University of Pune
Structure of S.E. Civil Engineering (2012 Course)
With effect from A.Y:2013-2014
Semester I

Code	Subject	Teaching Scheme (in Hrs/week)			Examination Scheme of Marks					
		Lect.	Tutorials	Pr/Drg.	Theory Paper	Online Paper	Tw	Pr	Or	Max.Marks
201001	Building Technology and Materials	3	-	4	50	50	25		50	175
207001	Engg.Maths III	4	1	-	50	50	25	-	-	125
201006	Surveying	4	-	2	50	50	25	50	-	175
201002	Strength of Materials	4	-	-	50	50	-	-	-	100
201003	Geotechnical Engineering	4	-	2	50	50	-	-	50	150
201010	Soft Skills	-	-	2	-	-	25	-	-	25
	Total	19	1	10	250	250	100	150		750

Semester II

Code	Subjects	Teaching Scheme (in Hrs/week)			Examination Scheme of Marks					
		Lect.	Tutorials	Pr/Drg.	Theory Paper	Online Paper	Tw	Pr	Or	Max.Marks
201004	Fluid Mechanics I	4	-	2	50	50	25	-	50	175
201005	Architectural Planning and Design of Buildings	4	-	4	50	50	25	50		175
201008	Structural Analysis-I	4	-	-	50	50	-	-	-	100
207009	Engineering Geology	4	-	2	50	50	25	-	-	125
201007	Concrete Technology	4	-	-	50	50	-	-	-	100
201009	Testing of Materials	-	-	2	-	-	25		50	75
		20		10	250	250	100	150		750

Building Technology and Materials(201001)

Teaching Scheme

Lectures: 3 hours/week

Practical: 4 hours/week

Examination Scheme

1st Online Exam.: 25Marks (30min.)

2nd Online Exam. :25 marks (30min.)

Theory Examination: 50 marks

Term work: 25marks

Oral—50 marks

SECTION I

UNIT I:

Introduction to Building Construction and Masonry.

a) Introduction to building construction- definition, types of building as per national building code. Substructure - shallow and deep foundation and their suitability. Failure of foundation and its causes and setting out, Layout of foundation in black cotton soil, sloping ground. Damp proof course, plinth filling and soling.

b) Masonry- Stone masonry- Principal terms, types of stone masonry.

Brick masonry- characteristics of good building bricks, IS specification and tests, classification of bricks-silica, refractory, fire and fly ash bricks. Brick work, types of bonds- English, Flemish, Header, Stretcher, construction procedure, supervision, underpinning,

Scaffolding- Purpose, types, suitability.   **(04+04 hours)**

UNIT II:

Block Masonry and Form work.

a) Block masonry: Cellular Lightweight Concrete blocks, Hollow blocks, solid blocks, cavity wall construction. Reinforced brick masonry: applications, advantages, materials required and construction procedure. Composite masonry- types, advantages, applications, materials required and construction procedure. Plasters-different types of plasters, plastering methods, modern materials for plaster.

b) Form work and casting procedure for reinforced concrete columns, R.C.C. beams and girders, R.C.C. slabs, curing methods, precast concrete construction and joints in concrete   work.

Slip Form work- Component parts- Design Criteria   **(08 hours)**

UNIT III:

Flooring and Roofing Materials.

a) Flooring and flooring materials --Functional requirement of flooring, varieties of floor finishes and their suitability, construction details for concrete, tiles and stone flooring. Types of flooring: timber flooring, cement concrete flooring, mosaic flooring ceramic flooring, terrazzo flooring or cast in situ terrazzo flooring, tiled flooring, rubber flooring, cork flooring, epoxy asphalt flooring or mosaic asphalt flooring, filler joist floor, jack arch floor, hollow block and rib floors. – Flooring materials, tests and IS Specifications.

b) Roofing materials: galvanized iron pre-coated aluminum sheets, fiber sheets, and Mangalore tiles. Roof construction: types and their suitability, method of construction, types of trusses, types of shell structure, space and frame structure, fixing details of roof covering

                                                                      (08 hours)

SECTION II

UNIT IV:
Doors, Windows, Arches and Lintels.

a) Doors and windows: definition of technical terms, installation of doors and window frames and their size specifications, fixtures and fastenings. Types of doors: glazed or sash doors, plastic doors, flush doors, louvered doors, collapsible doors, revolving doors, rolling steel doors, sliding doors, swing doors, folding doors. Types of windows: casement window, double hung window, pivoted window, sliding windows, louvered or Venetian window, metal window, sash or glazed window, bay window, corner window, dormer window, gable window, skylight window, circular window, mosquito proof window, curtain wall window. Ventilators: purpose and types.
b) Arches and lintels: principle of arch action, types of arches, method of arch construction, centering and removal of centering. Lintels: necessity and types, chajja or weather shade- necessity and types**.**   **(08 hours)**

UNIT V:
Vertical Circulation and Protective Coatings
a) Vertical circulation: Consideration in planning, design considerations .,Staircase: types, , and details of ramps. Ladders, lifts, and escalator. Types of staircase: straight stairs open well stairs, quarter turn stairs, half turn stairs, turning stairs, dog-legged stairs, circular stairs, geometrical stairs, bifurcated stairs, and spiral stairs, Materials, fire resisting materials,
b) Protective coatings: plastering types (lime plaster, cement plaster, gypsum plaster used in spray fire proofing, plaster of Paris) and application, pointing- purpose & types, mortar- Preparation and types, painting and varnishing, types and application, white washing, distempering, oil paints. Wall cladding: materials, method, wall papering and glazing work
                                                        (08 hours)
UNIT VI:
Miscellaneous Materials and Safety in Construction

a) Miscellaneous materials: Properties, types and uses of following materials, lime, polymers, plastic types, mastic, gypsum, , clay tiles and glazed wares,
Timber: types and properties, seasoning, testing, aluminum, Stainless Steel.
b) Safety in construction: safety on site, storage of materials, construction safety, prevention of accidents, fire proof construction. Repairs and maintenance: addition, and alteration, strutting and shoring.
c) Glass: uses, types and properties, application and ingredients, market forms, Glass claddings, Aluminum composite panel cladding. Ceramic products:ceramic sanitary application, water closet, urinals, tabs, washes basins, their common sizes, pipes and fitting. Eco-friendly materials: eco-friendly decorating materials, eco-friendly flooring, thatch, bamboo, linoleum, cork etc..
                                                        (08 hours)

Term Work

It shall consist of the following exercises and seminar.

A) Development of a given line plan of a residential building.
Draw to a scale of 1: 50
1. Detailed Plan.
2. Elevation.
3. Section.
4. Following Sketches pertaining to the above plan (with Standard Dimensions)
        a. Door- Panelled door
        b. Window
        c. Stair-
        d. Masonry
        e. Lintel
B) Students should **prepare working drawing of Foundation Plan** (on tracing paper) for the above Residential Building Plan. It should contain detailed foundation plan with foundation details. (Use suitable scale 1:50 or 1:100)
C) Draw sketches using computer software of the following:
1. Foundations- two plates
a) Line sketches of shallow and deep footing.
b) Details of any one of the shallow footings.
2. Arches- two plates.
a) Different types of arches
b) Details of arch showing different components
3. Trusses- one plate. (Showing different components)
D) One seminar report and presentation based on various aspects of Modern materials and
        construction methods.
E) Site visit and technical report on the visit (Minimum Two).
    (Visit should contain Stage of visit, related sketches of components-C/S-Dimensions,
Materials used ,site plan sketch and detailed report etc.) Visit to a construction related exhibition is strongly recommended.
F) Collection of advertisements of modern construction materials and Tools used in construction.
Oral : Based on above syllabus and term work.

