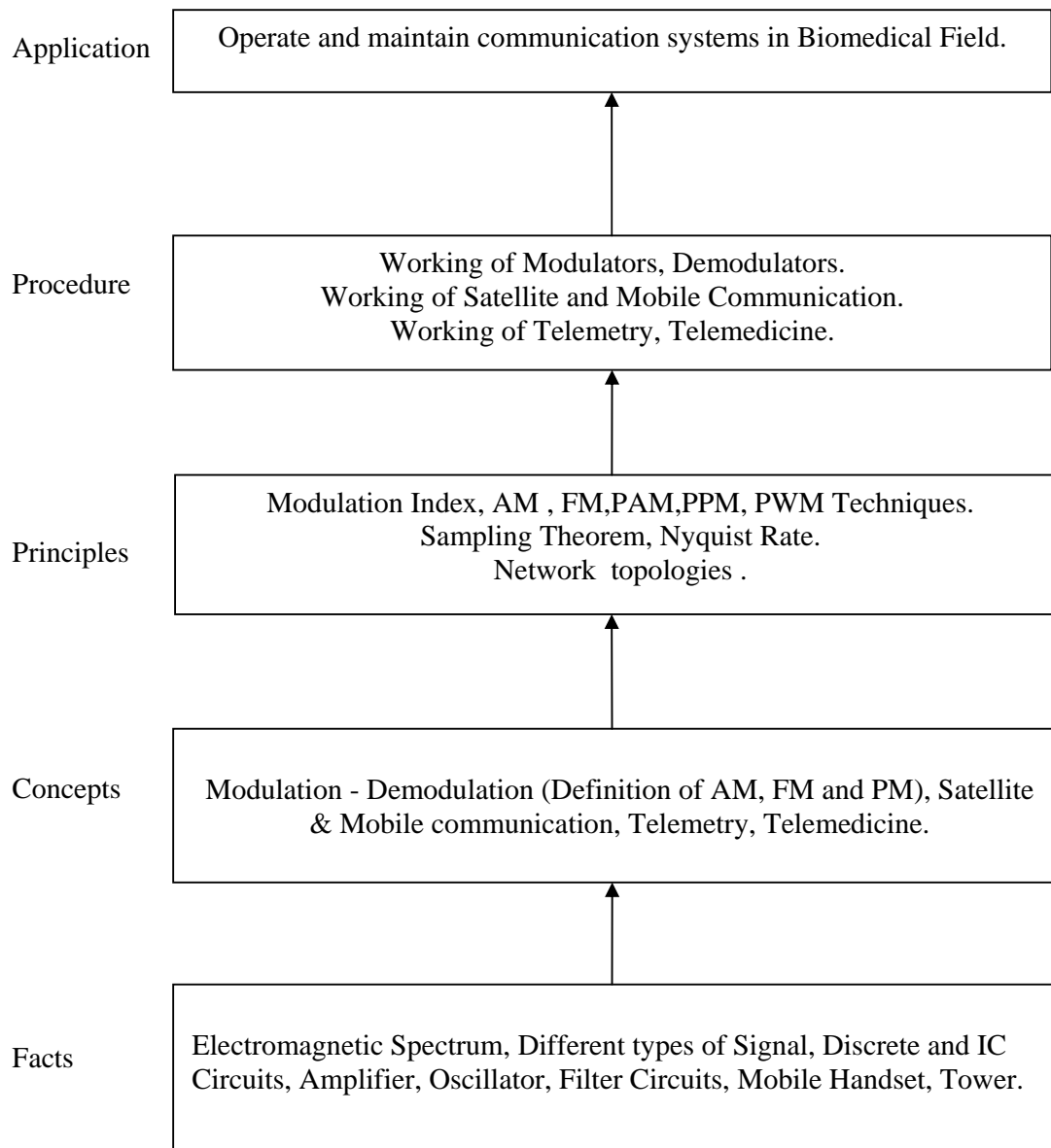
Rationale:

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.

Learning Structure:

Theory:

Topic No	Contents	Hours	Marks
1	<p>Fundamentals of Electronic Communication</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> ➤ State basic terminology concepts regarding Electronic Communication. ➤ Know different techniques of analog communication. <p>Contents:</p> <p>1.1 Basics of Communication System [12]</p> <ul style="list-style-type: none"> • Block diagram of communication system. • Electromagnetic spectrum • Concept of decibel bandwidth, information capacity in communication. <p>Terminology related to noise</p> <ul style="list-style-type: none"> • Sources of noise • Effects of noise. • Signal to noise ratio(SNR) • Noise voltage • Noise factor • Noise figure • Noise temperature. <p>Modulation-Demodulation</p> <ul style="list-style-type: none"> • 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. • Amplitude modulation circuits- emitter modulator, base modulator, collector modulator. • Fm modulation circuit using varactor diode. • Concept of demodulation- amplitude demodulation by diode detector. <p>1.2 Pulse Modulation [08]</p> <ul style="list-style-type: none"> • Sampling theorem, Nyquist rate, • Natural sampling. • Flat top sampling. <p>Pulse Analog Modulation</p> <ul style="list-style-type: none"> • Block diagram for generation. Waveforms, working, principle, advantages, disadvantages & applications of PAM, PWM& PPM. (no numerical to be taught) • Advantages of pulse modulation over AM. 	10	20
2	<p>Digital Communication</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> • State the fundamentals of digital communication. • Describe PCM • Know digital modulation techniques & multiplexing techniques 	12	24

	<p>Contents:</p> <p>2.1 Fundamental of Digital Communication [16]</p> <ul style="list-style-type: none"> Block diagram for generation, working principle, waveforms, advantages, disadvantage & application of ask, FSK, BPSK, QPSK, DPSK. Block diagram, working principle, waveforms, advantages, disadvantages & application of PCM, delta modulation, adaptive delta modulation. <p>2.2 Multiplexing & Data Encoding Techniques. [08]</p> <ul style="list-style-type: none"> Multiplexing technique: Definitions, schematic diagram, principle, application, advantages & disadvantage of TDM, FDM AND WDM Data encoding techniques Unipolar –NRZ, Polar –NRZ,RZ, Biphase (manchester and differential manchester) Bipolar – AMI Pseudoternary. 		
3	<p>Satellite Communication Specific objectives:</p> <ul style="list-style-type: none"> ➤ State basic concept regarding satellite communication. ➤ Know terms related to satellite communication ➤ State the concept of earth (ground) state. <p>Contents:</p> <ul style="list-style-type: none"> History of satellite. Terminology related to satellite communication: satellite orbits, elevation angle, azimuth angle, foot print, station keeping, altitude, geostationary satellite. 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 TDMA, FDMA, CDMA 	06	14
4	<p>Mobile Communication Specific objectives:</p> <ul style="list-style-type: none"> Know brief history of mobile telephone service. State the terminology related to cellular phone State the different concepts related to cell, interference, base station etc. <p>Contents:</p> <ul style="list-style-type: none"> Evolution of cellular telephone Concept of cell pattern, frequency reuse, interference - co channel & adjacent channel, cell splitting, sectoring, segmentation & dualization, roaming & handoffs. Block diagram and working of mobile communication 	06	12

	<ul style="list-style-type: none"> • Cellular telephone call processing <ul style="list-style-type: none"> ▪ Mobile (cellular) to wire line (PSTN) call procedure ▪ Mobile (cellular) to mobile (cellular) call procedure. ▪ Wire line (PSTN) to mobile (cellular) call procedure. 		
5	<p>Data Communication & Networking Specific objectives:</p> <ul style="list-style-type: none"> • Know modes of data transmission • State the concepts of network topologies, types of network and the network models. • Know about connecting devices & network security. <p>Contents:</p> <p>5.1 Modes of Transmission, Topologies, Categories and Models of Network. [14]</p> <ul style="list-style-type: none"> • Modes of data transmission serial, parallel, synchronous, asynchronous • Network topologies Diagram, working, advantage, disadvantages and application of mesh, star, bus, ring • Network categories Fundamentals of LAN,WAN,MAN • Network models Architecture of OSI model, TCP/IP model <p>5.2 Connecting Devices and Network Security [06]</p> <ul style="list-style-type: none"> • Connecting devices Concept and operation of hubs, repeaters, bridges, routers, gateway • Network security Concept of message confidentiality, message integrity, message authentication, digital signature, entity authentication 	08	20
6	<p>Bio telemetry Specific objectives:</p> <ul style="list-style-type: none"> ➤ Know basics of telemetry system. ➤ State the concept of telemedicine. <p>Contents:</p> <ul style="list-style-type: none"> • Block diagram of biotelemetry system. • Block diagram and working of single channel biotelemetry system for ECG • Block diagram of working of multi channel biotelemetry system. • Telemedicine in India • Tele radiology (block diagram and working) • Tele cardiology(block diagram and working) • Concept of tele psychiatry, tele dermatology, tele surgery. • Advantages and disadvantages of telemedicine. • Ethical and legal aspect of internet medical services. 	06	10
Total		48	100

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. No.	Title	Author	Publisher
1	Electronic Communication System (V th 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 & Networking	Forouzan	Tata McGraw Hill
5	Mobile Cellular Telecommunication	William Lee	McGraw Hill
6	Communication Electronic	Frenzel	Tata MCgraw hills
7	Introduction to Biomedical Instrumentation	Mandeep Singh	Prentice Hall of India.
8	Hand book of Biomedical Instrumentation	R.S.Khandpur	Tata MCgraw hills
9	Biomedical Instrument & Measurement	Cromwell, Weibell, Pfeiffer	Pearson
10	Principle of Medical electronics & 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 Electronics

Course Code : MU

Semester : Fourth

Subject Title : Biosensors

Subject Code : 17442

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

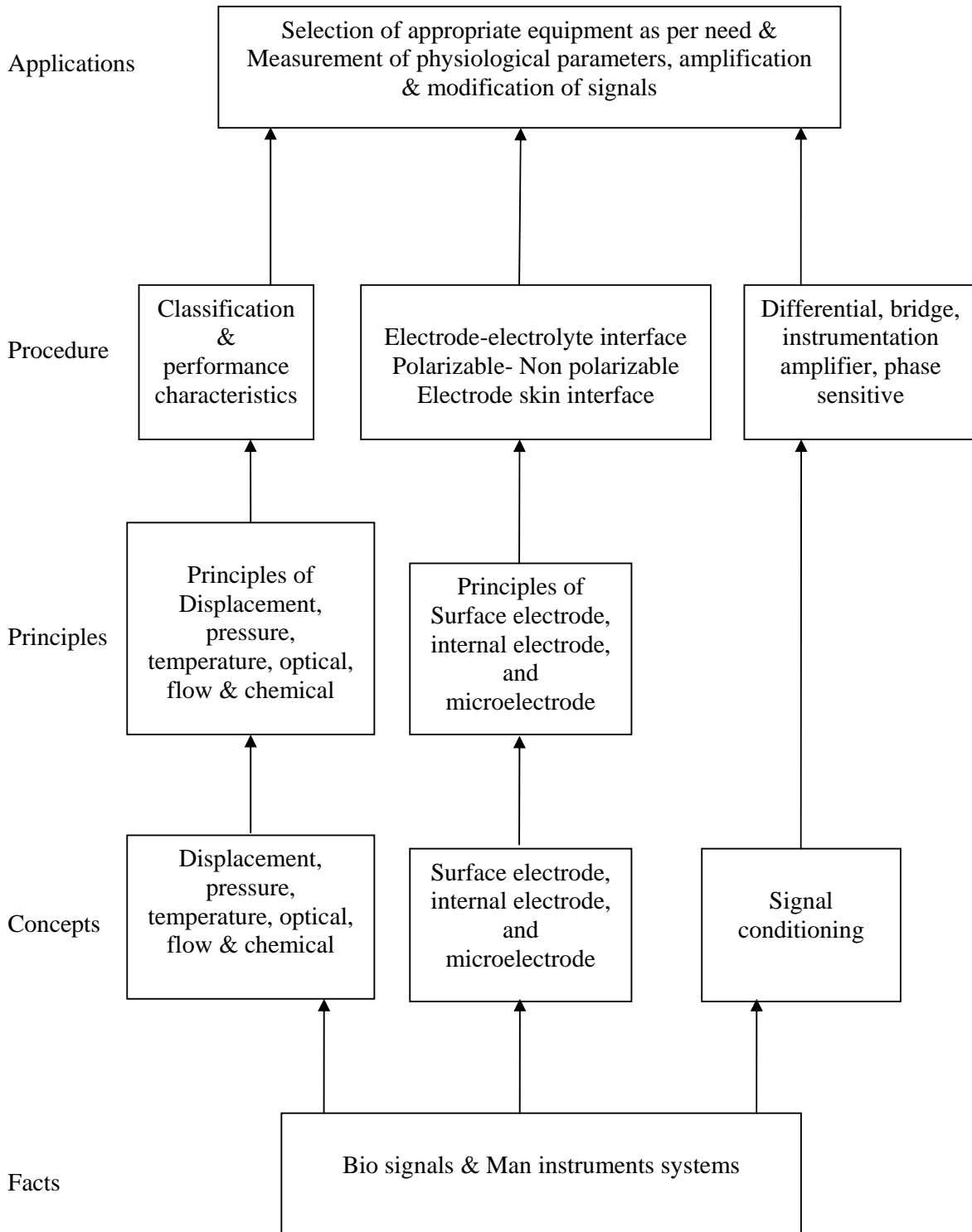
This subject, Biosensors is the pre-requisite for all the subjects related to patient's management in the respect of diagnosis monitoring and therapy.

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 No	Theory	Hrs.	Marks
1	<p>Introduction to Medical Instrumentation System & Physiological transducers</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Identify physiological sources of biomedical signals ➤ Describe working principle of Medical Instrumentation system ➤ Classify the physiology transducers <p>Contents:</p> <p>1.1 Introduction to Medical Instrumentation System: [12]</p> <ul style="list-style-type: none"> • Definition of Biometrics • Sources of biomedical signals • Basic medical instrumentation (Man instrumentation)system • Specification of medical instrumentation system • Objectives of medical instrumentation system • General constraints in design of MIS <p>1.2 Introduction to Physiological transducers: [08]</p> <ul style="list-style-type: none"> • Classification of transducer based on: Process used, Physical or chemical principle used, Applications • Performance characteristics of transducers: Static characteristics, Dynamic characteristics 	10	20
2	<p>Displacement & Pressure Transducers</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw constructional sketches of displacement & pressure transducers. ➤ Describe working principle of displacement & pressure transducers. <p>Contents:</p> <ul style="list-style-type: none"> • Resistive - Linear & angular potentiometers, bonded & unbounded strain gauge • Inductive - Variable inductance, LVDT • Capacitive • Piezoelectric • Diaphragm - Flat, corrugated, capsule • Bellows • Bourdon tube - C shape, spiral, helical, twisted 	08	16
3	<p>Temperature, Optical and, Radiation Transducers</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw constructional sketches of temperature, optical and radiation transducers ➤ Describe working of these transducers. <p>Contents:</p> <ul style="list-style-type: none"> • Temperature transducer - Thermistor, Thermocouple, RTD • Optical transducers-Fibre optic sensors, Photomultiplier tube • Radiation Thermometry 	08	20
4	Flow & Electro Chemical Transducers	12	24

	<p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw construction of Flow & electrochemical transducers. ➤ Describe working of these transducers. <p>Contents:</p> <p>4.1 Flow transducers: [12]</p> <ul style="list-style-type: none"> • Plethysmography • Ultrasonic flow transducers • Electromagnetic transducers • Flow measurement by indicator dilution • Flow measurement by thermal convection <p>4.2 Chemical transducers: [12]</p> <ul style="list-style-type: none"> • Reference electrode • pH electrode • PO₂ electrode • PCO₂ electrode • Ion-Sensitive Field Effect Transistor (ISFET) • Blood glucose sensor 		
5	<p>Bio Potential Electrode</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw constructional details & explain working of Electrodes. <p>Contents</p> <ul style="list-style-type: none"> • Electrode electrolyte interference • Polarizable & nonpolarizable electrodes • Electrode skin interface & motion artifact • Surface electrode- Metal plate electrode, Metal disc disposable, Suction electrode, Floating electrodes, Flexible electrode • Internal electrode-Needle electrodes, Wire electrodes • Micro electrodes - Metal microelectrodes, Supported microelectrodes, Micro pipette microelectrodes 	06	12
6	<p>Signal Conditioners</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw circuit diagram & explain working of the bio signal amplifiers. <p>Contents:</p> <ul style="list-style-type: none"> • Basic requirements of biomedical amplifier • Differential amplifier • Instrumentation amplifier • Bridge amplifier • Phase sensitive amplifier 	04	08
Total		48	100