Text Books :

1. Building Construction --- B.C. Punmia.
2. Building Materials— S.V.Deodhar , Khanna Publication
3 Building Construction -- Bindra and Arora.
4.Civil Engineering Materials—Neil Jackson &Ravindra K. Dhir--
     Palgrave Macmillan

Reference Books :

1.Building Materials---S.K.Duggal—New Age International Publishers
2 Civil Engineering Materials --- TTTI Chandigrah, Tata McGraw Hill Publications.
3. Materials of construction --- Ghosh, Tata McGraw Hill.
4.Building Construction -- S.C. Rangwala.

5. National Building Code.(Latest edition)
6. Doors Windows,and Stairs by R. Barry.
7. Building Materials Technology by Branyly, Tata McGraw Hill.
8. Properties of Concrete by A. M. Neville.
9. Properties Evaluation and Control of Engineering, Tata McGraw Hill.
10. Building Construction by Mitchell.
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Teaching Scheme:
Lectures – 4 Hrs./Week
Tutorials – 1 Hr./Week

Examination Scheme:
Paper – 50 Marks (2 Hrs.)
Online – 50 Marks
Term work: 25 Marks

Section I

Unit I: Linear Differential Equations (**LDE**) and Applications   (09 Hours)
LDE of nth order with constant coefficients, Method of variation of parameters, Cauchy's & Legendre's DE, Simultaneous & Symmetric simultaneous DE. Modeling of problems on bending of beams, whirling of shafts and mass spring systems.

Unit II: Numerical Methods   (09 Hours)
Numerical solutions of (i) System of linear equations by Gauss elimination method, Cholesky and Gauss-Seidel methods (ii) Ordinary differential equations by Euler's, Modified Euler's, Runge-Kutta 4th order and Predictor-Corrector methods.

Unit III: Statistics and Probability   (09 Hours)
Measures of central tendency, Standard deviation, Coefficient of variation, Moments, Skewness and Kurtosis, Correlation and Regression, Reliability of Regression estimates.
Probability, Probability density function, Probability distributions: Binomial, Poisson, Normal and Hypergometric, Test of hypothesis: Chi-square test.

Section II

Unit IV: Vector Differential Calculus   (09 Hours)
Physical interpretation of Vector differentiation, Vector differential operator, Gradient, Divergence and Curl, Directional derivative, Solenoidal, Irrotational and Conservative fields, Scalar potential, Vector identities.

Unit V: Vector Integral Calculus and Applications   (09 Hours)
Line, Surface and Volume integrals, Work-done, Green's Lemma, Gauss's Divergence theorem, Stoke's theorem. Applications to problems in Fluid Mechanics, Continuity equations, Stream lines, Equations of motion, Bernoulli's equation.

Unit VI: Applications of Partial Differential Equations (**PDE**)   (09 Hours)
Basic concepts, modeling of Vibrating String, Wave equation, one and two dimensional Heat flow equations, method of separation of variables, use of Fourier series. Applications of PDE to problems of Civil and allied Engineering.

Text Books:
1. Advanced Engineering Mathematics, 9e, by Erwin Kreyszig (Wiley India).
2. Advanced Engineering Mathematics, 7e, by Peter V. O'Neil (Cengage Learning).

Reference Books:
1. Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education).
2. Advanced Engineering Mathematics, Wylie C.R. & Barrett L.C. (McGraw-Hill, Inc.)
3. Higher Engineering Mathematics by B. S. Grewal (Khanna Publication, Delhi).
4. Applied Mathematics (Volumes I and II) by P. N. Wartikar & J. N. Wartikar (Pune Vidyarthi Griha Prakashan, Pune).
5. Higher Engineering Mathematics by B.V. Ramana (Tata McGraw-Hill).
6. Advanced Engineering Mathematics with MATLAB, 2e, by Thomas L. Harman, James Dabney and Norman Richert (Brooks/Cole, Thomson Learning).

Tutorial and Term Work:
i) Tutorial for the subject shall be engaged in minimum of four batches (batch size of 20 students maximum) per division.
ii) Term work shall consist of six assignments (one per each unit) based on performance and continuous internal assessment.

Surveying(201006)

Teaching Scheme
Lectures: 4-hours/week
Practical: 2 hours/week

Examination Scheme
1st Online Exam.: 25Marks (30min.)
2nd Online Exam. :25 marks (30min.)
Theory Examination: 50 marks
Term work: 25marks
Practical-50 marks

SECTION I

UNIT I:
Compass and Plane Table Surveying.
a) Definition, objective and fundamental classification of Plane of surveying, concept of scale, RF, Map, Plan, Ranging, Chainage, Offsetting, Types of tapes and concept of chainage. Concept of bearing, meridian and their types, construction and use of prismatic compass, local attraction and correction for local attraction, dip, declination and calculation of true bearings. Practical applications of bearing plan **(5 hours)**

b) Equipment required for plane table surveying and their uses, advantages and disadvantages, methods of plane table survey: Radiation, intersection, traversing **(3 hours)**

UNIT II:
Levelling and Contouring.
a) Introduction to levelling, Types of levelling, Types of bench marks, Construction and use of dumpy level, auto level, digital level and laser level in construction industry, principle axes of dumpy level, testing and permanent adjustments, reciprocal levelling, curvature and refraction corrections, distance to the visible horizon. **(5hours)**
b) Contouring: direct and indirect methods of contouring, uses of contour maps, study and use of topo-sheets, profile levelling and cross-sectioning and their applications
(3hours)

UNIT III:
Theodolite Surveying
a) Study of vernier transit 20" theodolite, uses of theodolite for measurement of horizontal angles by repetition and reiteration, vertical angles and magnetic bearing, prolonging a line, lining in and setting out an angle with a theodolite, **(4 hours)**

b) Theodolite traversing: computation of consecutive and independent co-ordinates, adjustment of closed traverse by transit rule and Bowditch's rule, Gales traverse table, omitted measurements, area calculation by independent co-ordinates, open traverse and its uses, measurement of deflection angles using transit theodolite, open traverse survey, checks in open traverse. **(4 hours)**

SECTION II

UNIT IV:

Curves

a) Introduction to horizontal and vertical curves (no numerical and derivations to be asked on vertical curves and reverse curves), different types and their applications, simple circular curves, elements and setting out by linear methods such as radial and perpendicular offsets, offsets from long chord, successive bisection of chord and offsets from chords produced. Angular methods: Rankine's method of deflection angles (one and two theodolite methods). (Numerical on simple circular curves and compound curves to be asked), Transition curves: necessity and types,

(8 hours)

UNIT V:

Permanent Adjustments of a Transit Theodolite and Tachometry.

a) Fundamental axes of theodolite: testing and permanent adjustments of a transit theodolite.

(3 hours)

b) Tachometry: application and limitations, principle of stadia tacheometry, fixed hair method with vertical staff to determine horizontal distances and elevations of points.

(5 hours)

UNIT VI:

Construction Survey and Electronic Measurement Techniques.

a) Introduction to construction survey, establishing of horizontal and vertical controls, setting out of buildings, maintaining verticality of tall buildings, survey for roads and rails, drainage lines, water lines, tunnels, canals. **(3 hours)**

b) Surveying using total station – Construction, types, principle features, field equipment, method of use, introduction to various special functions available in a total station such as remote elevation measurements, remote distance measurements and co-ordinate stake out.

(5 hours)

Term Work

The term work shall consist of any six practicals out of which Sr.No.7,8 and 9 are mandatory

1. Measurement of magnetic bearings of sides of a triangle or polygon, correction for local attraction and calculations of true bearings using prismatic compass, .
2. Plane table traversing with at least four stations.
3. Simple and differential levelling with at least three change points using digital level.
4. Measurement of horizontal angles (by repetition method) using Vernier Transit Theodolite
5. Setting out a circular curve by Rankine's method of deflection (two theodolite method).
6. Setting out a building from a given foundation plan (minimum six co-ordinates).
7. **Project I:** Road project using Auto level for a minimum length of 100 m including fixing of alignment, Profile levelling, cross-sectioning, plotting of L section and Cross Section. (One full imperial sheet including plan, L-section and any three typical Cross-sections)

8. **Project II:** Tachometric contouring project on hilly area with at least two instrument stations about 60 m to 100 m apart and generating contours using software such as Autodesk land desktop, Autocivil, Foresight etc (minimum contour interval 1 meter)

9. Traversing using a total station (minimum 10 acres area)

Text Books:
1 Surveying and Levelling by Vol. I and Vol. II – T.P.Kanetkar and S.V.Kulkarni
2. Surveying and Levelling by Subramanian, Oxford University Press.
3 Surveying, Vol. I & II by Dr.B.C.Punmia, Ashok K. Jain, Arun K.Jain
4.Surveying for Engieers-John Uren & Bill Price—Palgrave Macmillan

Reference Books
1 Plane Surveying----A.M.Chandra---- New Age International Publishers
1. Surveying and Levelling ---- N. N. Basak, Tata Mc-Graw Hill
2. Surveying Vol. I & II ---- Dr.K. R. Arora
3. Surveying: Theory and Practice --- James M. Anderson, Edward M. Mikhail
4. Surveying theory and practices -- Devis R. E., Foot F. S.
5. Plane and Geodetic surveying for Engineers. Vol. I -- David Clark
6. Principles of Surveying. Vol. I by J.G.Olliver, J.Clendinning
7. Surveying, Vol. I & II by S. K. Duggal,Tata Mc-Graw Hill

General Reading Suggested:
Codes:
IRC: SP: 19, IRC: SP: 35 & IRC: SP: 54

IRC: SP: 42 and IRC: SP: 50.

IRC: 73, IRC: 86, IRC: 38 and IRC SP: 23.

http://www.bis.org.in/sf/wrd/p_449.pdf
http://www.bis.org.in/sf/wrd/WRD10(491).pdf
http://www.bis.org.in/sf/wrd/WRD10(491).pdf
http://sbq.com.au/member/board-publications/code-of-practice/

http://usa.autodesk.com/adsk/servlet/pc/index?id=3091031&siteID=123112
http://www.cadacademynoida.com/?page=civileng3
http://www.sitetopo.com/

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Strength of Materials (201002)

Teaching Scheme

Lectures: 04 hours/week

Examination Scheme

1st Online Exam.: 25Marks (30min.)
2nd Online Exam. :25 marks (30min.)
Theory Examination: 50 marks

SECTION I

UNIT I:
Simple Stresses and Strains
a) Materials used in construction and their nature, Hook's Law, Stress-Strain Diagram for elastic ,plastic materials and brittle material, Idealized stress-strain diagram , Concept of axial stresses(compression, tension), strains(linear, lateral, shear and volumetric), Elastic constants and their relations. Stresses and strains due to change in temperature.
b) Stresses, strains and deformations in determinate and indeterminate structures for homogeneous and composite structures under concentrated loads and temperature changes.

(08 hours)

UNIT II:
Bending and Shear Stresses.
a) Concept and determination of Moment of Inertia for various cross-sections. Stress due to bending: theory of simple or pure bending, Assumptions, derivation of flexure formula, bending stress distribution diagrams, Moment of Resistance of cross-section.
b) Shear stresses in beams: concept of shear, complimentary shear, derivation of shear stress formula, shear stress distribution for various cross sections, maximum and average shear stress for circular and rectangular sections. Shear connectors.

(08 hours)

UNIT III:
Torsion and Strain Energy.
a) Torsion of circular shafts: theory of torsion, assumptions, derivation of torsion formula. Stresses, strains and deformations in determinate and indeterminate shafts of hollow, solid, homogeneous and composite cross-sections subjected to twisting moments. Power transmitted by shafts, twisting moment diagrams.
b) Strain energy and impact: concept of strain energy, expression of strain energy for axially loaded member under gradual, sudden and impact loads. Strain energy due to self weight,

(08 hours)

SECTION II

UNIT IV:
Principal Stresses and Strains.
a) Principal stresses and strains: concept of principal planes and principal stresses, normal and shear stresses on an oblique plane, magnitude and orientation of principal stresses and maximum shear stress.
b) Combined effect of axial stress, bending moment, shear and torsion. Theories of failure: maximum normal stress, maximum shear stress and maximum strain theory.

(08 hours)

UNIT V:
Shear Force and Bending Moment Diagram
a) Concept of shear force and bending moment. Relation between shear force, bending moment and intensity of loading. Shear force and bending moment diagrams for cantilevers, simple and compound beams due to concentrated, uniformly distributed, uniformly varying loads and couples in determinate beams.
b) Bending moment and loading diagram from given shear force diagram. Shear force and loading diagram from given bending moment diagram.

(08 hours)

UNIT VI:
Axially and Eccentrically Loaded Columns.
a) Axially loaded columns: concept of critical load and buckling, Euler's formula for buckling load with hinged ends, concept of equivalent length for various end conditions, Rankine's formula, safe load on column and limitations of Euler's formula.
b) Direct and bending stresses for eccentrically loaded short column and other structural components such as retaining walls, dams, chimneys, etc. Effect of lateral force and self-weight. Resultant stress diagrams due to axial loads, uni-axial, and bi-axial bending. Concept of core of section for solid and hollow rectangular and circular sections.

(08 hours)

Text Books
1. Strength of Materials - F.L. Singer and Andrew Pyt Ltd, Harper and Row Publication
2. Strength of Materials – R. Subramanian, Oxford University Press
3. Elements of Strength of Materials – Timo Shenko and Young, East-West Press Ltd.

Reference Book
 1   Strength of MaterialsD.Ghosh , A.K.Datta--- New Age International Publishers
 2. Mechanics of Materials- Beer and Johnston, McGraw Hill Publication
 3. Introduction to Mechanics of Solids- E.P. Popov, Prantice Hall Publication
 4. Strength of Materials- S.S. Ratan, Tata McGraw Hill
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Geotechnical Engineering (201003)

Teaching Scheme
Lectures: 4 hours/week
Practical: 2 hours/week

Examination Scheme
1st Online Exam.: 25Marks (30min.)
2nd Online Exam. : 25 marks (30min.)
Theory Examination: 50 marks
Oral Exam: 50marks

SECTION I

UNIT I: Introduction and Index Properties.

a) Introduction to Geotechnical Engineering and its applications to Civil Engineering, Complexity of soil structure, major soil deposits of India, Field identification of soils. Introduction to soil exploration-objective and purpose.

b) Three phase soil system, weight -volume relationships, Index properties of soil–methods of determination and their significance. IS and Unified Soil classification systems.

(08 hours)

Unit 2: Permeability and Seepage.

a)Soil water, permeability definition and and necessity of its study, Darcy's law, factors affecting permeability. Laboratory measurement of permeability – Constant head method and Falling head method as per IS 2720. Field test for determination of permeability- Pumping in test and Pumping out test as per IS 5529part-I. Permeability of stratified soil deposits.

b) Seepage and Seepage Pressure, quick sand phenomenon, critical hydraulic gradient, General flow equation for 2-D flow (Laplace equation), Flow Net, properties and application, Flow Net construction for flow under sheet pile and earthen dam.