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. No.	Title	Author	Publisher
1	Biomedical Instrumentation & Measurements	Leslie Cromwell, Fred J. Weibell, Erich Pfeiffer	Prentice Hall of India
2	Medical Instrumentation- Application & Design	John G. Webster	John Wiley & Sons (Asia) Pvt. Ltd
3	Principles of medical electronics & Biomedical Instrumentation	C. Raja Rao, S. K. Guha	Universities Press
4	Handbook of Biomedical Instrumentation	R. S. Khandpur	Tata Mc Graw hills
5	Biomedical Instrumentation & Measurements	R. Ananadnatarajan	PHI learning Pvt. Ltd.
6	Electronics in medicine & 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

- 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 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:

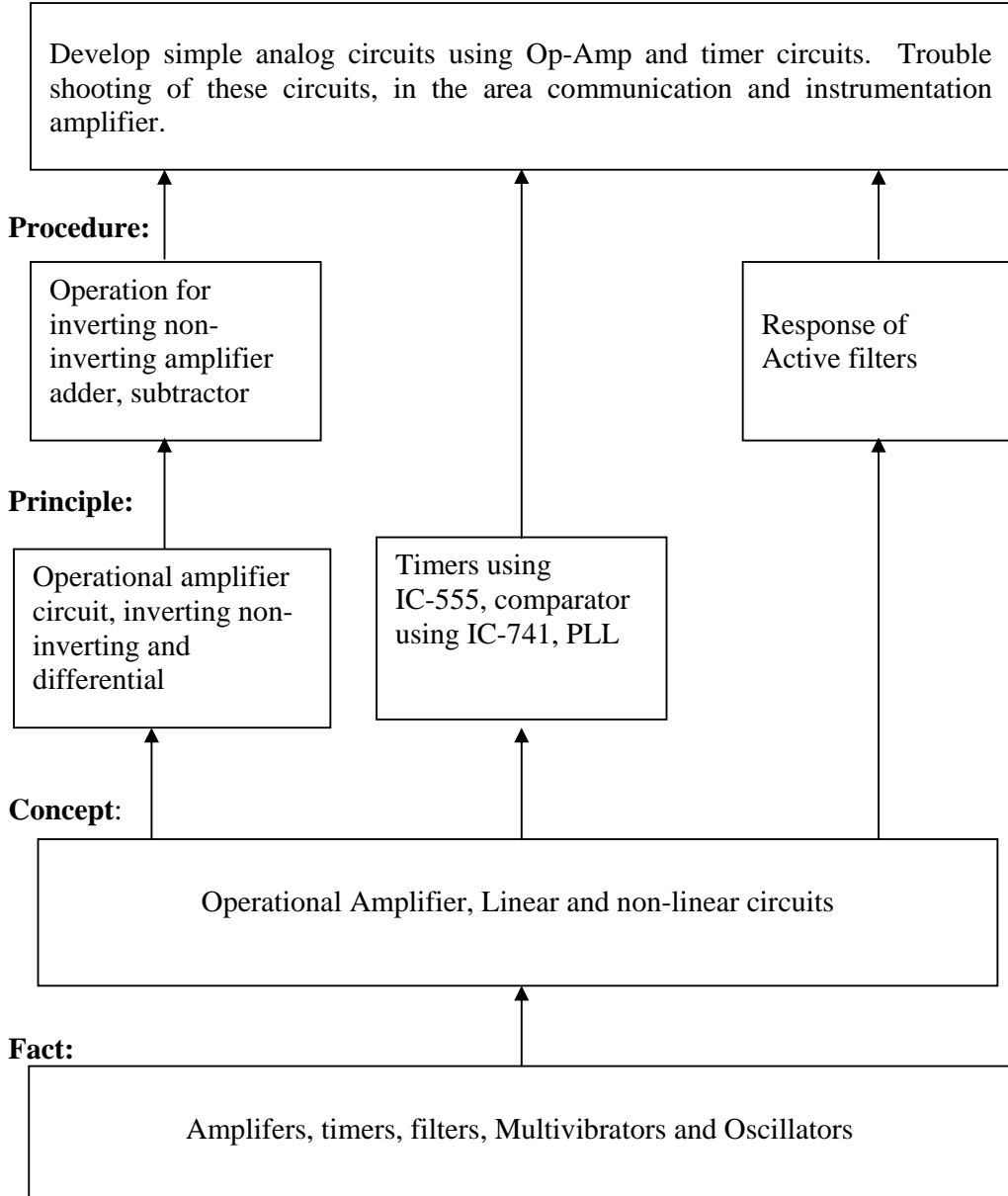
Students will be able to:

- 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
1	<p>Operational Amplifier (Op-Amp): Specific Objectives :</p> <ul style="list-style-type: none"> ➤ Draw labeled block diagram of Op-Amp ➤ Specify and define Different parameters of Op-Amp ➤ Interpret ideal transfer characteristics of Op-Amp <p>Contents:</p> <ul style="list-style-type: none"> • 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 push-pull amplifier. Equivalent Circuit, Circuit Symbols And 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. 	12	10
2	<p>Op-Amp Configuration: Specific Objectives: Students will be able to</p> <ul style="list-style-type: none"> ➤ Differentiate open and close loop configuration. ➤ Identify inverting and non-inverting configuration. ➤ Construct integrator and differentiator. <p>2.1 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, differential amplifier, unity gain amplifier (voltage follower), inverter(sign changer)</p> <p>2.2 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.</p>	12	18
3	<p>Applications of Op-Amp: Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Compute component values for instrumentation amplifier. ➤ Explain IC LM-324 ➤ Explain different applications of Op-Amp. <p>3.1 Need for signal conditioning and signal processing. [08]</p>	12	22

	<p>Circuit diagram, operation, derivation of output voltage Equation. advantages and applications of Instrumentation amplifier. Pin diagram pin functions and specifications of IC LM 324 Voltage to current converter (with floating load, with grounded load) Current to voltage converter.</p> <p>3.2 Sample and hold circuit. [16]</p> <p>Logarithmic and antilogarithmic amplifiers (using Diodes) Analog divider and analog multiplier Comparator: Circuit diagrams and operation of</p> <ul style="list-style-type: none"> • Zero crossing detector, • Schmitt trigger, • Window detector, • Phase detector, • Active peak detector, • Peak to peak detector 		
4	<p>Filters: Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Distinguish the types of filter ➤ Explain active and passive filter ➤ Explain different parameters of filter. <p>Contents:</p> <ul style="list-style-type: none"> • Introduction to filters ,Classification of filters, • Concept of passive and active filters • Merits and demerits of active filters over passive filters • 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. 	10	16
5	<p>Timers Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw block diagram of IC 555 ➤ Understand industrial applications of IC 555 ,565 <p>5.1 Introduction to timer IC 555 [10]</p> <ul style="list-style-type: none"> • Block diagram of IC 555 and its pin diagram and function of each pin. • Concepts of different timer circuits used in industries: water level controller, Touch plate switch, frequency divider. • Numericals based on timers. <p>5.2 Phase Lock Loop</p> <ul style="list-style-type: none"> • Principle of operation, block diagram of PLL. [08] • Applications of PLL as multiplier, FM demodulator. • Pin diagram and pin functions of IC 565(PLL) 	10	18

6	Oscillators: Specific Objectives: <ul style="list-style-type: none"> ➤ Explain concept of oscillators ➤ Explain different types of oscillators ➤ Develop multivibrators and oscillators for given values. Contents: <ul style="list-style-type: none"> • Concept of oscillators, • 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. 	08	16
	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: <ul style="list-style-type: none"> • Input Offset Voltage (V_{io}) • Output Offset Voltage (V_{oo}) • 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.
04	Verify the working of active integrator and differentiator circuits using op-amp IC 741 for following inputs: <ul style="list-style-type: none"> • Sine waveform • Square waveform • Rectangular waveform
05	Assemble V to I converter and I to V converter using IC 741 and measure the respective output.
06	Verify the working of following comparator circuits using op-amp IC 741 and draw the input-output waveforms <ul style="list-style-type: none"> • Zero crossing detector • Active peak detector
07	Assemble first order low pass Butterworth filter using op-amp and plot the frequency 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.
09	Assemble Monostable multivibrator circuit using IC 555. Plot the output waveform 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. 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 Analog Integrated Circuit	Tata-McGraw Hill
04	Willam D. Stanley	Operation Amplifier with Linear Integrated Circuit	Person

Course Name : Electronics Engineering and Video Engineering Group

Course Code : ET/EJ/IE/IS/EN/EX/IC/MU/EV/DE/TU/ED/EI

Semester : Fourth

Subject Title : Visual Basic

Subject Code : 17043

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

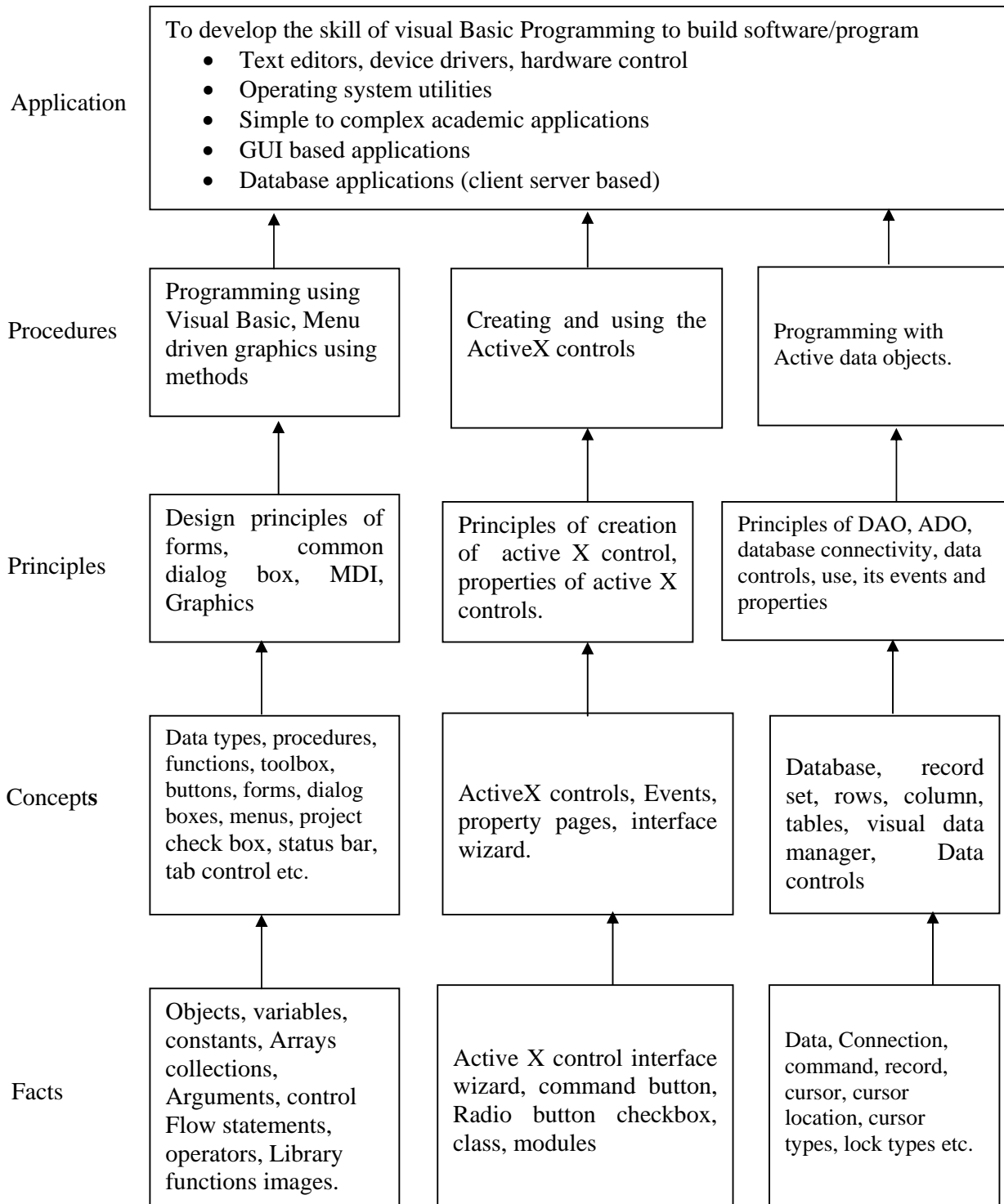
This course will lay the basic foundation of visual programming which will enable students to develop simple to complex programmable systems interfaces in the real world of work

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
<p>Topic 1] Introduction to Visual Environment Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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 ➤ Create objects, place them on forms <p>Contents:</p> <p>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.</p>	02
<p>Topic 2] Introduction to Visual Basic Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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 ➤ Use Inputbox and MsgBox functions <p>Contents:</p> <p>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 ().</p>	02
<p>Topic 3] Controls and Events Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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 <p>Contents:</p> <p>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.</p>	02
<p>Topic 4] Advance Controls & Events Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Add extrinsic controls in an application ➤ Use common dialog box control and its properties such open, save as, font, color, print and help ➤ 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 <p>Contents:</p>	03

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: <ul style="list-style-type: none"> ➤ 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 Contents: <p>5.1 Concept of module, class module, using class module to define functions, procedures, variables and accessing them using objects</p> <p>5.2 MDI- MDI form and child form, Creation and use in</p> <p>5.3 Menu: Creating own menu using menu editor, popup menu.</p> <p>5.3 Graphics: Basic controls – Line & shape control , line method, circle method, Pset method, RGB () Functions, Paint picture () method, Load picture () function.</p>	03
Topic 6] Database and Report Specific Objectives: <ul style="list-style-type: none"> ➤ 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: <p>6.1 Concept of database, Record, Record set, Data control & its important properties</p> <p>6.2 validating data, entering data, visual data manager.</p> <p>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,</p> <p>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.</p> <p>6.5 Report generation using data report and crystal report</p>	04
Total	16

TERM WORK:-

Sr No.	Name of the Experiments
1	a) Study and Understand Visual Basic Environment 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 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	a) Design Color box using RGB function to observe color change using H- scroll bar. b) Design project to demonstrate file, folder & drive controls to explore drive & folders.
7	Design GUI for Testing AC series Circuit
	Practice Experiment / Exercise
8	a) Design project to implement Common Dialog box controls such as open, save, Color, Font, Printer & Help b) Design a menu structure like notepad using menu editor
9	Design MDI application with 4 child forms & arrange forms with cascade, Tile Horizontal, 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. No.	Author	Title	Publisher
01	MSDN library on Line Reference	--	From Microsoft MSDN Library
02	Evangelos Petroustus	Mastering VB6	WILEY India
03	Steven Holzner	Visual basic 6	Dream Tech. Press
04	Content Development Group	Visual Basic 6.0 Programming	Tata McGraw Hill
05	Mohammed Azam	Programming with visual basic 6.0	Vikas Publishers
06	Nel Jerka	The complete reference VB6	Tata McGraw Hill Publishing

Course Name : Electronics Engineering Group

Course Code : ET/EJ/EN/EX/IE/IS/IC/DE/EV/MU/TU/ED/EI

Semester : Fourth

Subject Title : Professional Practices-II

Subject Code : 17044

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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:

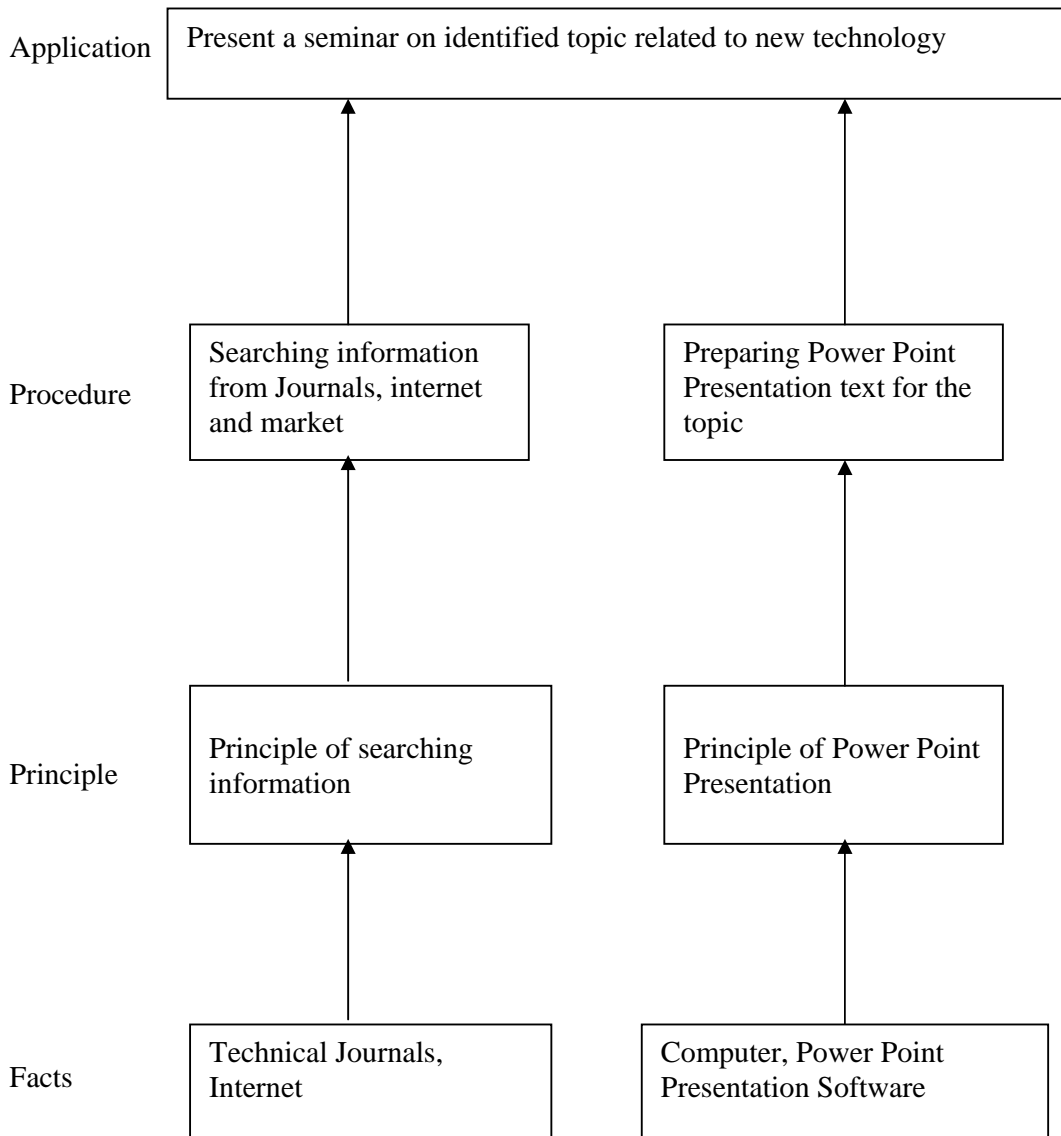
Intellectual skills:

- 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	Industrial Visits 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. Minimum two industrial visits may be arranged in the following areas/ industries : i) Electronic equipment manufacturing unit ii) Resistance Welding unit iii) Industrial automation unit iv) Sugar mill, Paper mill, Cement Industry. v) Railway station control room. vi) Telephone Exchange. vii) Any other suitable Industry.	16
2	Lectures by Professional / Industrial Expert to be organized from any of the following areas (Any three) i) Cyber laws. ii) Fiber optics communication system iii) Disaster management iv) Atomic energy v) Industrial Safety vi) Computer security systems/Ethical hacking. vii) Any other suitable topic viii) Introduction to Apprenticeship Training Scheme	08
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: 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	06
4	Seminar : 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: 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. 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 for All – Ninth Edition	PHI
05	Apprenticeship Training Scheme:- Compiled By – BOAT (Western Region), Mumbai, 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 4th semester examination.

Note:- Examination in Professional Practices of 5th 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.

 MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES																	
COURSE NAME : DIPLOMA IN PRODUCTION ENGINEERING / DIPLOMA IN PRODUCTION TECHNOLOGY																	
COURSE CODE : PG / PT																	
DURATION OF COURSE : 6 SEMESTERS								WITH EFFECT FROM 2012-13									
SEMESTER : FOURTH								DURATION : 16 WEEKS									
PATTERN : FULL TIME - SEMESTER								SCHEME : G									
SR. NO	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME										SW (17400)
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)			
								Max	Min	Max	Min	Max	Min	Max	Min		
1	Environmental Studies \$	EST	17401	01	--	02	01	50#*	20	--	--	--	--	25@	10	50	
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		
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)			Examination in 5th Semester Professional Practices-III													
<p>Student Contact Hours Per Week: 34 Hrs.</p> <p>THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.</p> <p>Total Marks : 900</p> <p>@ - Internal Assessment, # - External Assessment, No Theory Examination, \$ - Common to all branches, #* - Online Examination, β - Common to ME, MH, MI</p> <p>Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work</p> <p>** Industrial Training (Optional) - Student can undergo Industrial Training of four weeks after fourth semester examination during summer vacation.</p> <p>Assessment will be done in Fifth semester under Professional Practices-III. They will be exempted from activities of Professional Practices-III of 5th Semester.</p> <ul style="list-style-type: none"> ➤ 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:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

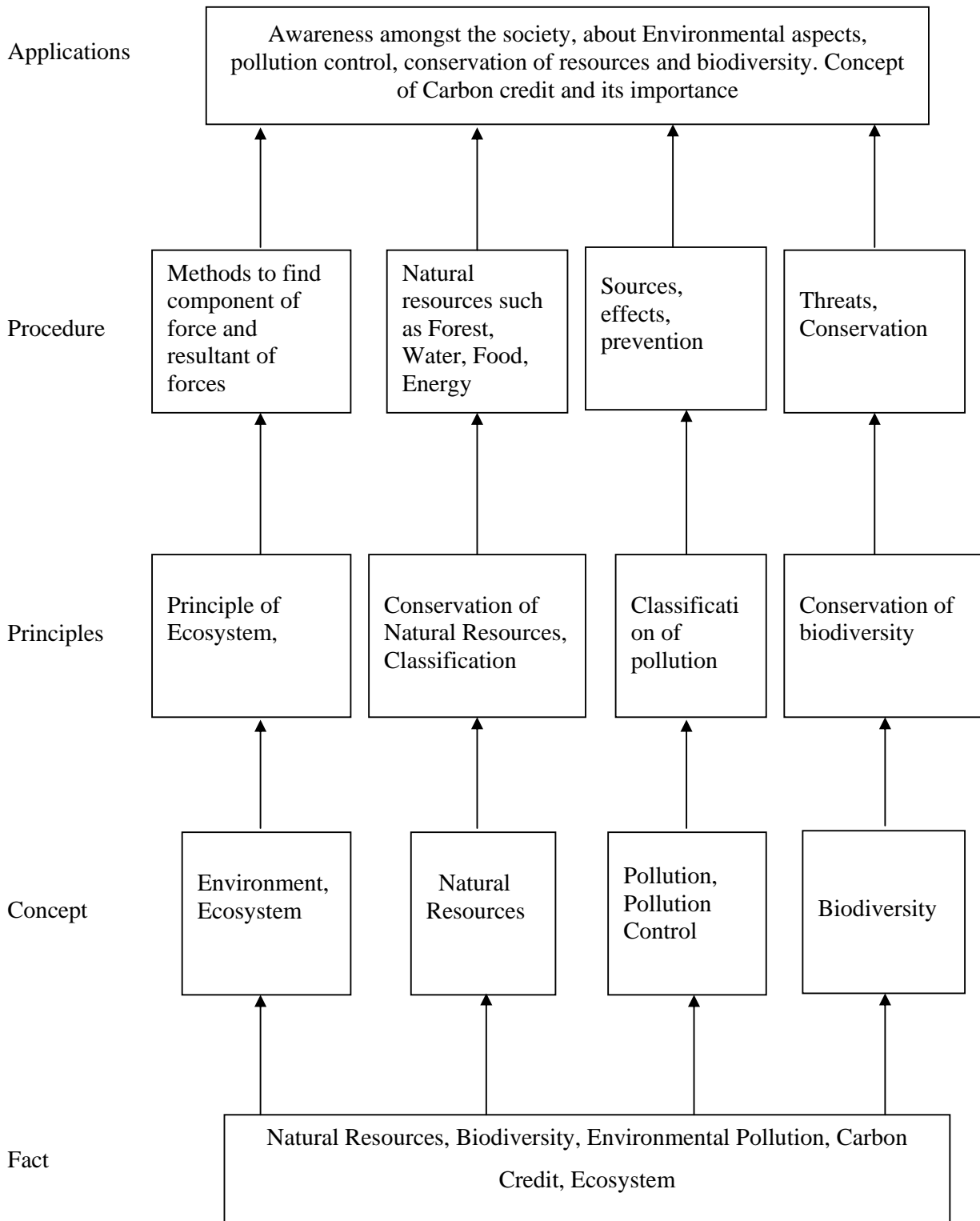
It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

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
<p>Topic 1: Nature of Environmental Studies</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define the terms related to Environmental Studies ➤ State importance of awareness about environment in general public <p>Contents:</p> <ul style="list-style-type: none"> • Definition, Scope and Importance of the environmental studies • Importance of the studies irrespective of course • Need for creating public awareness about environmental issues 	01	04
<p>Topic 2: Natural Resources and Associated Problems</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define natural resources and identify problems associated with them ➤ Identify uses and their overexploitation ➤ Identify alternate resources and their importance for environment <p>Contents:</p> <p>2.1 Renewable and Non renewable resources</p> <ul style="list-style-type: none"> • Definition • Associated problems <p>2.2 Forest Resources</p> <ul style="list-style-type: none"> • General description of forest resources • Functions and benefits of forest resources • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc. <p>2.3 Water Resources</p> <ul style="list-style-type: none"> • Hydrosphere: Different sources of water • Use and overexploitation of surface and ground water • Effect of floods, draught, dams etc. on water resources and community <p>2.4 Mineral Resources:</p> <ul style="list-style-type: none"> • Categories of mineral resources • Basics of mining activities • Mine safety • Effect of mining on environment <p>2.5 Food Resources:</p> <ul style="list-style-type: none"> • Food for all • Effects of modern agriculture • World food problem 	04	10
<p>Topic 3. Ecosystems</p> <ul style="list-style-type: none"> • Concept of Ecosystem • Structure and functions of ecosystem • Energy flow in ecosystem • Major ecosystems in the world 	01	04
<p>Topic 4. Biodiversity and Its Conservation</p> <ul style="list-style-type: none"> • Definition of Biodiversity • Levels of biodiversity 	02	06

<ul style="list-style-type: none"> • Value of biodiversity • Threats to biodiversity • Conservation of biodiversity 		
Topic 5. Environmental Pollution <ul style="list-style-type: none"> • Definition • Air pollution: Definition, Classification, sources, effects, prevention • Water Pollution: Definition, Classification, sources, effects, prevention • Soil Pollution: Definition, sources, effects, prevention • Noise Pollution: Definition, sources, effects, prevention 	03	08
Topic 6. Social Issues and Environment <ul style="list-style-type: none"> • Concept of development, sustainable development • Water conservation, Watershed management, Rain water 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 	03	10
Topic 7. Environmental Protection Brief description of the following acts and their provisions: <ul style="list-style-type: none"> • Environmental Protection Act • Air (Prevention and Control of Pollution) Act • Water (Prevention and Control of Pollution) Act • Wildlife Protection Act • Forest Conservation Act Population Growth: Aspects, importance and effect on environment <ul style="list-style-type: none"> • Human Health and Human Rights 	02	08
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. No.	Author	Title	Publisher
01	Anindita Basak	Environmental Studies	Pearson Education
02	R. Rajgopalan	Environmental Studies from Crises to Cure	Oxford University Press
03	Dr. R. J. Ranjit Daniels, Dr. 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			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	04	03	100	25#	--	50@	175

Rationale:

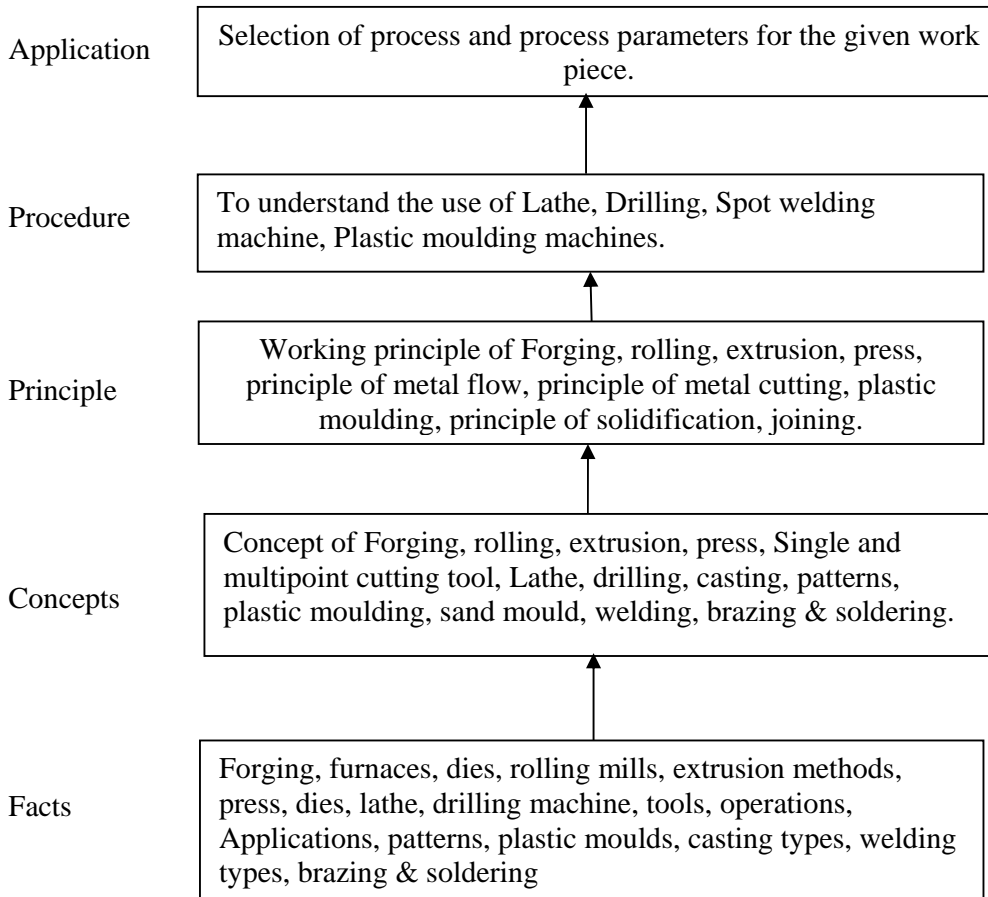
Diploma technician often comes across various types of basic manufacturing processes. He / she is required to select, operate and control the appropriate processes for specific applications. He / she is also required to know about various cutting tools, latest improvements in manufacturing processes. 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:

Topic and Content	Hours	Marks
1:Forming Processes Specific Objectives: <ul style="list-style-type: none"> ➤ 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, 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.	08	18
2. Press working: Specific Objectives: <ul style="list-style-type: none"> ➤ 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 Content 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	08	16
3. Casting Processes: Specific Objectives: <ul style="list-style-type: none"> ➤ 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 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 & 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. 04 Marks	10	22
4. Welding Specific Objectives:	07	14