(08 hours)

Unit 3: Compaction and Stress Distribution

a) Compaction- Introduction, compaction tests- Standard Proctor test, Modified Proctor test, Zero air void line. Factors affecting compaction. Effect of compaction on soil properties.
Field compaction methods and compaction equipments for different types of soil, Placement water content, Field compaction control- use of compaction test result, Proctor needle in field compaction control.

b) Stress Distribution in Soils: Geostatic stress, Boussinesq's theory with assumptions for point load and circular load (with numerical), Pressure Distribution diagram on a horizontal and vertical plane, Pressure bulb and its significance. Westergaard's theory, equivalent point load method, Approximate stress distribution method.

(08 hours)

SECTION II

Unit 4: Shear Strength of Soil

a) Introduction- Shear strength an Engineering Property. Mohr's stress circle, Mohr-Coulomb failure theory. The effective stress principle- Total stress, effective stress and neutral stress / pore water pressure. Peak and Residual shear strength, factors affecting shear strength. Stress-strain behavior of sands and clays.

b) Measurement of Shear Strength- Direct Shear test, Triaxial Compression test, Unconfined Compression test, Vane Shear test. Their suitability for different types of soils, advantages and disadvantages. Different drainage conditions for shear tests. Sensitivity and thixotropy of cohesive soils.

Unit 5: Earth Pressure.
a) Earth Pressure- Introduction, Rankine's state of Plastic Equilibrium in soils- Active and Passive states due to wall movement, Earth Pressureat rest. Rankine's Theory- Earth pressure on Retaining wall due to submerged backfill,
b) Backfill with uniform surcharge, backfill with sloping surface, layered backfill. Coulomb's Wedge theory. Rebhann's and Culmann's graphical method of determination of earth pressure.

(08 hours)

Unit 6: Stability of Slopes and Introduction to Geoenvironmental engineering
a) Stability of Slopes- Classification of slopes and their modes of failure, Taylor's stability number, Infinite Slopes in cohesive and cohesion less soil, Landslides- Causes and remedial measures.
b) Introduction to Geoenvironmental engineering, subsurface contamination, contaminant transport, effects of subsurface contamination, Control and remediation, Soil- A geochemical trap, detection of polluted zones, Monitoring effectiveness of designed facilities.

(08 hours)

Term Work

The term work shall consist of a journal giving details of at least 10 out of 12 of the following experiments / assignments .Sr. No 13 and 14 are compulsory.
1. Specific gravity determination by Pycnometer /density bottle.
2. Sieve analysis, particle size determination and IS classification as per I.S.Codes.
3. Determination of Consistency limits and their use in soil classification. as per I.S.Codes.
4. Field density test by a) Core cutter b) Sand Replacement and c) Clod method
5. Determination of coefficient of permeability by a) constant head and b) variable head method.
6. Direct shear test.
7. Unconfined compression test.
8. Vane Shear test.
9. Standard Proctor test / Modified Proctor test.
10. Differential free swell test.
11. Triaxial test
12. Swelling Pressure test
13) Any one of the following assignments using software / programming -
    a) Classification of Soils.
    b) Construction of Pressure bulb.

14. Assignments on the following topics

a) Rebhann's and Cullman's graphical method for determination of earth pressure.
b) Solution of problems on shear strength parameters using graph.

Note:-Oral examination should be based on the above Term Work done.

Text Books/
1. Soil Mechanics and Foundation Engineering by Dr.B.C.Punmia, Laxmi Publications
2.Geotechnical Engineering by Shashi K. Gulati & Manoj Datta, Tata McGraw Hill

3. Principles of Soil Mechanics and Foundation Engineering by V.N.S. Murthy, UBS Publishers
4.Soil Mechanics-Principles and Practice-Graham Barnes-Palgrave MacMillan

Reference books:

1 Geotechnical Engineering—C.Venkatramaiah—New Age International Publishers

2.Principles of Geotechnical Engineering—Braj M.Das—Cengage Learning

2. Geotechnical Engineering by Dr. B. J. Kasmalkar

3. Geotechnical Engineering by P Purushothma Raj

4. Geotechnical Engineering – Principles & Practices by Donald. P. Coduto, Pearson Education

5. Basic and Applied Soil Mechanics by Gopal Ranjan and A.S.R.Rao, Newage International

6. Physical and Geotechnical Properties of Soils by Joseph.E.Bowles, International Students Edition

7. Rocks Mechanics by Goodman.

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SOFT SKILLS(201010)

Teaching Scheme

Practical: --2--hours/week   **Term work: 25 marks**

SECTION – I

UNIT I: **(04 hours)**
Self Awareness & self Development –
a) Self Assessment , Self Appraisal, SWOT, Goal setting - Personal & career - Self-Assessment, Self-Awareness, Perceptions and Attitudes, Positive Attitude, Values and Belief Systems, Self-Esteem, Self appraisal, Personal Goal setting,
b) Career Planning, Personal success factors, Handling failure, Depression and Habit, relating SWOT analysis & goal setting, prioritization.

UNIT II: Communication Skill   **(06 hours)**
a) Importance of communication, types, barriers of communication, effective communication
b) Speaking Skills – Public Speaking, Presentation skills, Group discussion- Importance of speaking effectively, speech process, message, audience, speech style, feedback, conversation and oral skills, fluency and self expression, body language phonetics and spoken English, speaking techniques, word stress, correct stress patterns, voice quality, correct tone, types of tones, positive image projection techniques.
c) Listening Skills: Law of nature- you have 2 ears and 1 tongue so listen twice and speak once is the best policy, Empathic listening, Avoid selective listening-
d) Group Discussion - characteristics, subject knowledge, oral and leadership skills, team management, strategies and individual contribution and consistency.
e) Presentation skills - planning, preparation, organization, delivery.
f) Written Skills – Formal & Informal letter writing, Report writing, Resume writing   - Sentence structure, sentence coherence, emphasis. Paragraph writing. letter writing skills - form and structure, style and tone. Inquiry letters, Instruction letters, complaint letters,
Routine business letters, Sales Letters etc.

UNIT III: Corporate / Business Etiquettes   **(02 hours)**
Corporate grooming & dressing, Email & telephone etiquettes, etiquettes in social & office setting-Understand the importance of professional behaviour at the work place, Understand and Implement etiquettes in workplace, presenting oneself with finesse and making others comfortable in a business setting. Importance of first impression, Grooming, Wardrobe, Body language, Meeting etiquettes (targeted at young professionals who are just entering business environment) , Introduction to Ethics in engineering and ethical reasoning, rights and responsibilities,

UNIT IV: Interpersonal relationship   **(04 hours)**
a) Team work, Team effectiveness, Group discussion, Decision making - Team Communication. Team, Conflict Resolution, Team Goal Setting, Team Motivation Understanding Team Development, Team Problem Solving, Building the team dynamics. Multicultural team activity
b) Group Discussion- Preparation for a GD, Introduction and definitions of a GD, Purpose of a GD, Types of GD, Strategies in a GD , Conflict management, Do's and Don'ts in GD

UNIT V: Leadership skills   **(02 hours)**
Leaders' role, responsibilities and skill required - Understanding good Leadership behaviours, Learning the difference between Leadership and Management, Gaining insight into your Patterns, Beliefs and Rules, Defining Qualities and Strengths of leadership, Determining how well you perceive what's going on around you, interpersonal Skills and Communication Skills, Learning about Commitment and How to Move Things Forward, Making Key Decisions, Handling Your and Other People's Stress, Empowering, Motivating and Inspiring Others, Leading by example, effective feedback

UNIT VI: Other skills   **(02 hours)**
a) Time management- The Time management matrix, apply the Pareto Principle (80/20 Rule) to time management issues, to prioritise using decision matrices, to beat the most common time wasters, how to plan ahead, how to handle interruptions , to maximise your personal effectiveness, how to say "no" to time wasters, develop your own individualised plan of action
b) Stress management- understanding the stress & its impact, techniques of handling stress
c) Problem solving skill, Confidence building Problem solving skill, Confidence building

Term Work/Assignments
Term workwill consist the record of any 8 assignments of following exersises
1. SWOT analysis
2. Personal & Career Goal setting – Short term & Long term
3   Presentation Skill
4. Letter/Application writing
5. Report writing
6. Listening skills
7. Group discussion
8. Resume writing
9. Public Speaking
10. Stress management
11. Team Activity-- Use of Language laboratory

 * Perform any 8 exercises out of above 11 with exercise no. 11 as compulsory.