<p>➤ To define Arc welding and Gas welding Principal. ➤ To state difference between soldering and brazing processes</p> <p>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. 10 Marks</p> <p>4.2 Introduction to soldering and brazing – Process, fillers, heating methods & applications. 04 Marks</p>		
<p>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</p> <p>Content 5.1 Lathe Machine: 12 Marks Introduction, classification and basic parts of center lathe & their functions, Lathe operations like facing, plain turning, taper turning, thread cutting, chamfering, grooving, knurling. Cutting tool nomenclature & tool signature, cutting parameters.</p> <p>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.</p>	10	20
<p>6. Plastic Moulding: Specific Objectives: ➤ To state different properties of plastics ➤ To explain various plastic mauling methods like Injection, blow, compression molding</p> <p>Content Introduction, Properties of plastics, types of plastics, plastic moulding methods - compression moulding, injection moulding, blow moulding, extrusion, vacuum forming and calendaring.</p>	05	10
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. No.	Author	Title	Publisher
01	S. K. Hajra Chaudhary, Bose, Roy	Elements of workshop Technology-Volume I & II	Media Promoters and Publishers Limited
02	O. P. Khanna & Lal	Production Technology Volume- I & II	Production Technology Volume- I & II

			Dhanpat Rai Publications
03	W. A. J. Chapman, S. J. Martin	W. A. J. Chapman, S. J. 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 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			Examination Scheme					
TH	TU	PR	PAPER 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:

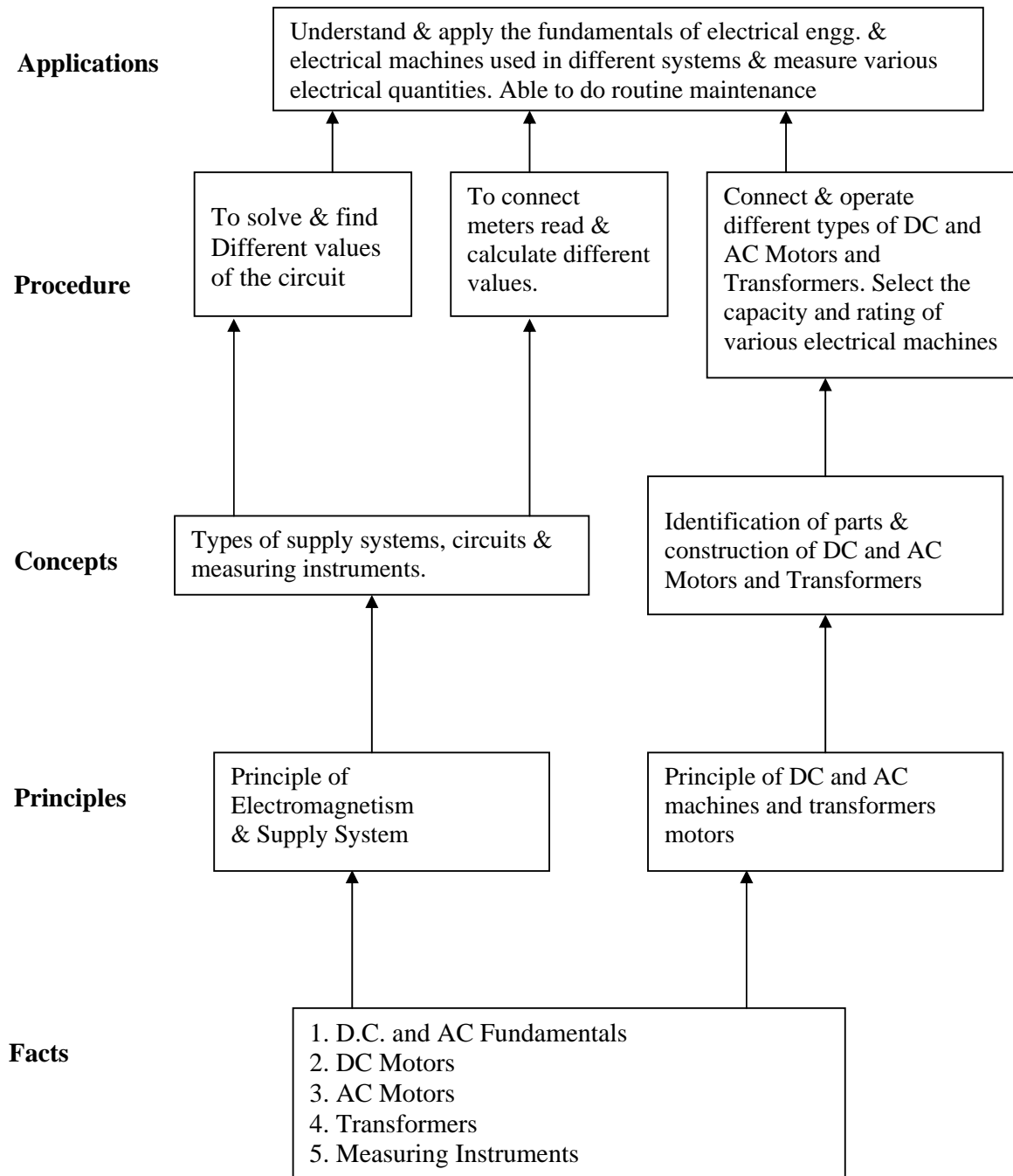
This subject is introduced with intention to teach students of mechanical branch facts, concepts, principles and procedure of operating electrical machines, circuits and systems and their applications. This subject is most important in regards to selection of electrical drives for various applications 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
<p>1. Introduction to Electric Power System and A. C. Supply 20 Marks</p> <p>Specific Objectives: Student will be able to :</p> <ul style="list-style-type: none"> ➤ 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 and R-C circuits. ➤ Calculate line and phase quantities and various powers in three phase circuit <p>Contents: Introduction 04 Marks</p> <p>1.1 Electrical power supply system generation, transmission, distribution. AC supply & DC Supply.</p> <p>AC Fundamentals: 08 Marks</p> <p>1.2 Definitions; cycle, frequency, phase, period, maximum value, average value, r.m.s. value. (Simple Numericals)</p> <p>1.3 Concept of current, voltage, power & energy in series R-L and R-C circuits. (Simple Numericals)</p> <p>Three phase supply: 08 Marks</p> <p>1.4 Star and Delta circuit, 1.5 Line and Phase relationship, power equation. (No Derivation, Simple Numericals)</p>	10	20
<p>2.Measuring Instruments: 06 Marks</p> <p>Specific Objectives: Student will be able to :</p> <ul style="list-style-type: none"> ➤ Differentiate between ac and dc meters. ➤ Use multimeter for measurements of current, voltage and passive parameter. <p>Contents:</p> <p>2.1 Introduction to construction, operation and use of AC and DC ammeter, voltmeter (PMMC and MI meters only).</p> <p>2.2 Electro-dynamic wattmeter, energy meter and digital multimeter, Clip on meter.</p>	04	06
<p>3. DC Motor 04 Marks</p> <p>Specific Objectives: Student will be able to :</p> <ul style="list-style-type: none"> ➤ State working principle of d.c. motor. ➤ Select type of d.c. motor as per requirement. <p>Contents:</p> <p>3.1 Construction and principle of operation.</p> <p>3.2 Speed-torque characteristics. D.C. shunt, series and compound motors. Their specifications and applications.</p>	02	04
<p>4. Transformer: 14 Marks</p> <p>Specific Objectives: Student will be able to :</p> <ul style="list-style-type: none"> ➤ State the working principle of transformer. ➤ Calculate transformation ratio, efficiency and regulation from direct load test. <p>Contents:</p>	06	14

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 : <ul style="list-style-type: none"> ➤ 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 <ul style="list-style-type: none"> ➤ 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 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 style="list-style-type: none"> ➤ Universal motor ➤ Servo motor ➤ Stepper motor 5.4 Alternator: 04 Marks Construction, principle of operation & applications. Self and separate excitation.	10	24
6.Utilization of Electrical Energy: 18 Marks Specific Objectives: Student will be able to : <ul style="list-style-type: none"> ➤ 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 <ul style="list-style-type: none"> ➤ 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. <ul style="list-style-type: none"> ➤ Electrical machines used in electro-agro systems. 	08	18
7.Electric Wiring, Illumination, Electric Safety, Tariff & Power Conservation : 14 Marks Specific Objectives:	08	14

<p>Student will be able to :</p> <ul style="list-style-type: none"> ➤ 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. <p>Contents:</p> <p>7.1 Introduction to switches used in mechanical machines. Simple Electric Installations with 2 sockets, 2 fans, 2 lamps, with switches and fuses</p> <p>7.2 Introduction to different accessories like MCB, ELCB, wires & cables.</p> <p>7.3 Fluorescent, CFL and LED lamps with their ratings and applications.</p> <p>7.4 Concept of energy conservation and energy audit</p> <p>7.5 Necessity of earthing, type, safety tools, first aid.</p> <p>7.6 Types of tariff, pf improvement only methods.</p> <p>7.7 Fire extinguishing methods adopted in electrical engineering</p> <p>7.8 Trouble shooting electrical installations and machines.</p>		
Total	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.

Learning Resources:

1. Books:

Sr.No.	Author	Title Of Book	Edition	Publisher
01	B.L. Theraja	Electrical Technology (Vol. I and IV)	Multicolour Edition 2005 And Subsequent Reprint	S.Chand & Co. Ramnagar New Delhi
02	E. Hughes	Electrical Technology	Second Edition	ELBS/Pearson
03	R.S. Ananda Murthy	Basic Electrical Engineering	Second Edition	Pearson
04	Theodore Wildi	Electrical Machines, Drives and Power Systems	Sixth Edition	Pearson
05	Sunil T. Gaikwad	Basic Electrical Engineering	First Edition	WILEY India

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:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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:

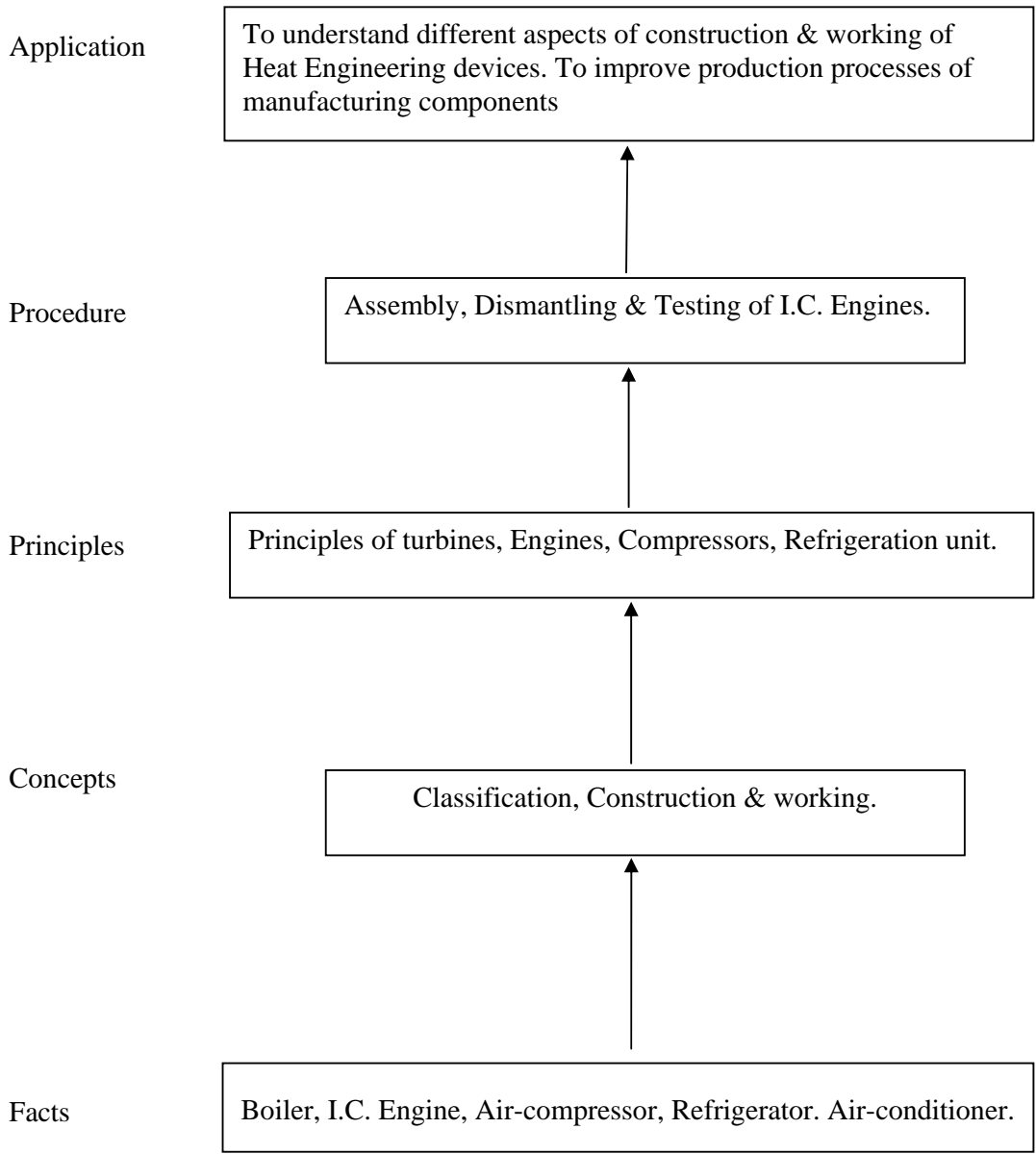
Production Engineer is involved in manufacturing aspects of power producing and power absorbing devices. I.C. Engines are used on large scale in automobiles and power sector. Compressors find many applications due to automation. Use of refrigeration and air-conditioning systems is increasing in industrial 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
<p>1. Sources of energy 10Marks</p> <p>Specific objectives</p> <ul style="list-style-type: none"> ➤ State the various types and sources of energy. <p>Content:</p> <p>1.1 Brief description of energy Sources.</p> <p>1.2 Classification of energy sources</p> <ul style="list-style-type: none"> • Renewable- 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 <p>1.3 Fuel cell – Types of fuel cells</p>	08	10
<p>2.Fundamentals of Thermodynamics 20 Marks</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> ➤ State laws of thermodynamics. <p>Content:</p> <p>2.1 Concepts of pure substance, types of system, properties of system, Extensive and Intensive properties with units and their conversion. 06 Marks</p> <p>2.2 Work and Energy - Thermodynamic definition of work, heat, difference between heat and work, P.E., K.E, Internal Energy, Flow work, concepts of enthalpy. 06 Marks</p> <p>2.3 Laws of Thermodynamics - Zeroth Law, First law - Principle of conservation of energy, irreversibility, second law, entropy. 08 Marks (Note: Simple numerical may be asked.)</p>	14	20
<p>3. Ideal Gases 16 Marks</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> ➤ Describe thermodynamic processes of the gases. <p>Content:</p> <p>3.1 Concept of Ideal gas - Charle's law, Boyle's law, Avogadro's law, equation of state, characteristic gas constant and universal gas constant. 08 Marks</p> <p>3.2 Ideal gas processes - Isobaric, Isochoric, Isothermal, Adiabatic, Polytropic with representation of the processes on P-V and T-S diagrams 08 Marks (Note: Simple numerical may be asked.)</p>	08	16
<p>4.Boilers and Steam Turbines 12 Marks</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> ➤ Describe working of boilers and turbines. <p>Content:</p> <p>4.1 Introduction and classification of boilers.</p> <p>4.2 Construction and working of Cochran, Babcock and Wilcox Boilers.</p> <p>4.3 Construction and working of impulse and reaction turbines.</p> <p>4.4 Introduction to steam power plant.</p>	08	12
<p>5. I.C. Engines 14 Marks</p> <p>Specific objectives:</p> <ul style="list-style-type: none"> ➤ Describe working of I.C engine. 	08	14

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. 6.1 Uses of compressed air. 6.2 Construction and working of single stage and two stage reciprocating compressor. 6.3 Screw compressor and centrifugal compressor- construction, working and applications.	10	14
7. Refrigeration and Air-conditioning 14 Marks Specific objectives: ➤ Explain refrigeration cycle. ➤ Describe working of air conditioner. Content: 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.	08	14
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:**

Sr. No.	Author	Title	Publisher
01	V.M. Domkundwar	Thermal Engg.	Dhanpat Rai and Co
02	P.L. Ballaney	Thermal Engg.	Khanna Publishers 24 th edition
03	R. S. Khurmi	Thermal Engg.	S. Chand and Co. Ltd. 15 th 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 rd edition

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:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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).