Teaching Methodology

Each class should be divided into three batches of 20-25 students each. The sessions should be activity based and should give students adequate opportunity to participate actively in each activity. Teachers and students must communicate only in English during the session. Specific details about the teaching methodology have been explained in every activity given below.

Practical Activities (Term work)

Following 10 activities are <u>compulsory</u> and teachers must complete them during the practical sessions within the semester. The teacher should give students 10 assignments on the basis of the 10 activities conducted in the practical sessions. Students will submit these 10 assignments as their term work at the end of the semester but it should be noted that the teacher should assess their assignment as soon as an activity is conducted. The continual assessment process should be followed.

1. **SWOT analysis**

The students should be made aware of their goals, strengths and weaknesses, attitude, moral values, self confidence, etiquettes, non-verbal skills, achievements etc. through this activity. The teacher should explain to them on how to set goals, SWOT Analysis, Confidence improvement, values, positive attitude, positive thinking and self esteem. The teacher should prepare a questionnaire which evaluate students in all the above areas and make them aware about these aspects.

2. **Personal & Career Goal setting – Short term & Long term**

3 **Presentation Skills**

Students should make a presentation on any informative topic of their choice. The topic may be technical or non-technical. The teacher should guide them on effective presentation skills. Each student should make a presentation for at least 10 minutes.

4**. Letter/Application writing**

Each student will write one formal letter, and one application. The teacher should teach the students how to write the letter and application. The teacher should give proper format and layouts.

5. **Report writing**

The teacher should teach the students how to write report .. The teacher should give proper format and layouts. Each student will write one report based on visit / project / business proposal etc.

6**. Listening skills**

The batch can be divided into pairs. Each pair will be given an article (any topic) by the teacher. Each pair would come on the stage and read aloud the article one by one. After reading by each pair, the other students will be asked questions on the article by the readers. Students will get marks for correct answers and also for their reading skills. This will evaluate their reading and listening skills. The teacher should

give them guidelines on improving their reading and listening skills. The teacher should also give passages on various topics to students for evaluating their reading comprehension.

7. **Group discussion**
Each batch is divided into two groups of 12 to 14 students each. Two rounds of a GD for each group should be conducted and teacher should give them feedback.

8. **Resume writing**
Each student will write one formal letter, and one application. The teacher should teach the students how to write the letter and application. The teacher should give proper format and layouts.

9. **Public Speaking**
    Any one of the following activities may be conducted :

   a. **Prepared speech** (topics are given in advance, students get 10 minutes to prepare the speech and 5 minutes to deliver.
   b. **Extempore speech (**students deliver speeches spontaneously for 5 minutes each on a given topic)
   c. **Story telling (Each student narrates a fictional or real life story for 5 minutes each)**
   d. **Oral review** (Each student orally presents a review on a story or a book read by them)
   10.. **Team Activity**-- Use of Language laboratory

Text Books:

1 Communication Skills : Sanjay Kumar and Pushpa Lata , Oxford University Press
2 Developing Communication Skill : Krishna Mohan, Meera Banerji,- McMillan India Ltd.
3 English for Business Communication : Simon Sweeney , Cambridge University Press

Books for references:
   1.Ethics in Engineering Practice and Research—Caroline,Whitbeck— Cambridge University Press
   2.NASSCOM-Global Business Foudation Skills: Accenture,Convergys,Dell et.al. Foundation Books : Cambridge University Press
   3**.** Basic Managerial Skills for all E. H. McGrath, Eastern Economy Edition, Prentice hall India.
   4.. Personality Development and Group Discussions,Barun K. Mitra, Oxford University Press
   5 Group Dissussions and Interview Skills : Priyadarshi Patnaik : Foundation Books : Cambridge University Press
   6 .Thinks and Grow Rich: Napoleon Hill, Ebury Publishing, ISBN 9781407029252
   7 . Awaken the Giant Within: Tony Robbins HarperCollins Publishers, ISBN-139780743409384
   8. Change Your Thoughts, Change Your Life: Wayne Dyer, Hay House India, ISBN-139788189988050
   9 Habits of Highly Effective People: Stephen Covey Pocket Books, ISBN-13

9781416502494
10. The Power of Your Subconscious Mind: Dr Joseph Murphy Maanu Graphics ,
ISBN-13 9789381529560
11- The new Leaders: Daniel Coleman Sphere Books Ltd , ISBN-139780751533811
12   The 80/20 Principal: by Richard Koch, Nicholas Brealey Publishings ,
ISBN-13 9781857883992
13 Time management from inside out: Julie Morgenstern, Owl Books (NY),
ISBN-13 9780805075908
14. Wonderland of Indian Manageress: Sharu Ranganekar, Vikas Publishing Houses,
ISBN-13 9788125942603
15. You can win: Shiv Khera, Macmillan, ISBN-139789350591932
16 . The Ace of Soft Skills: Attitude, Communication and Etiquette for Success:
Gopalaswamy Ramesh, Mahadevan Ramesh
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Fluid Mechanics-I (201004)

Teaching Scheme

Lectures: ---4-hours/week

Practical: --2 hours/week

Examination Scheme

1st Online Exam.: 25Marks (30min.)

2nd Online Exam. :25 Marks (30min.)

Theory Examination: 50 Marks

Oral Exam. -50 Marks

Term work -25 Marks

SECTION I

UNIT I:
Properties of Fluids & Dimensional Analysis.

a) Definition of fluid and fluid mechanics: examples and practical applications involving fluids at rest and in motion, physical properties of fluids: density, specific weight, specific volume, relative density and viscosity. Newton's law of viscosity, classification of fluids, rheological diagram, Dynamic and kinematic viscosity, compressibility, cohesion, adhesion, surface tension, capillarity, vapour pressure, problems involving use of above fluid properties.

b) Dimensions of physical quantities, dimensional homogeneity, dimensional analysis using Buckingham's π theorem method, geometric kinematic and dynamic similarity, important dimensionless parameters, Reynold's No., Froude No. and their significance.   **(08 hours)**

UNIT II:
Fluid Statics, Buoyancy

a) The basic equation of hydrostatics, concept of pressure head, measurement of pressure (absolute, gauge), application of the basic equation of hydrostatics, simple manometers, differential manometers and precision manometers. Centre of pressure, total pressure on plane and curved surfaces, practical applications.

b) Principle of floatation and buoyancy, equilibrium of floating bodies, stability of floating bodies. Metacentre and metacentric height and its determination (experimental &analytical).