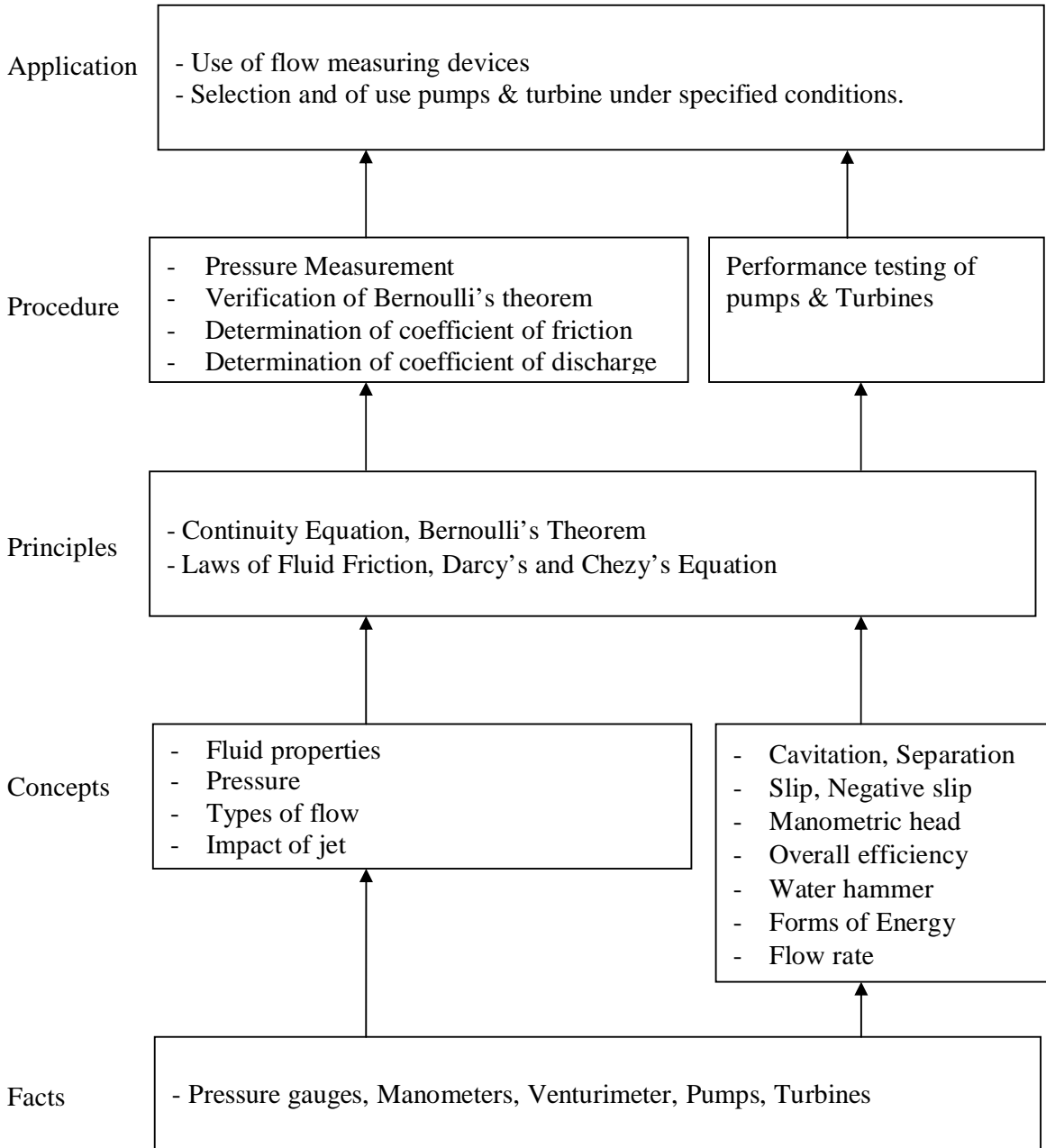
Rationale:

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
<p>1. Properties of fluid and Fluid Pressure</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define fluid properties. ➤ Differentiate between fluid pressure intensity and pressure head. ➤ Solve numerical related to properties of fluid, fluid pressure and manometers. <p>Contents:</p> <p>1.1 Properties of Fluid 06 Marks Density, Specific gravity, Specific volume, Specific Weight, Dynamic viscosity, Kinematic viscosity, Surface tension, Capillarity, Vapour Pressure, Compressibility</p> <p>1.2: Fluid Pressure & Pressure Measurement 14 Marks</p> <ul style="list-style-type: none"> • Fluid pressure, Pressure head, Pressure intensity • Concept of 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 	12	20
<p>2. Fluid Flow</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State Bernoulli's theorem and apply it to venturimeter, orifice and pitot tube. <p>Contents:</p> <ul style="list-style-type: none"> • Types of fluid flows-Laminar, turbulent, steady, unsteady, uniform, non uniform, rotational, irrotational. • Continuity equation, Bernoulli's theorem • 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 	10	14
<p>3. Flow Through Pipes</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ 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. <p>Contents:</p> <ul style="list-style-type: none"> • Laws of fluid friction (Laminar and turbulent) • 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 	10	14
<p>4. Impact of Jets</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Analyze explain the impact of jet on vanes in various conditions. 	06	10

<p>➤ Solve numerical on impact of jet on vanes in various conditions.</p> <p>Contents:</p> <ul style="list-style-type: none"> • Impact of jet on fixed vertical, moving vertical flat plates. • Impact of jet on curved vanes with special reference to turbines and pumps 		
<p>5. Hydraulic Turbines</p> <p>Specific Objectives:</p> <p>➤ Explain working principle of various hydraulic turbines.</p> <p>➤ Calculate work done, power generated and various efficiencies of hydraulic turbines.</p> <p>Contents:</p> <ul style="list-style-type: none"> • Layout and features of hydroelectric power plant, surge tanks and its need. • 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, • Calculation of Work done, Power, efficiency of turbine 	12	18
<p>6. Pumps</p> <p>Specific Objectives:</p> <p>➤ Explain working of centrifugal, reciprocating and multistage pumps.</p> <p>➤ Explain the concept of cavitation in pumps.</p> <p>➤ Calculate manometric head, work done and various efficiencies related to the pumps.</p> <p>➤ Select the pump for a given application.</p> <p>6.1 Centrifugal Pumps 14 Marks</p> <p>Contents:</p> <ul style="list-style-type: none"> • Construction, principle of working, priming methods and Cavitation • Types of casings and impellers. • Manometric head, Work done, Manometric efficiency, Overall efficiency, NPSH. • Performance Characteristics of Centrifugal pumps. • Trouble Shooting. • Construction, working and applications multistage pumps • Submersible pumps and jet pump <p>6.2 Reciprocating Pump 10 Marks</p> <ul style="list-style-type: none"> • 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. <p>(No numerical on reciprocating pumps)</p>	14	24
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:**Books:**

Sr. No	Author	Title	Publication
01	Ojha, Berndtsson, Chnadramouli	Fluid Mechanics and Machinery	Oxford University Press
02	Som S K , Biswas G.	Introduction to Fluid Mechanics and Fluid Machines 3 rd Edition	Tata McGraw-Hill Co. Ltd.
03	Modi P.N. Seth S M	Hydraulics and Fluid Mechanics including Hydraulic Machines	Standard Book House New Delhi
04	Subramanya K.	Fluid Mechanics and Hydraulic Machines: problems and solution	Tata McGraw-Hill Co. Ltd.
05	Product catalogues of various pump manufacturers		

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			Examination Scheme					
TH	TU	PR	PAPER 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
<p>1. Fundamentals and type of Mechanisms Specific objectives:</p> <ul style="list-style-type: none"> ➤ Define various terms related to mechanisms. ➤ Explain construction and working of various mechanisms <p>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</p> <p>1.2 Inversion of Kinematic Chain</p> <ul style="list-style-type: none"> • 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 Coupling -----8 Marks 	07	16
<p>2. Velocity and Acceleration in Mechanisms Specific objectives</p> <ul style="list-style-type: none"> ➤ Draw velocity and acceleration diagram for given mechanism <p>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.</p> <p>2.2 Analytical method (No derivation) and Klein's construction to determine velocity and acceleration of different links in single slider crank mechanism. -----8 Marks</p> <p>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 Coriolis component of acceleration) ----- 8 Mark</p>	08	16
<p>3. Cams and Followers Specific objectives</p> <ul style="list-style-type: none"> ➤ Define the terms related to Cam ➤ Classify Cams and Followers ➤ Draw cam profile as per the given applications <p>3.1 Concept, definition and applications of Cams and Followers. Cam terminology</p> <p>3.2 Classification of Cams and Followers.</p> <p>3.3 Different follower motions and their displacement diagrams - Uniform velocity, Simple harmonic motion, uniform acceleration and Retardation. ---- 4 Marks</p> <p>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</p>	06	12
<p>4. Power Transmission Specific objectives</p> <ul style="list-style-type: none"> ➤ Give broad classification of Drives. ➤ Select Suitable Drives and Mechanisms for a particular application 	10	20

<p>➤ Calculate various quantities like velocity ratio, belt tensions, slip, angle of contact, power transmitted in belt drives</p> <p>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</p> <p>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</p> <p>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</p>		
<p>5. Flywheel and Governors ----- 8 Marks</p> <p>Specific objectives</p> <p>➤ Differentiate between flywheel and governor</p> <p>➤ Explain with neat sketch the construction and working of various governors</p> <p>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) Coefficient of fluctuation of energy, coefficient of fluctuation of speed and its significance.</p> <p>5.2 Governors- Types, concept, function and application & Terminology of Governors.</p> <p>5.3 Comparison between Flywheel and Governor.</p>	04	08
<p>6. Brakes and Dynamometers. ----- 10Marks</p> <p>Specific objectives</p> <p>➤ List the differences between brakes and dynamometers</p> <p>➤ Explain with neat sketch the construction and working of various brakes and dynamometers</p> <p>➤ Calculate braking force, braking torque and power lost in friction in shoe and band brake</p> <p>6.1 Function of brakes and Dynamometers, Type of brakes & Dynamometers, comparison between brakes & Dynamometer.</p> <p>6.2 Construction and working i) shoe brake, ii) Band brake iii) Internal expanding shoe brake iv) Disc Brake</p> <p>6.3 Numerical problems to find braking force and braking torque and power for shoe and band brake.</p> <p>6.4 Construction and working of i) Rope brake Dynamometer ii) Hydraulic Dynamometer iii) Eddy current Dynamometer.</p>	05	10
<p>7. Clutches and Bearings.</p> <p>Specific objectives</p> <p>➤ Explain the difference between uniform pressure and uniform wear theories</p> <p>➤ Explain with neat sketch, the construction and working of various clutches</p> <p>➤ Calculate torque required to overcome friction and power lost in friction in clutches and footstep bearings</p> <p>7.1 Clutches- Uniform pressure and Uniform Wear theories. Function of Clutch and its application, Construction and working of i) Single plate clutch, ii)</p>	06	12

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 ➤ Find balancing mass and position of plane, analytically and graphically. 8.1 Concept of balancing. Balancing of single rotating mass. Analytical/Graphical methods for balancing of several masses revolving in same plane.	02	06
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. 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:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

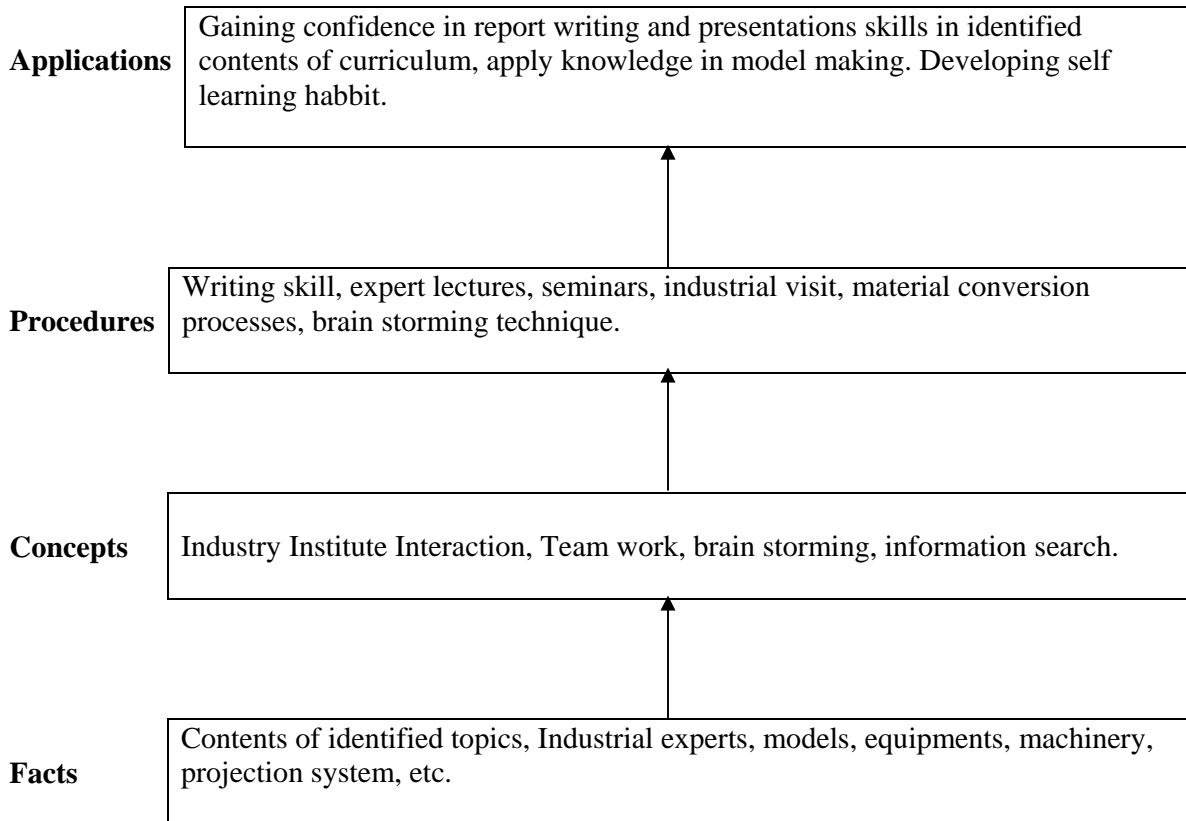
Intellectual Skill:

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	Hours
<p>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.</p> <ol style="list-style-type: none"> 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 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. 	06
<p>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.</p> <ol style="list-style-type: none"> 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. vi) Industrial application of mechatronics. 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 	04
<p>3. Seminars: One seminar be arranged on the subjects related to 4th semester. Or topics beyond curriculum. Each student shall submit a report up to 10 pages and deliver the seminar. batch size – 2-3 students.</p>	04

<p>Source of information – books, magazine , Journals, Website ,surveys, Topics suggested for guidance-</p> <ol style="list-style-type: none"> 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. 	
<p>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 :</p> <ul style="list-style-type: none"> ➤ 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 ➤ To observe Tool room, standards room etc. <p>Following types of industries may be visited in & around the institute.</p> <ol style="list-style-type: none"> 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 	04

<p>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)</p> <ol style="list-style-type: none"> i) Awareness about carbon credit ii) Anticorruption movement 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) 	04
<p>6. Mini Projects Students, in a group of 4, shall perform any one activity listed below.</p> <ol style="list-style-type: none"> i) Model making out of card board paper ,wood ,thermocool, plastics, metal, clay etc <ol style="list-style-type: none"> 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 v) 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. <p>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.</p> <p style="text-align: center;">OR</p> <p>Modular course: Modular courses on any one of the suggested or equivalent topic be undertaken by a group of 15 to 20 students.</p> <ol style="list-style-type: none"> i) Advance features in CAD ii) Meshing of solid model using any suitable software iii) Developing Unfold Sheet or Hyperblank by using Blanking Software iv) CAM Software v) Basics of PLC programming vi) Applications of mechatronics vii) Piping Technology viii) Modern packaging technology ix) Enterprise Resource Planning x) Bio-pneumatic Robots xi) Bio-mimicry 	10
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. No.	Author	Title	Publisher
01	NRDC, Publication Bi Monthly Journal	Invention Intelligence Journal	National Research Development 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 for All – Ninth Edition	PHI
05	Apprenticeship Training Scheme:- Compiled By – BOAT (Western Region), Mumbai, 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 4th semester examination.