(08 hours)

UNIT III:
Fluid Kinematics.

a) Methods of describing the motion of fluid, velocity and acceleration, and their components in Cartesian co-ordinates, stream line, stream tube, path line, and streak line, control volume. Classification of flow, steady and unsteady, uniform and non-uniform, laminar and turbulent. One, two, and three-dimensional flows.

b) Equation of continuity for three dimensional flow in Cartesian co-ordinates, equation of continuity for one-dimensional flow along a streamline, types of motion, rotational and irrotational motion, velocity potential, stream function and flow net, methods of drawing flow net, uses and limitations of flow net.   **(08 hours)**

SECTION II
UNIT IV:
Fluid dynamics, Bernoulli's equation
a) Forces acting on fluid mass in motion, Euler's equation of motion along a streamline and its integration, assumptions of Bernoulli's equation, kinetic energy correction factor. Hydraulic grade line and total energy line. Linear momentum equation and momentum correction factor.

b) Venturimeter, orifice meter, Rotameter,Flow through sharp edged circular orifice discharging free, Hydraulic coefficient for orifice, experimental determination, mouthpiece, pitot tube,. Introduction to weirs and notches .

(08 hours)

UNIT V:
Laminar flow & boundary layer theory.
a) Reynolds experiment, laminar flow through a circular pipe, flow between two parallel plates-Couette flow only , Stokes' law, methods of measurement of viscosity, flow through porous media, Darcy's law. Transition from laminar to turbulent flow.
b) Development of boundary layer on a flat plate, nominal, displacement, momentum, energy thicknesses, laminar, transitional and turbulent boundary layer, laminar sub layer, Local and mean drag coefficients, hydrodynamically smooth and rough boundaries. Boundary Layer separation and its control. **(08 hours)**

UNIT VI:
Turbulent flow & Flow through Pipes
a) Characteristics of flow, instantaneous velocity, temporal mean velocity, scale of turbulence and intensity of turbulence, Prandtl's mixing length theory, velocity distribution in turbulent flow.
b) Flow through pipes: energy losses in pipe flow (major losses and minor losses), Darcy Weisbach Equation,Borda Carnot equation, variation of friction factor for laminar flow and for turbulent flow, Nikuradse's experiments on artificially roughened pipes, resistance to flow in smooth and rough pipes, friction factor for commercial pipes, Moody's diagram, flow through pipes such as simple, compound, series parallel, Dupits equations, branched pipes,(Three reservoir and pipe net work analysis- only theory) **(08 hours)**

Term work :

The term work shall consist of a journal giving details of a minimum 8 out of the following experiments. Sr No 11 is compulsory.
1. Measurement of viscosity by Redwood viscometer
2. Measurement of surface tension
3. Measurement of pressures using different pressure measuring devices

4. Determination of stability of floating bodies using ship models.
5. Drawing flow net by electrical analogy for flow below weir (with & without sheet pile)
6. Experimental verification of Bernoulli's theorem with reference to loss of energy
7. Calibration of Venturimeter / Orifice meter
8. Plotting the pattern of laminar flow using Reynolds apparatus or Heleshaws apparatus
9. Transition of Laminar and turbulent flow through pipes
10. Determination of, minor loss in a pipe system/friction factor for a given pipe.
11. Demonstration of fluid flow through appropriate VCD/Audio visual/PPT's

Assignments any two, of the following.

1. Solve three reservoir problem / pipe network analysis using Excel or any programming language.
2. Use of HEC for solving any problem related to theory.
3. Determination of friction factor for a pipe using any programming language
4. Application of any fluid mechanics software to analyze the problem

Note: **-** Term Work should include a detailed analysis of practical interpretation, significance and application of test results including above contents in form of journal.

Oral : Based on above syllabus and term work.

Text Books :
1.   Hydraulics & Fluid Mechanics by Modi and Seth, Standard Book House
2.   Fluid Mechanics and Fluid Machinery-S.K.Bansal-
3.   Theory and Applications of Fluid Mechanics—K.Subramanya- Tata McGraw Hill
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Reference Books :
 1.Fluid Mechanics-Yunus Cengel, Jhon Cimbala- Tata Macgraw Hill,New Delhi
 2. Inroduction to Fluid Mechanics-E.J.Shaughnessy,I.M.Kartz-Oxford University Press
 3 Fluid Mechanics by . R.J.Garde, A.J Mirajgaonkar, SCITECH Publication
 4 Fluid Mechanics and Hydraulics by Suresh Ukarande, Ane Books Pvt.Ltd.
 5. Fluid Mechanics by Streeter & Wylie, Tata McGraw Hill.
 6. Fluid Mechanics & its Application, Vijay Gupte &Santosh K.Gupte,New Age
    International publisher
 7. Fluid Mechanics by Dr A. K.Jain
 8. Introduction to Fluid Mechanics by S K Som and G Biswas, Tata McGraw Hill.
 9. Fluid Mechanics with Engineering Applications by Daugherty, Franzini &
 10 Fennimore, SI Metric Edition by K Subramanya, McGraw Hill.
 11. Fluid Mechanics by White, McGraw Hill.
 12. Mechanics of Fluids by Irving Shames, McGraw Hill.
 13.Fluid Mechanics and Machinery—C.P.Kothandaraman—New Age International
    Publishers

Hand books:

1. http://www.engmatl.com/home/viewdownload/10-engineering-handbooks-pocket-books/123-fluid-mechanics-handbook
2. http://www.springer.com/materials/mechanics/book/978-3-540-25141-5

e-Resourses:

1. http://nptel.iitm.ac.in/courses.php
2. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-KANPUR/FLUID MECHANICS /ui/Course_home-3.htm

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Architectural Planning and Design of Buildings (201005)

Teaching Scheme	Examination Scheme

Teaching Scheme

Lectures: 4 hours/week

Practical: --4 hours/week

Examination Scheme

1st Online Exam.: 25Marks

2nd Online Exam. :25 marks

Theory   Paper   50 marks

Term work: 25marks

Practical: 50 marks.

SECTION I

UNIT I:
Town planning and legal aspects   .

a) Town Planning :History, necessity and evolution of town planning in India. Importance of safety, amenities and services. -Development plan and its importance with reference to living, working and leisure; Land use- zoning: Introduction to different zones of land in town planning, Requirements of residential zone, commercial industrial and agricultural zone, open areas, green belts and parks.

b)Legal Aspects: Role of Plan Sanctioning Authority for Townships, co-op Housing societies and apartments. Ownership of land, plot, 7/12 abstract, meanings of different terms of 7/12 abstract, 6-D form, list of documents to be submitted along with building Plan for sanction from the authority. TDR, certificate of commencement and completion, various no objection certificates to be produced, format of permissions from pollution control board, MSEB, Water Supply and Drainage Department, State or National Highway Department**.   (8 hours)**

UNIT II:
Planning, Design and Safety of Buildings

a)Principles of Architectural Planning and Design: Function/Utility , form, planning for utility and aesthetics, submission drawings, working drawings. Design of buildings for different climatic conditions and comfort standards. ,

   Principles and Planning concepts of green buildings: Salient features of a Green Building , Site Integration ,Benefits of green Buildings Planning concepts of Green Buildings or Eco-housing , Environmentally Friendly, Non-Toxic Paint ,Green Roofing ,Use of Insulating Materials ,Cost Effective Housing

b) Safety Aspects: fire safety, fire load, grading of occupancies by fire loads, consideration in fire protection, properties of fire resistant construction: wall, column, roofs and floors, wall openings, fire escape elements

c) Introduction to earthquake resistant structures:Need for earthquake resistant structures- loss of human
     life; property and infrastructure , effective disaster management , existing techniques.
                                                                                    (8 hours)

UNIT III:
Building Services

a)Noise and Acoustics: noise control, sound insulation, Acoustics: reverberation, acoustical defects, conditions of good acoustics, sound absorbents; Vertical Circulation: Lifts, escalators, staircase;Telecommunication, Electrical, Entertainment etc.;Use of solar energy , rain water harvesting systems etc.

b)Ventilation – Necessity of Ventilation, Natural ventilation stack effect, wind effect, orientation with respect to ventilation, mechanical ventilation, objectives, selection of ventilation system, air conditioning: necessity, design data, comfort factors, calculation of air conditioning cooling load, air distribution, air conditioning system.

C) Lighting – Principles, day lighting design of windows, artificial illumination, solar energy systems for lighting.

D)Plumbing Services – water storage tanks at Ground level and on terrace, calculation of storage capacity, layout of water supply and drainage systems.

(8 hours)

SECTION II

UNIT IV:
Architectural Drawing and building byelaws
a) Introduction Architectural drawing :i) Line plan and its development, ii) Developed plan, Elevation
  ,   Section.iii) Isometric, Axonometric, Perceptive-One point and Two point.
b)Drawing paper sizes, Engineering folds, Symbols etc.
c) Building rules and bye laws**.**: Necessity of building rules and bye laws, plot sizes, road widths, open spaces, floor area ratio of (FAR), marginal distances, building line, control line, heights regulations, room sizes, Area calculations for Built up area, floor area, carpet area, rules for ventilation, lighting, drainage, sanitation and parking of vehicles, rules for layout plans.

(8 hours)

UNIT V:
Planning of Residential Buildings
 a)Residential buildings – types-Load bearing/Framed structure**.**

b). Developed Plans :i)Bungalows ii) Row houses, iii)Ownership flats iv)Apartments and v) Twin Bungalows.

c). Elevation:i)Bungalows ii) Row houses, iii)Ownership flats iv)Apartments and v) Twin Bungalows
d). Section: i) Bungalows ii) Row houses, iii)Ownership flats iv)Apartments and v) Twin Bungalows.

(8 hours)

UNIT VI:
Planning of Public Buildings
a)Educational buildings, buildings for health care, industrial buildings and commercial buildings.

b) Dimensioned line plans of various public buildings

(8 hours)

Term Work

A) Working Drawings of any one type of building (either residential or public). Individual project to be planned. Submission of working drawing on 1:50 or suitable scale.

1. Layout Plan

2. Typical floor plan/s(by hand)

3. Elevation (by hand)

4. Sectional Elevation (by hand)

5. Axonometric view (on tracing paper)

6. Water Supply and Drainage layout. (On tracing paper)

B) Detailed line plans of any two public buildings to be drawn on graph papers.

C) Two point perspective for any small object on construction field like steps, pedestal , flower bed , bench ETC

D) AutoCAD drawing for residential bungalow- Plan ,Elevation,section with electric layout.

E) Report on applications of Architectural software (such as AutoCAD, 3 D Max, Revit and updations) –any two, prevailing in the market , supporting for the development of any project.-Report should contain the details like   ------

     Name, Year of release , Developer , Updations from the year of release , Application areas , A small application and its printout , Architecture of software , Compatibility with other software , Cost (free or paid) , licensed year.

F) Compilation of the documents required from commencement to completion of the building by

     the concerned local body i.e.Muncipal Corporation or nearest Municipality

G)Study and summary in own words about the D.C.Rules of own or nearest city.

- **Prerequisite:** - 1. NBC-2005   2. DC RULES   3. Income group concepts (Plot areas, Dimensions etc)   4. Green building concepts

Practial Exam will be based on above syllabus and term work. Practical exam. will be of 1hour and 30 minutes in batches of appropriate size and will consist of---

    i) Exercise of planning based on Software.

    ii) Exercise on D.C.Rules / Commencement to completion documents

    iii) Any one exercise on above syllabus of Term work.

Text Books :

  1 Building Drawings with an integrated Approach to Built-Environment – Shah, Kale and Patki- Tata Mcgraw Hill co. 5th edition.
  2   Building Science and Planning -- Dr. S. V. Deodhar. Khanna Publication
  3 Principles of Building Drawing—M.G.Shaha,C.M.Kale---Macmillan

Reference Books :

  1.   National Building Code (latest)
  2.   Building services – Prof. S.M.Patil
   3   Times Saver standards of Architectural Design Data by Callender – Tata John Handcock Callender-McGaw Hill
  4. Building Design and construction by Merrit Tata McGraw Hill

General Reading Suggested
1**.** NBC-2005 (or latest edition)
2. "I.S. 962 – 1989 Code for Practice for Architectural and Building Drawings".
3."Civil Engineering Drawing".-- M. Chakraborty,
4. "A Course in Civil Engineering Drawing" --, V.B.Sikka, S.K.Kataria and Sons
5 . DC Rules of local body.
6 Green Building Rating Systems,
7. Development Plan
 8 .http://www.grihaindia.org/
 9. http://new.usgbc.org/
10.http://www.hcd.ca.gov/hpd/green_build.pdf
11 .http://ncict.net/Examples/Examples1.aspx
12 .http://www.igbc.in/site/igbc/
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Structural Analysis - I (201008)

Teaching scheme

Lectures: 04 hours/week

Examination scheme

1st Online Exa. 25 marks (30 minutes)
2nd Online Exa. 25 marks (30 minutes)
Theory Examination 50 marks (02 hours)

SECTION I

Unit 1: Fundamentals of structure, slope and defection.

a) Types and classification of structures based on structural forms, concept of indeterminacy, static and kinematics degree of indeterminacy. **(02 hours)**

b) Slope and deflection of determinate beams by Macaulay's method, concept of moment area method and conjugate beam method and its application. **(04 hours)**

c) Strain energy, Castigliano's first theorem, application to determine slope and deflection of determinate beams and frames. **(02 hours)**

Unit 2: Analysis of indeterminate beams and frames.

a) Propped cantilever and fixed beams by strain energy method, analysis of continuous beams by three moment theorem (Clapeyron theorem) up to three unknowns. **(04 hours)**

b) Castigliano's second theorem, analysis of beams and rectangular portal frames with indeterminacy up to second degrees. **(04 fours)**

Unit 3: Analysis of pin jointed plane trusses.

a) Joint displacement of determinate trusses by Castigliano's first theorem. **(04 Hours)**

b) Analysis of redundant trusses by Castigliano's second theorem, lack of fit, sinking of support, temperature changes (indeterminacy up to second degrees). **(04 Hours)**

SECTION – II

Unit 4: Influence line diagram.

a) Basic concept, Muller-Braslau's principle, influence line diagram for reaction, shear and moment to simply supported and overhanging beams, application of influence line diagram to determine reaction, shear and moment in beams. **(04 hours)**

b) Influence line diagram for axial force in trusses, application of influence line diagram to determine of axial forces in the members of plane determinate trusses under dead load and live load. **(04 hours)**

Unit 5: Analysis of arches

a) Three hinged arches: Concepts, types of arches, analysis of parabolic arch with supports at same and different levels, semicircular arches with support at same level, determination of horizontal thrust, radial shear and normal thrust for parabolic and circular arch. **(04 hours)**

b) Two hinged arches: analysis of parabolic and semicircular arches with supports at same level, determination of horizontal thrust, radial shear and normal thrust. **(04 hours)**

Unit 6: Plastic analysis of structure.

a) True and idealized stress-strain curve for mild steel in tension, stress distribution in elastic, elasto-plastic and plastic stage, concept of plastic hinge and collapse mechanism, statical and kinematical method of analysis, upper, lower bound and uniqueness theorem. **(04 hours)**

b) Plastic analysis of determinate and indeterminate beams, single bay single storied portal frame. **(04 hours)**

Text Books

1. . Structural analysis: a matrix approach by Pandit and Gupta, Tata Mc Graw Hill.