Note:- Examination in Professional Practices of 5th 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.

 MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI 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										WITH EFFECT FROM 2012-13							
SEMESTER : FOURTH										DURATION : 16 WEEKS							
PATTERN : FULL TIME - SEMESTER										SCHEME : G							
SR. NO	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME										SW (17400)
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)			
								Max	Min	Max	Min	Max	Min	Max	Min		
1	Environment Studies \$	EST	17401	01	--	02	01	50#*	20	--	--	--	--	25@	10	50	
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		
5	Plastic Processing-I	PPR	17449	04	--	02	03	100	40	--	--	25#	10	--	--		
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)			Examination in 5th Semester Professional Practices-III													
<p>Student Contact Hours Per Week: 32 Hrs.</p> <p>THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.</p> <p>Total Marks: 800</p> <p>@ - Internal Assessment, # - External Assessment, No Theory Examination, \$ - Common to all branches, #* - Online Examination,</p> <p>* - Practicals of Electrical & Electronics at alternate week.</p> <p>Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work.</p> <p>** Industrial Training (Optional) - Student can undergo Industrial Training of four weeks after fourth semester examination during summer vacation.</p> <p>Assessment will be done in Fifth semester under Professional Practices-III. They will be exempted from activities of Professional Practices-III of 5th Semester.</p> <ul style="list-style-type: none"> ➤ 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:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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.

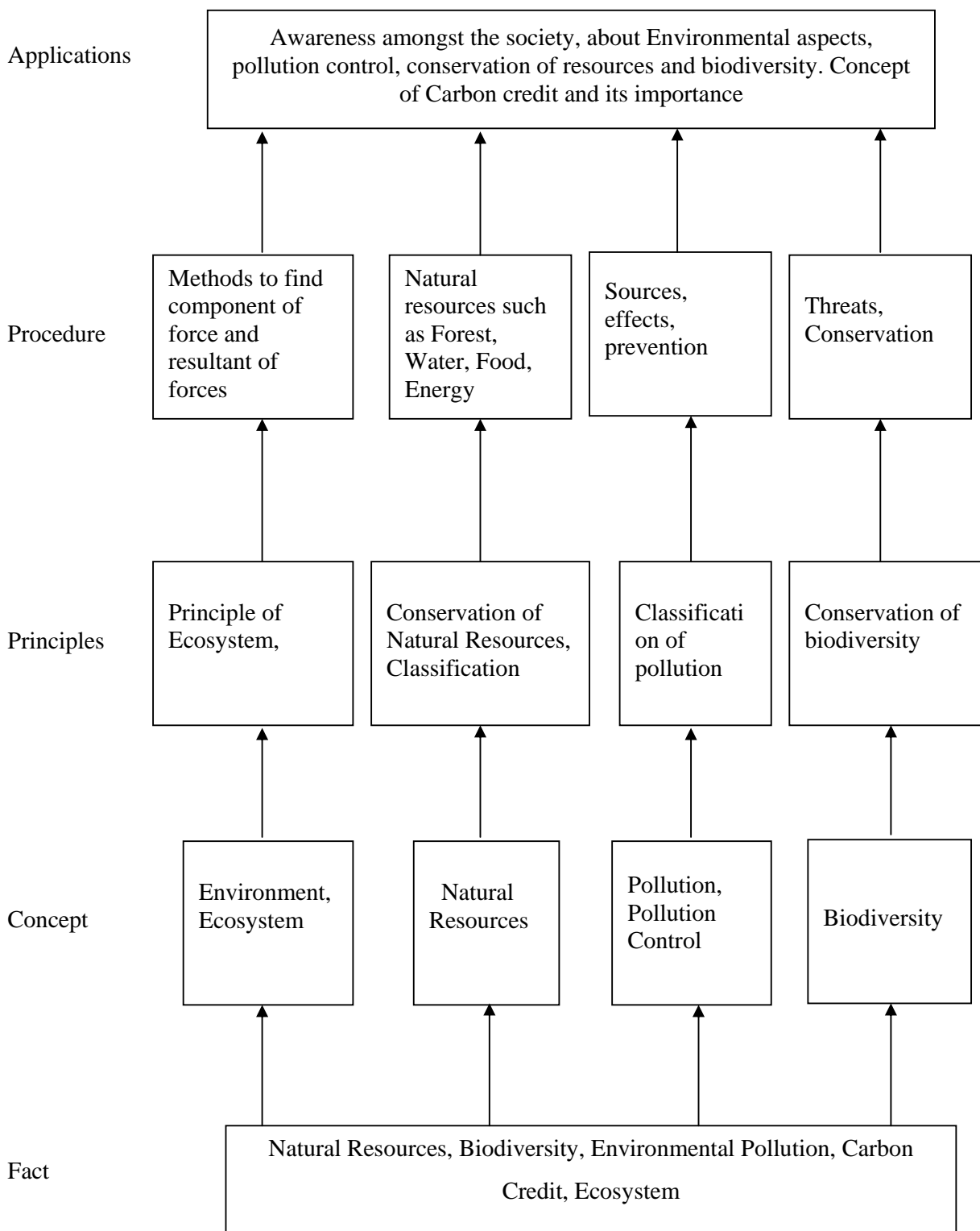
It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

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
<p>Topic 1: Nature of Environmental Studies</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define the terms related to Environmental Studies ➤ State importance of awareness about environment in general public <p>Contents:</p> <ul style="list-style-type: none"> • Definition, Scope and Importance of the environmental studies • Importance of the studies irrespective of course • Need for creating public awareness about environmental issues 	01	04
<p>Topic 2: Natural Resources and Associated Problems</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Define natural resources and identify problems associated with them ➤ Identify uses and their overexploitation ➤ Identify alternate resources and their importance for environment <p>Contents:</p> <p>2.1 Renewable and Non renewable resources</p> <ul style="list-style-type: none"> • Definition • Associated problems <p>2.2 Forest Resources</p> <ul style="list-style-type: none"> • General description of forest resources • Functions and benefits of forest resources • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc. <p>2.3 Water Resources</p> <ul style="list-style-type: none"> • Hydrosphere: Different sources of water • Use and overexploitation of surface and ground water • Effect of floods, draught, dams etc. on water resources and community <p>2.4 Mineral Resources:</p> <ul style="list-style-type: none"> • Categories of mineral resources • Basics of mining activities • Mine safety • Effect of mining on environment <p>2.5 Food Resources:</p> <ul style="list-style-type: none"> • Food for all • Effects of modern agriculture • World food problem 	04	10
<p>Topic 3. Ecosystems</p> <ul style="list-style-type: none"> • Concept of Ecosystem • Structure and functions of ecosystem • Energy flow in ecosystem • Major ecosystems in the world 	01	04
<p>Topic 4. Biodiversity and Its Conservation</p> <ul style="list-style-type: none"> • Definition of Biodiversity • Levels of biodiversity 	02	06

<ul style="list-style-type: none"> • Value of biodiversity • Threats to biodiversity • Conservation of biodiversity 		
Topic 5. Environmental Pollution <ul style="list-style-type: none"> • Definition • Air pollution: Definition, Classification, sources, effects, prevention • Water Pollution: Definition, Classification, sources, effects, prevention • Soil Pollution: Definition, sources, effects, prevention • Noise Pollution: Definition, sources, effects, prevention 	03	08
Topic 6. Social Issues and Environment <ul style="list-style-type: none"> • Concept of development, sustainable development • Water conservation, Watershed management, Rain water 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 	03	10
Topic 7. Environmental Protection Brief description of the following acts and their provisions: <ul style="list-style-type: none"> • Environmental Protection Act • Air (Prevention and Control of Pollution) Act • Water (Prevention and Control of Pollution) Act • Wildlife Protection Act • Forest Conservation Act Population Growth: Aspects, importance and effect on environment <ul style="list-style-type: none"> • Human Health and Human Rights 	02	08
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. No.	Author	Title	Publisher
01	Anindita Basak	Environmental Studies	Pearson Education
02	R. Rajgopalan	Environmental Studies from Crises to Cure	Oxford University Press
03	Dr. R. J. Ranjit Daniels, Dr. 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:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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:

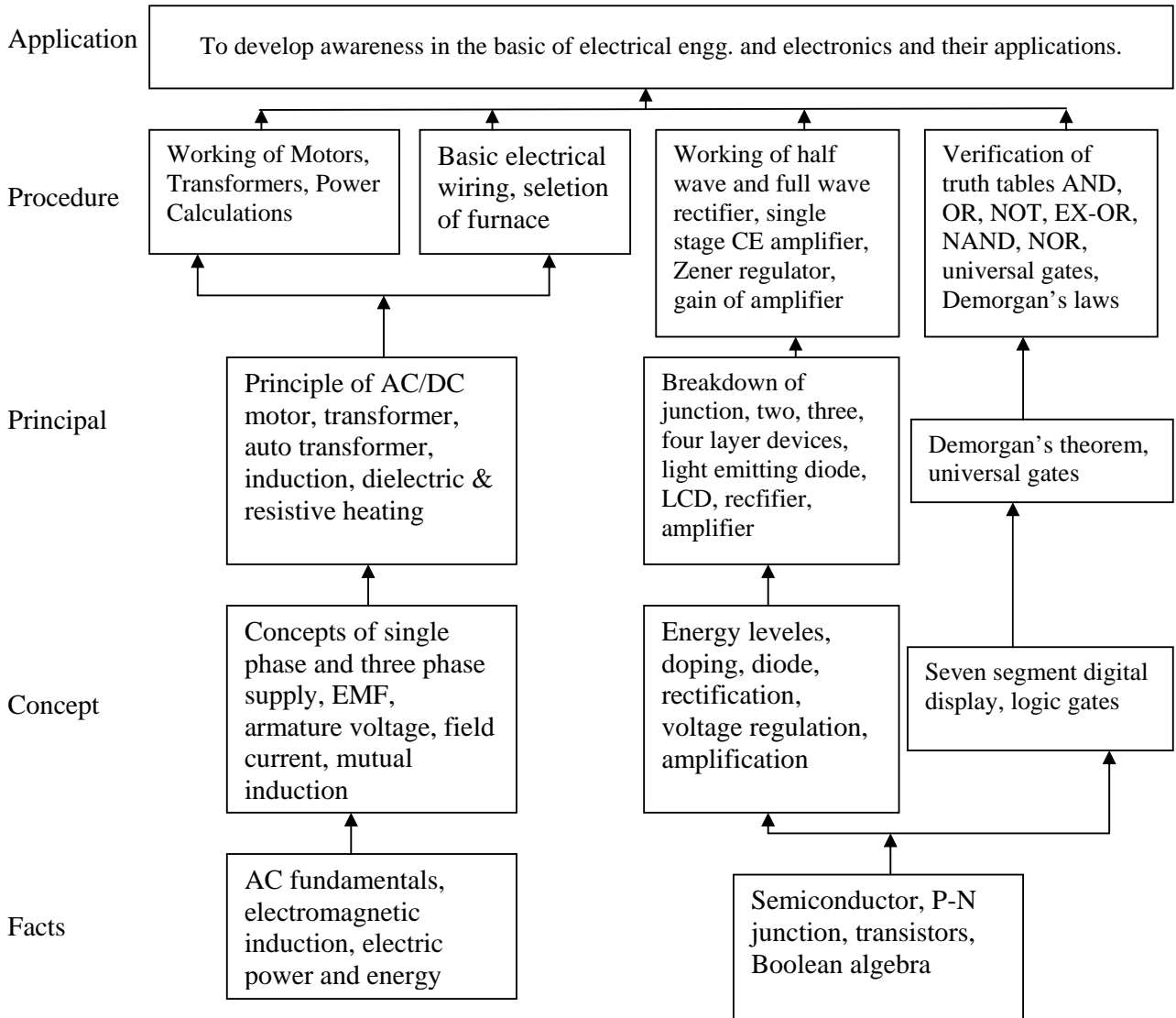
Most of the equipments used in chemical industry are electrically powered. A minor electrical faults can be attended by a shop floor chemical engineer. This subject of electrical engg. addresses the fundamental concepts and operating principles of electrical appliances. It will enable the students in 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
<p>Topic 1: Basic Fundamentals</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State principle of electromagnetic induction. ➤ Calculate electrical power and energy from given data. <p>Contents:</p> <ul style="list-style-type: none"> • Ohm's Law – Simple problems on Ohm's Law • 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 	07	10
<p>Topics 2: D.C. Motor</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw electrical circuit diagram of D.C. shunt motor. ➤ Draw diagram & explain armature voltage speed control method. <p>Contents:</p> <ul style="list-style-type: none"> • Working principle, construction, different parts – their material & 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. 	06	10
<p>Topics 3: A.C. Motor</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw electrical circuit diagram of R – Split single phase induction motor. ➤ State any four parts & their material used for three phase induction motor. <p>Contents:</p> <ul style="list-style-type: none"> • Three phase induction motor – working principle, construction & application. • Construction, working & application of following single phase induction motors. R – Split, C – Split. 	05	08
<p>Topics 4: Transformer</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Compare core type & shell type transformer. ➤ Define voltage ratio, current ratio & transformation ratio of single phase transformer. <p>Contents:</p> <ul style="list-style-type: none"> • Working principle of transformer, Elementary theory of an ideal transformer. 	06	10

<ul style="list-style-type: none"> • Construction of core & shell type transformer, comparison. • EMF equation (No Derivation), simple problems. • Transformation ratio – simple problems. • Autotransformer – Concept, advantages, limitations, applications. 		
<p>Topics 5: Electrical Wiring & Safety</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State the necessity of fuse. ➤ State the necessity of earthing. <p>Contents:</p> <ul style="list-style-type: none"> • 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. • 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 	08	12
Total	32	50

Section- II Electronics

Topic and Content	Hours	Marks
<p>Topic 1: Semiconductor Electronic Devices</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw V-I characteristics of different devices. ➤ State the symbols of different components. <p>Contents:</p> <p>1.1 ----- 12 Marks</p> <ul style="list-style-type: none"> • Resistor, inductor, capacitor – definition, symbols & applications. • Conductors, semiconductors, Insulators – definition, energy band diagram, examples. • Semiconductors classification – Intrinsic and Extrinsic – N type & P type, definition, charge carrier. • PN junction diode – construction, symbol, working, forward & reverse bias V-I characteristic, applications. • Light emitting diode – Construction, symbol, working principle, applications. • Junction breakdown. • Zener diode - Construction, symbol, working principle, reverse bias V-I characteristic, applications. <p>1.2 Power devices - (08 marks)</p> <p style="padding-left: 40px;">SCR - Construction, symbol, working principle, Applications.</p> <p style="padding-left: 40px;">TRIAC - Construction, symbol, working principle, Applications.</p>	12	20
<p>Topics 2: Bipolar Junction Transistor</p> <p>Specific Objectives:</p>	06	08

<ul style="list-style-type: none"> ➤ Draw output characteristics of CE configuration. ➤ Describe working of transistor amplifier. <p>Contents:</p> <ul style="list-style-type: none"> • 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. 		
<p>Topics 3: Power Supply</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Draw block diagram of power supply. ➤ Describe working of different rectifier circuits. <p>Contents:</p> <ul style="list-style-type: none"> • Power supply – Necessity, block diagram. • Rectifier – Types, Half wave, Full wave (center tapped & bridge type) - Circuit diagram, working, waveforms & their comparison. • Filter - Need & types – shunt capacitor, series inductor, LC & π type, circuit diagram. • Voltage regulator - Need, principle of zener shunt regulator. 	07	12
<p>Topics 4: Digital circuits</p> <p>Specific Objectives:</p> <ul style="list-style-type: none"> ➤ State symbols of different logic gates. ➤ Use NAND / NOR gate as universal gates. <p>Contents:</p> <ul style="list-style-type: none"> • Digital signal, Negative & positive logic. • 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. <p>Digital display – Types of LED & LCD display</p>	07	10
Total	32	50

Practical:**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. 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, S.C. Gupta	Basic Electronics & Linear N.N. Bhargava, Technical Teachers Circuits	Technical Teachers 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 Costing	R.B. Publications

Course Name : Diploma in Plastic Engineering**Course Code : PS****Semester : Fourth****Subject Title : Polymer Chemistry****Subject Code : 17446****Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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:

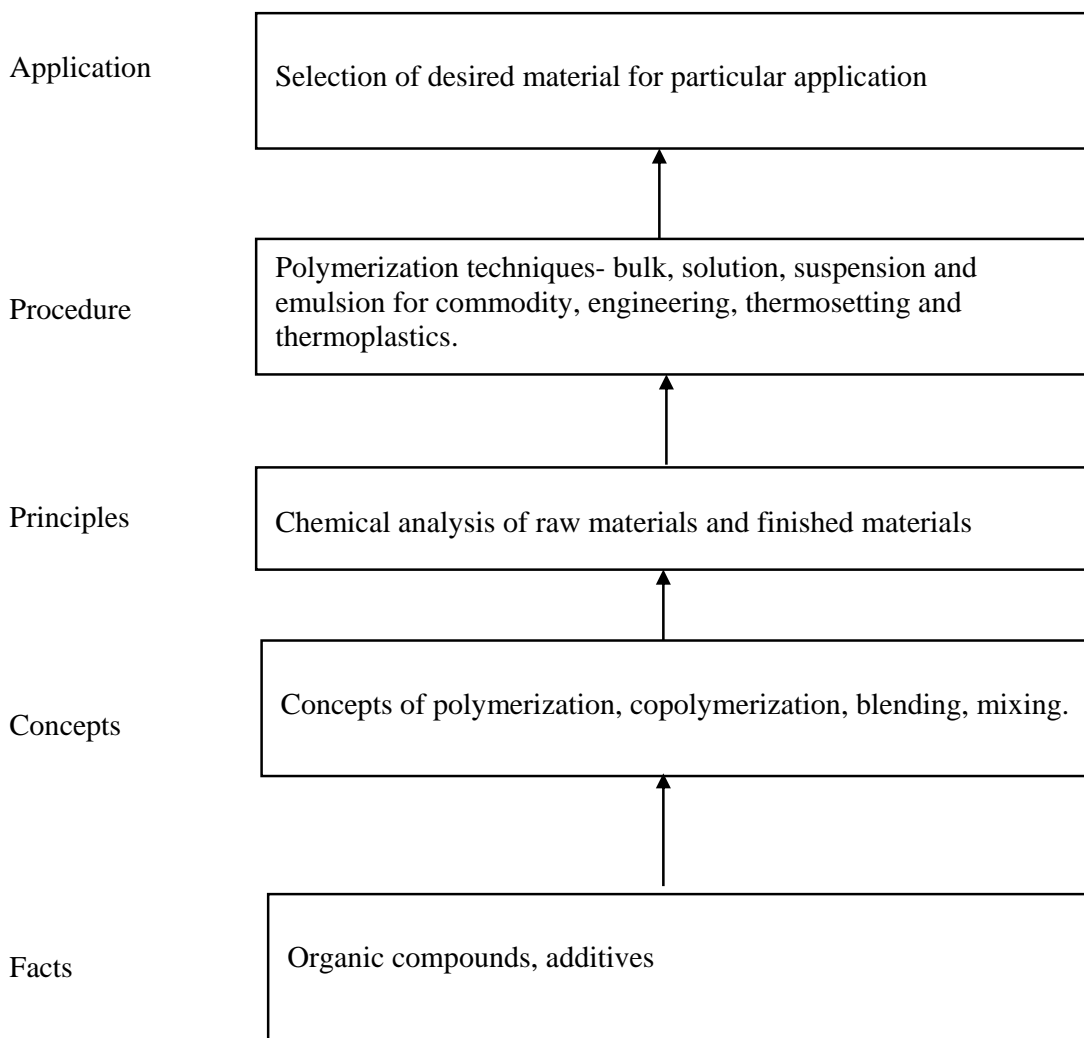
As per the present requirement new polymer materials are being invented and some are modified. The properties of these materials depend on the structure of polymer molecules. This subject provides information about monomers and organic chemical compounds. The basic understanding of polymerization reaction, 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
1	<p>Introduction to Polymers: Specific Objectives: - Students should be able to</p> <ul style="list-style-type: none"> ➤ Define the polymer, monomer and polymerization. ➤ Classify the polymers. ➤ Differentiate between Thermoplastic & Thermosetting plastic. <p>Content: 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.</p>	06	16
2	<p>Polymerization Reactions : Specific Objectives: - Students should be able to</p> <ul style="list-style-type: none"> ➤ Describe various polymerization reactions. ➤ Understand the concept of functionality, co-polymerization, and free radicals. <p>Content: Addition polymerization, Free radical polymerization, Ionic 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.</p>	10	26
3	<p>Polymerization Techniques (Introductory Level): Specific Objectives: - Students should be able to</p> <ul style="list-style-type: none"> ➤ Describe various polymerization techniques. ➤ Compare different techniques with respect to salient features. <p>Content: Bulk, Solution, Suspension and Emulsion polymerization, their merits and demerits, comparison of different techniques (salient features).</p>	08	16
4	<p>Molecular Weight of Polymer: Specific Objectives: - Students should be able to</p> <ul style="list-style-type: none"> ➤ Select appropriate polymer on the basis of molecular weight and properties. ➤ Determine the average molecular weight by using different instruments. ➤ Understand the concept of 'K' value. <p>Content: 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.</p>	10	22
5	<p>Significance of Glass transition temperature in Polymers:</p>	08	10

	<p>Specific Objectives: - Students should be able to</p> <ul style="list-style-type: none"> ➤ Define glass transition temperature. ➤ Know the importance of glass transition temperature. <p>Content: What is glass transition temperature? Factors influencing the glass transition temperature, glass transition temperature and molecular weight, glass transition temperature and plasticizers, glass transition temperature of copolymers, glass transition temperature and melting point, importance of glass transition temperature.</p>		
6	<p>Degradation of Polymers:</p> <p>Specific Objectives: - Students should be able to</p> <ul style="list-style-type: none"> ➤ Define the polymer degradation. ➤ Understand the concept of different types of polymer degradation. ➤ Prevent the polymer degradation. <p>Content: What is Polymer degradation? Mechanical, Oxidative, Thermal, UV Degradation, Prevention of degradation.</p>	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.

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 Clinsivy 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			Examination Scheme					
TH	TU	PR	PAPER 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).

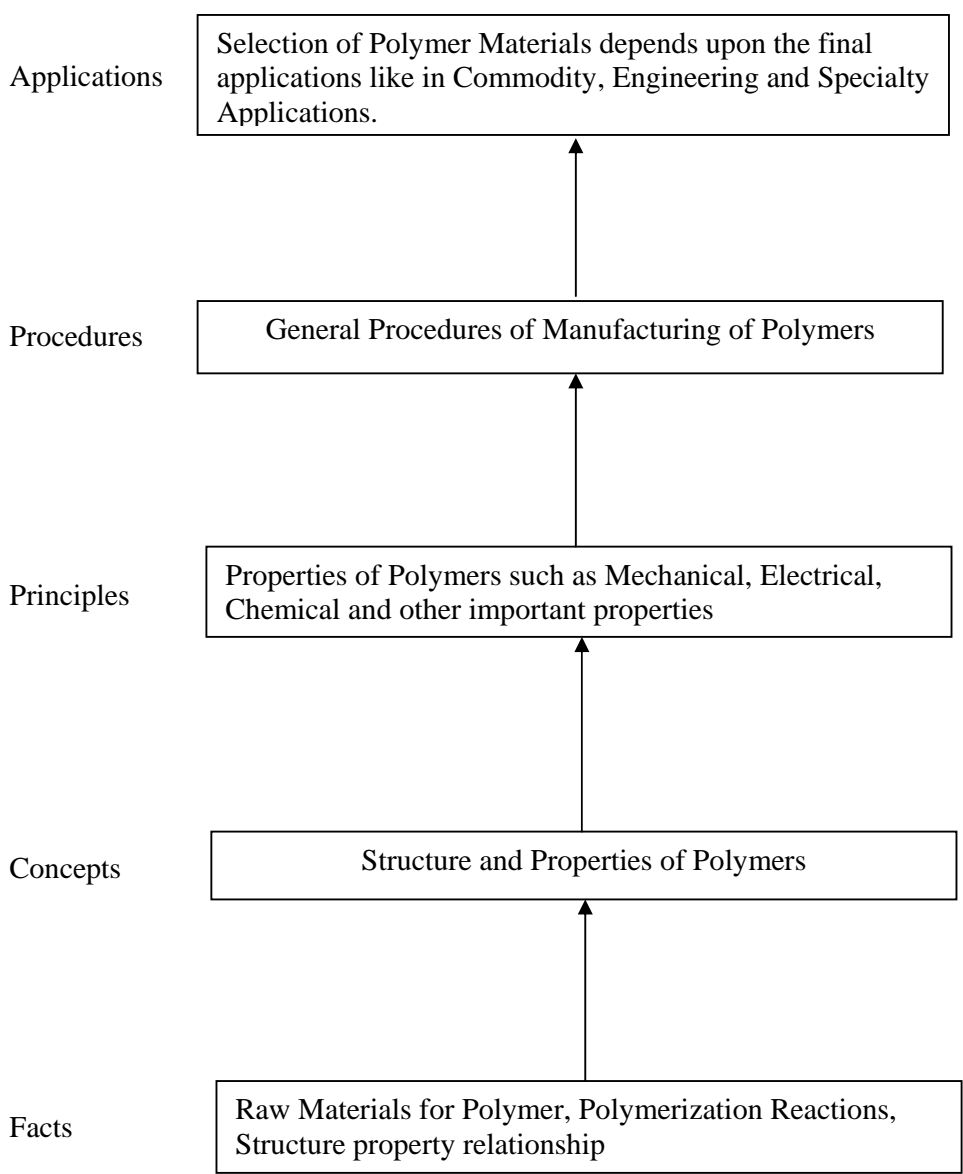
Rationale:

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
1	<p>History & Development of Plastics: Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Classify Polymers. ➤ Know the origin of Plastic Materials. <p>Contents:</p> <ul style="list-style-type: none"> • Revision of polymers, its classification, Origin of the materials. 	02	02
2	<p>Principle of Manufacturing, Properties & Applications of Plastics (Detail description of Manufacturing and flow sheet not expected)</p> <p>Commodity Plastics: Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Classify the plastics materials used in plastic industries. ➤ Understand the Principle of Manufacturing of different Plastic Materials. <p>Contents:</p> <ul style="list-style-type: none"> • Polyethylene (High pressure and low pressure process), Polypropylene (using Ziegler-Natta catalyst process), Polystyrene (using suspension and bulk polymerization technique), High impact polystyrene, Expanded polystyrene. • Poly (methyl methacrylate), Polyacryloamides, Polyacrylonitrile. • Poly (vinyl alcohol) by Hydrolysis process, Poly (vinyl acetate), Poly (vinyl chloride) by cracking process. • Polyesters such as Poly (ethylene terphthalate) and poly (butylenes terphthalate) • Cellulosic's – cellulose and its sources, cellulose nitrate, cellulose acetate and cellulose acetate butyrate. 	10 04 06 04 04	18 06 08 08 08
3	<p>Principle of Manufacturing, Properties & Applications of Plastics (Detail description of Manufacturing and flow sheet not expected)</p> <p>Engineering Plastics: Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Elaborate the features of preparation of plastic materials. ➤ Interpret properties and applications relationship. ➤ Compare the different plastic materials according to their properties and structures. <p>Contents:</p> <ul style="list-style-type: none"> • Acrylonitrile Butadien Styrene, Polycarbonate, Polyacetals, Polyamides such as Nylon-6, Nylon-66, Polyphenyleneoxide, Polytetrafluoroethylene. 	10	14
4	<p>Principle of Manufacturing, Properties & Applications of Plastics (Detail description of Manufacturing and flow sheet not expected)</p> <p>Thermosetting Plastics: Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Prepare the plastic materials by laboratory method. ➤ Follow standard procedure for polymer preparation. <p>Contents:</p>	08	12

	<ul style="list-style-type: none"> Phenol formaldehyde, Urea formaldehyde, Melamine formaldehyde, Epoxy, Polyurethane, Unsaturated polyester. 		
5	<p>Principle of Manufacturing, Properties & Applications of Plastics (Detail description of Manufacturing and flow sheet not expected)</p> <p>Engineering Plastics: Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Compare the plastic materials according to their properties. ➤ Select suitable plastic materials depending on the end applications. ➤ Identify plastics by flame test. <p>Contents:</p> <ul style="list-style-type: none"> Ethylene vinyl acetate, Styrene acrylonitrile, PPS, PEEK, Polyamide-imide, Bismelamide. 	06	08
6	<p>Additives & Compounding : Specific Objectives:</p> <ul style="list-style-type: none"> ➤ Use different additives for Plastic Materials Processing. ➤ Select the suitable compounding equipments. <p>Contents:</p> <ul style="list-style-type: none"> 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. 	10	16
Total		64	100

Practical:

Skills to be developed:

Intellectual Skill

- To prepare the plastics materials by laboratory methods
- To select additives for compounding of plastics materials.
- To compare the plastics materials according to their properties
- To select the suitable compounding equipment.

Motor Skills

- To follow standard procedure of polymer preparation.
- To run machine successfully.
- To understand the operation of machine.
- To identify plastics by flame test.

List of Practicals:

Sr. 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. 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. & Technology of Polymer, Vol. 1 & Vol. 2)	M. S. Bhatnagar	--
7	Plastics Material Properties & 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			Examination Scheme					
TH	TU	PR	PAPER 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).

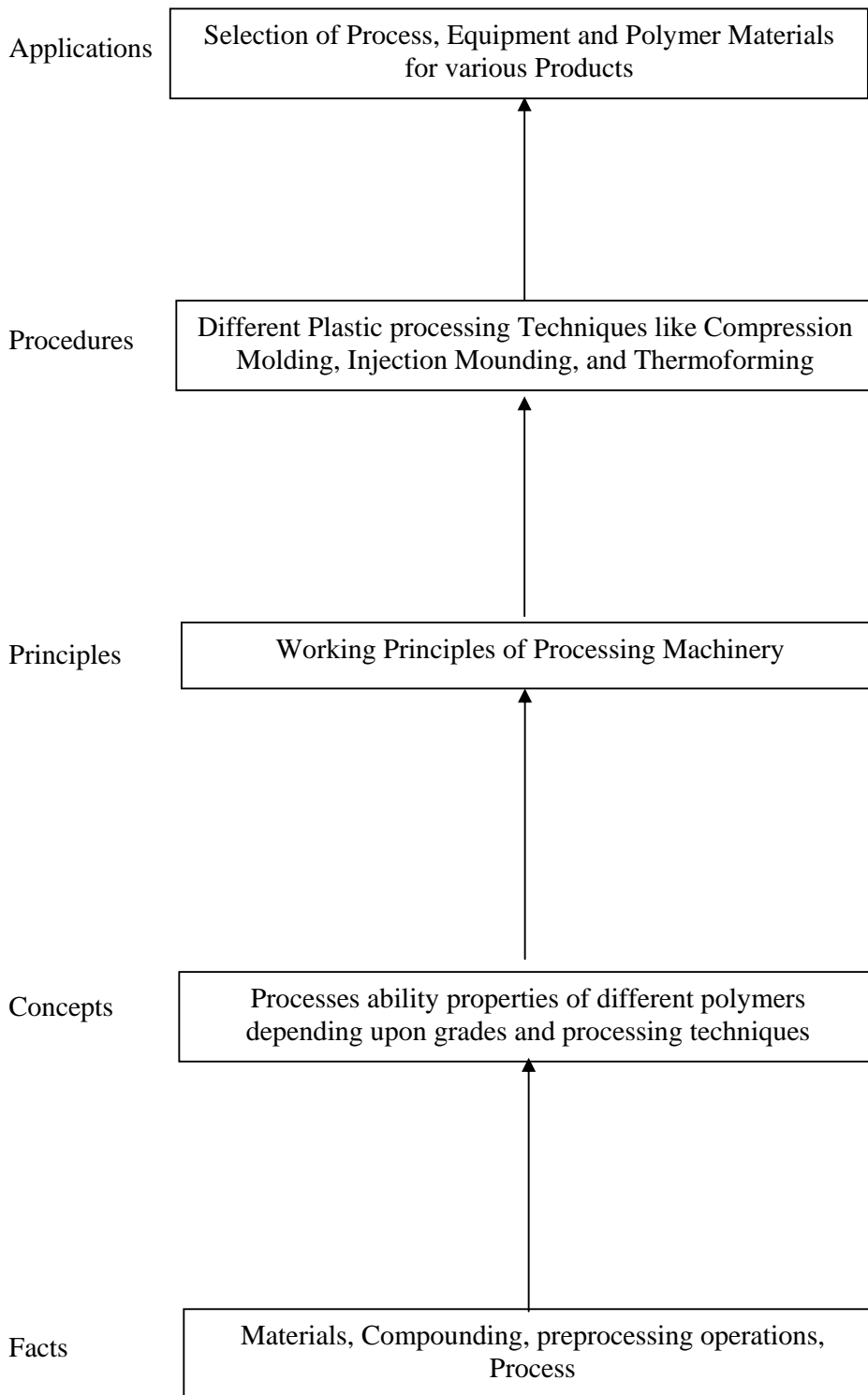
Rationale:

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	<p>Extrusion: Specific Objectives: The student will be able to:</p> <ul style="list-style-type: none"> ➤ Analyse practical significance of extrusion ➤ Describe configuration of extrusion ➤ Find faults, causes and remedies in extruded product <p>Contents</p> <ul style="list-style-type: none"> • 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) • Extrusion line diagrams <ul style="list-style-type: none"> 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. b) Sheet extrusion- process layout and auxiliary equipments such as cooling unit, stripping roll-unit, gauging heads, cut-out unit, sheet stacker and coiler. 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) • Extrusion Dies 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 & bottom fed. (10 Mark) • 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) 	17	34
2	<p>Injection Moulding: Specific Objectives: The student will be able to:</p> <ul style="list-style-type: none"> ➤ Analyse practical significance of injection moulding ➤ Describe configuration of injection moulding ➤ Discuss the trouble shooting guide for injection Molding <p>Contents</p> <ul style="list-style-type: none"> • Basic process, types of injection moulding machine-plunger type, screw type moulding machine, criteria for its selection. (06 Marks) • 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. 	17	30

	<p>(10 Marks)</p> <ul style="list-style-type: none"> • Comparison between mechanical and hydraulic clamping system. Effect of processing parameters on quality of product. Advantages and disadvantages of injection moulding. Moulding defects-causes and remedies.(08 Mark) • Injection Moulding of thermosets. Gas assisted injection moulding Reaction injection moulding- basic process, materials & applications. (06Mark) 		
3	<p>Blow Moulding Specific Objectives: The student will be able to:</p> <ul style="list-style-type: none"> ➤ Analyse practical significance of blow moulding, ➤ Describe configuration of blow moulding, ➤ Find faults, causes and remedies in blow moulded products. <p>Contents-</p> <ul style="list-style-type: none"> • Principle, materials and applications, Types of blow molding - continuous extrusion, intermittent extrusion, injection and stretch blow moulding. (06 Mark) • Parision cutting devices, Parision thickness control methods, Process parameters and their effect on quality of products, Trouble shooting (04 Mark) 	14	10
4	<p>4. Thermoforming: Specific Objectives: The student will be able to:</p> <ul style="list-style-type: none"> ➤ Analyse practical significance of therforming ➤ Describe configuration of therforming ➤ Know process variables in therforming. ➤ Find defects, causes and remedies in therforming. <p>Contents-</p> <ul style="list-style-type: none"> • Basic process, materials and applications. Methods of Thermoforming, plug assist forming, Drape forming, plug and Ring forming, Slip forming, Ridge forming, Reverse Draw with plug Assists, vacuum forming, snap back forming, match mold forming, plug & ring, pressure forming, dual - sheet forming , trimming methods (08 Mark) • 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) 	10	14
5	<p>Cellular Plastics- Specific Objective The student should be able to</p> <ul style="list-style-type: none"> ➤ Distinguish the application of cellular plastic products ➤ Analyse the practical significance of cellular plastics ➤ Acquire skill of identifying the art of cellular plastics ➤ Understading the principle and operation of calendaring process. 	06	12

	<p>Contents:</p> <ul style="list-style-type: none"> • 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) • 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. PS foam:- Extruded PS foam and moulded bead PS foam, PS foam properties, applications for PS foam. PVC foam :- method of preparation of PVC foam by using chemical blowing agent, properties, applications.(08 Mark) 		
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.
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:

Sr. No.	Title	Author	Publisher
1	Compression and Transfer Moulding	J. Butler	--
2	SPI Plastics Engineering Hand 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 Engineering

Course Code : PS

Semester : Fourth

Subject Title : Computer Programming

Subject Code : 17045

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
01	--	02	--	--	50@	--	--	50

Rationale:

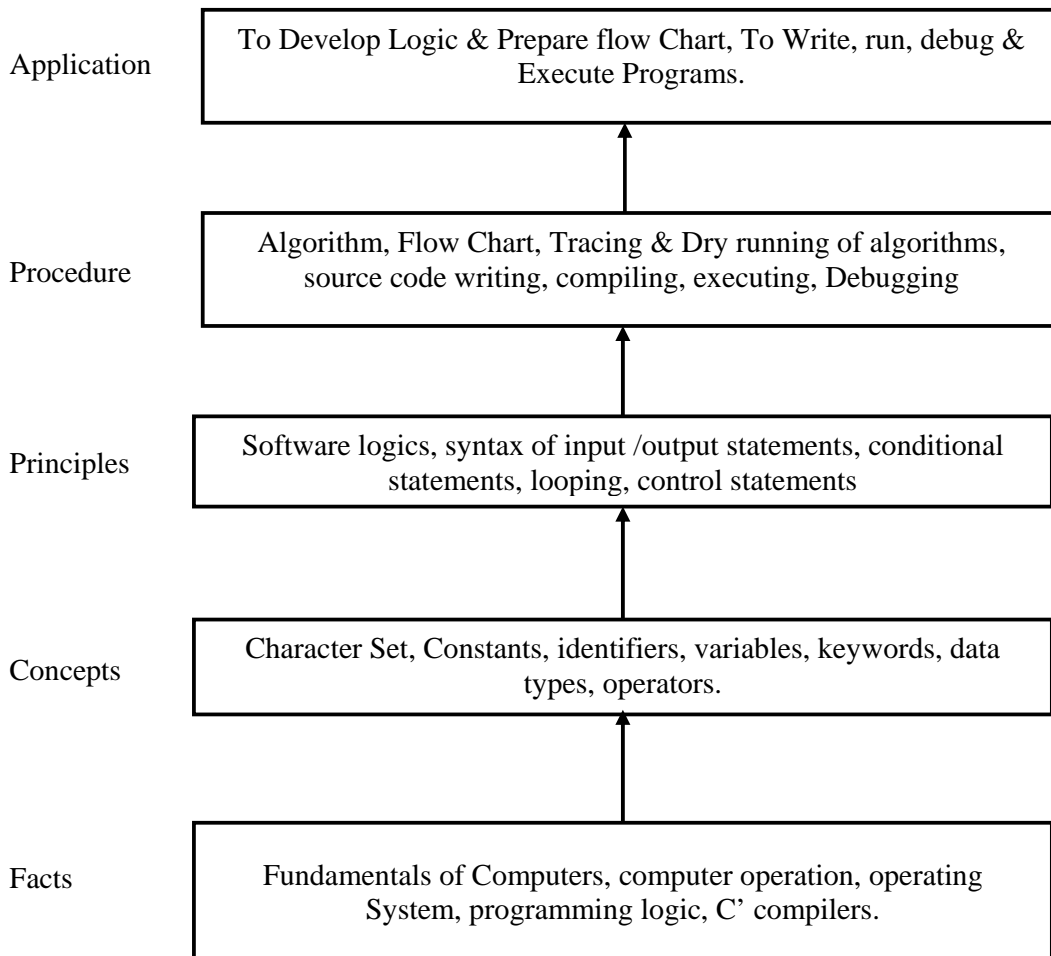
In advanced age of computer, it becomes essential to understand how to give instructions to computers. This course intends to expose a student to the basic principles of programming through a structured programming language like 'C'. Study of this course would enable the students to learn any advanced 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	Introduction: 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 Types of Operators - unary, binary, arithmetic, relational, logical, assignment. Hierarchy of operators, expressions, library functions, Use of input/ output functions viz. Printf(), Scanf(), getch(), putch()	03
3	Use of Control Statements: if-else, while loop, do - while loop, for loop, switch, break and continue. Writing, Compiling, Executing and debugging programs	05
4	Introduction to Subscripted variables, arrays, defining and declaring one and two dimensional arrays, reading and writing	03
4	Concept of String, string input / output functions Defining and accessing a user defined functions, Passing of arguments, declaration of function prototypes 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. 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 Kernighan	Introduction to 'C' programming	Prantice Hall Publications
04	Balguruswamy	Programming in 'C'	Tata McGraw Hill

Course Name : Diploma in Plastics Engineering**Course Code : PS****Semester : Fourth****Subject Title : Professional Practices-II****Subject Code : 17046****Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER 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:

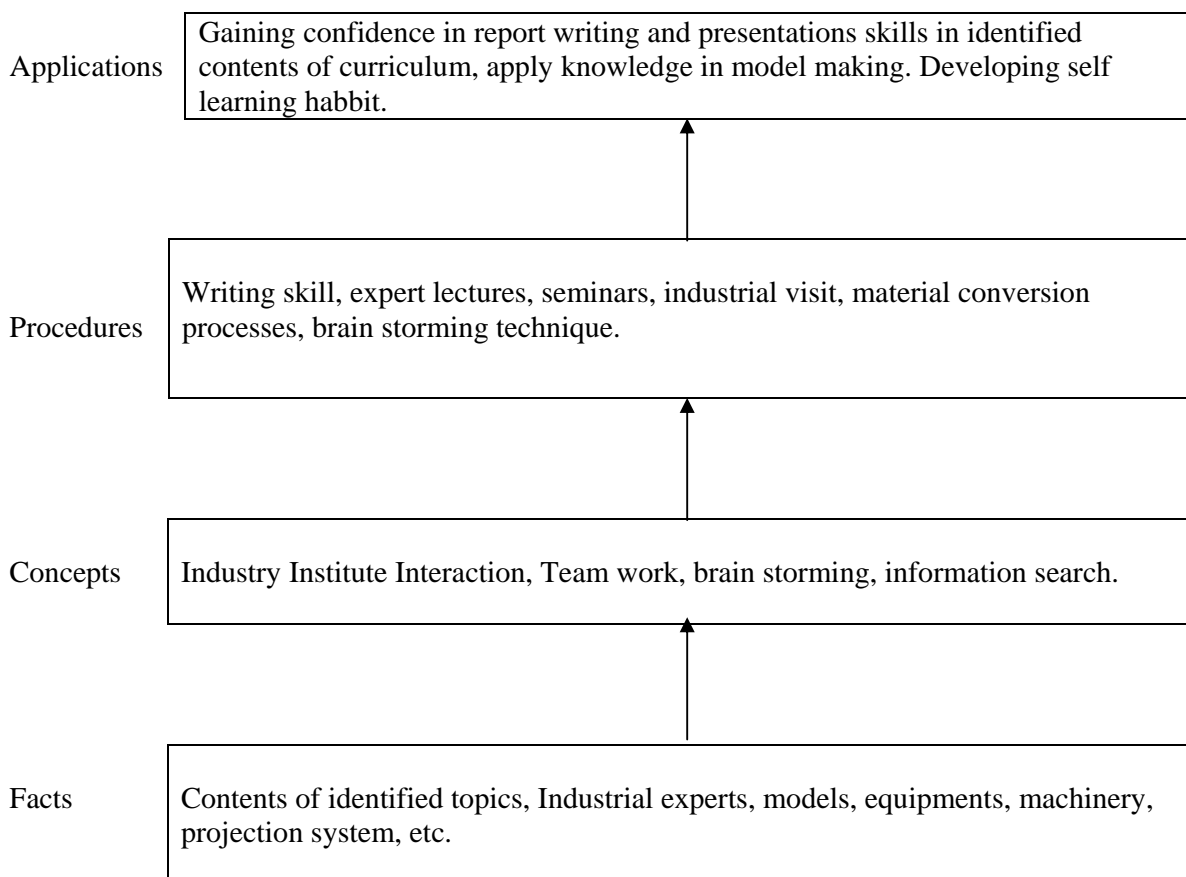
Student will be able to:

- 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: Theory

Topic & Content	Hours
<p>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.</p> <ol style="list-style-type: none"> 1) Collect the information related to manufacturer, suppliers, grades & cost of the plastic materials. 2) Collect the information related to manufacturer, suppliers, type of the plastic machine manufacture 3) Collect the information related to manufacturer, suppliers, of the plastic mold. 4) Collect the information related to different machining carry out on mold plate. 5) Collect the information related to different heat treatment on mold material. 	06
<p>2. Lectures by professionals/Industry Experts-</p> <p>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.</p> <p>Students shall prepare a brief report of each lecture as a part of their term work.</p> <ol style="list-style-type: none"> 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. vi) Industrial application of PTFE vii) Processing of RPVC for pipe manufacturing application. viii) Quality control in plastic industries. xiii) Industrial drives-Types, components, comparison and applications. 	06
<p>3. Seminars: One seminar be arranged on the subjects related to 4th semester. Or topics beyond 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,</p> <p>Topics suggested for guidance-</p> <ol style="list-style-type: none"> i) Foam Extrusion. ii) Two component injection molding. iii) Gas assist injection molding. iv) Multilayer extrusion process. v) On line thermoforming process. vi) Quality control in injection molding. vii) Microinjection molding. viii) Fully electrical operated injection molding machine. ix) Twin screw extrusion techniques. 	06

<p>4. Industrial visits</p> <p>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 :</p> <ul style="list-style-type: none"> • To study the profile of industry • To see the advanced manufacturing processes & machinery. • To observe working of Plastic industry. • To observe working in different shops in plastic industries • To observe chip less manufacturing machines & processes. • To study process sheets, quality control charts & production drawings, Plastic testing laboratory • To observe Tool room, standards room etc. <p>Following types of industries may be visited in & around the institute.</p> <ol style="list-style-type: none"> i) Mold manufacturing ii) Extrusion molding process(Pipe/ film) iii) Thermoforming industries iv) Injection molding industries. v) Compression & transfer molding industries vi) Printing & decorating techniques industries. 	08
<p>5. Socially Relevant Activities</p> <p>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)</p> <ol style="list-style-type: none"> i) Awareness about carbon credit ii) Anticorruption movement 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. <p>(Any other relevant activity may be performed).</p>	06
<p>6. Individual Assignment</p> <p>At least one Assignment from each theory subject of 4th sem. shall be chosen to form a part of term work.</p> <p>* Assignment shall be problem solving type, comparative study type, application oriented etc.</p> <p>* Subject teacher of various subjects shall prepare 'question bank 'and allot the Assignment Individually or in a group of 3to4 students.</p>	04

<p>7. Mini Projects</p> <p>Students, in a group of 4, shall perform any one activity listed below.</p> <ol style="list-style-type: none"> i) Model making out of card board paper, wood, thermocol, plastics, metal, clay etc. <ol style="list-style-type: none"> a) Any new idea/principle converted into model b) Mechanisms c) Toggles system ii) Toy making with simple operating mechanisms iii) Layout of workshop/department/college iv) Experimental set up/testing of a parameter v) Display board indicating different type of machine components like screw, barrel, heater, fasteners, couplings, pipe fitting, valves, thermocouple, exploded views of assemblies, vi) Any relevant project which will make students to collect information & work with their own hands. <p>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.</p>	12
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Learning Resources:**1. Books:**

Sr. No.	Author	Title	Publisher
01	NRDC, Publication Bi Monthly Journal	Invention Intelligence Journal	National Research Development Corporation, GOI.
02	DK Publishing	How things works 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 All-Ninth Edition	PHI

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 4th semester examination.

Note:- Examination in Professional Practices of 5th 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.