2. Structural Analysis –Dr. Deodas Menon

3. Structural Analysis –T.S.Thandavmoorthy—Oxford University Press

4.Understanding Structures –Derek Seward-(ISBN-:978-0-2305-7428-1)-Palgrave

Reference Books

 1 Mechanics of Materials—James Gere, Barry Goodno—Cengage Learning
 2. Basic Structural Analysis byK.U.Mutthu,Azami Ibrahim,Maganti Janardhana—
        I.K.International Publishing House (ISBN-978-93-81141-30-4)
3. Basic Structural Analysis by C S Reddy, Tata Mc Graw Hill.
 4. Structural Analysis by R C Hibbler, Pearson Education.
5. Plastic Methods of Structural Analysis by B. G. Neal, Champman and Hall.
6. Elementary Structural Analysis by Norris, Wilbur and Utku, TMH.
7. Intermediate Structural Analysis by C K Wang, Mc Graw Hill.
8.Mechanics of Structures Vol. II by S B Junnarkar and Dr. H J Shah, Charotar.
9.Introduction toStructural Mechanics(ISBN-13:978-0-230-57429-8)—P.S.Smith—Palgrave

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Engineering Geology (207009)

Teaching scheme: Examination scheme:
Lectures: 04 hours/week   1st Online Paper: 25 marks (30 min.)
Practical: 02 hours/week   2nd Online Paper: 25 marks (30 min.)
                                         Theory Exam: 50 marks (2 Hrs)
                                         Term work: 25 marks

SECTION I

Unit 1: Mineralogy, Petrology and General Geology.

a) *Introduction to the subject, object, scope and sub divisions*: Introduction to mineralogy, rock forming minerals and their properties, primary and secondary minerals, felsic and mafic minerals, essentials and accessory minerals.   (02 hours)

b) *Introduction to petrology:* Main divisions of rocks. Igneous rocks: mineral composition, textures, reasons of textural variation, textures of plutonic, hypabyssal and volcanic rocks. Classification of igneous rocks, study of common rock types prescribed in practical work and their engineering applications.   (03 hours)

c) *Secondary rocks:* Rock weathering, decomposition and disintegration, classification and grain size classification, textures of secondary rocks, features of shallow water depositions, study of common rock and engineering applications. (02 hours)

d) *Metamorphic rocks:* Agents and types of metamorphism, metamorphic textures and structures, study   of common rock types prescribed in practical work and their engineering applications. Rock cycle   (02 hours)

Unit 2: Structural Geology and Plate Tectonics.

a) *Structural geology:* Out crop, dip and strike, conformable series, unconformity and over lap, faults and their types, folds and their types, inliers and outlier.   (05 hours)

b) *Structures:* Structural features resulted due to igneous intrusions, concordant and discordant igneous Intrusions, joints and their types, stratification and lamination. (03 hours)

c) Mountain building activity and introduction to plate tectonics.   (01 hour)

Unit 3: Geomorphology and Historical Geology.

a) *Geomorphology:* Geological action of river, Coastal Geology.   (03 hours)

b) *Historical geology:* General principles of Stratigraphy, geological time scale, physiographic divisions of India, significance of their structural characters in major civil engineering activities. (03 hours)

Unit 4: Preliminary Geological Studies and Remote Sensing.

a) *Preliminary geological explorations:* Surface survey, reconnaissance survey, subsurface survey, drill holes, preservation of cores. Compilation and interpretation of information obtained from these, comparative reliability of data obtained by drilling and excavation.   (04 hours)

b) Correlation of surface data with results of subsurface exploration, limitations of drilling, engineering significance of geological structures i.e. stratification, dips, folds, faults, joints, fractures, crush zones, fault zones, dykes, and case studies.   (04 hours)

c) Remote sensing and geographical information system, application of remote sensing and geographical information system in Civil Engineering.   (02 hours)

Unit 5: Role of Engineering Geology in Reservoirs, Dams and Tunneling.

a) Geology of dam site: Strength, stability and water tightness of foundation rocks, influence of geological conditions on the choice and type of dam, preliminary geological work on dam sites, precaution to be taken to counteract unsuitable conditions like leaky rocks, faults, dykes, crush zones, joints, fractures, unfavorable dips, etc. and their treatments, case studies.   (03 hours)

b) *Geology of reservoir sites:* Physical properties and structure of rocks, geological conditions suitable and unsuitable for reservoir sites, conditions likely to cause leakage through reservoir rims, importance of ground water studies and effects of rising of the water table and case studies.   (02 hours)

c) *Tunneling:* Preliminary geological investigations for tunnels, important geological considerations while choosing alignment, difficulties during tunneling as related with lithology, nature and structures of material to be excavated, role of groundwater, geological conditions likely to be troublesome, suitability of common rock types for excavation and tunneling, unlined tunnels and case studies.   (03 hours)

Unit 6: Geological Hazards, Ground Water and Building Stones.

a) *Geological hazards:* Volcanism, Earthquakes & Seismic zones of India, Landslides and stability of hill slopes, its causes, role of water, stability of slopes in consolidated material, influence of dip and slope, safe and unsafe slopes, prevention of landslides, keeping slopes free from water, retaining walls, vegetation, slope treatment, precautions to be taken while aligning roads along the slopes and case studies. (02 hours)

b) *Groundwater:* Types of ground water, water table and depth zones, relation between surface relief and water table, influence of hydrological properties of rocks, geological work of groundwater, effects of solution and deposition, geological conditions favorable for natural springs and seepages, depression and contact springs, hot springs and geysers, wells and drill holes, fluctuations in water table levels,

effects of dams and canals, effect of pumping, cone of depression, circle of influence, conservation of groundwater, artesian wells, and geological conditions, water bearing capacity of common rocks. (02 hours)

c) *Building stones:* Requirements of good building stone, strength, durability, ease of dressing, and appearance on mineral composition, textures and field structures, suitability of common rocks as building stone. (02 hours)

Term Work:

Essential: The lab should be developed according to the standards and specifications of AICTE, University of Pune.

Following 8 experiments/assignments are to be compulsorily performed. Term work shall consist of journal giving details of the experiments performed in the laboratory and the reports of field visits.

1. Megascopic identification of following mineral specimens (around 50).

Rock Crystal, Rosy Quartz, Transparant Quartz, Milky Quartz, Smoky Quartz, Amethyst, Chalcedoney, different varieties of Agate, Jasper Banded Hematite Jasper, Orthoclase, Microcline, Plagioclase, Muscovite, Biotite,Olivine , Apophyllite, Stilbite, different varieties of Calcite, Gypsum Tourmaline, Chromite, Limonite, Asbestos, Laterite, Kyanite, Graphite, Haematite, Pyrite, Hornblende, Diopside,Hypersthene,Micaceous Haematite, Garnet,

2. Megascopic identification of following different rock specimens (around 50).

Hbl. Muscovite Granite, Granite porphyry, Hornblende Granite, Syenite, Syenite porphyry, Diorite, Epidiorite, Gabbro, Pegmatite, Picrite,Graphic Granite, Tourmaline Pegmatite, Dolerite,Rhyolite, Andesite,Pumice, Trachyte, Compact Basalt, HT. alteredA.B, Giant Phenocryst Basalt (GPB),Amygdaloidal Basalt, Pipe A.B,Volcanic Breccia, Tuff breccias, Laterite, Bauxite, Conglomerate, Secondary Breccia,Sandstone (Red), Sandstone With Ripple marks, Sandstone (White), Sandstone (weathered), Sandstone (Micaceous), Sandstone (Motteled), Sandstone (Current Bedding), Shahabad Limestone, Red Limestone, Black Limestone, Stalactite Limestone,Oolitic limestone, Shelly Limestone, Chert Breccia, Secondary Quartzite, Mudstone, Kyanite Quartzite, Grit,Arkose sandstone, Shale (White), Shale (Yellow), Shale (Black), Marble, Serpentine Marble, Phyllite, Slate, Augen Gneisse, Hornblende Biotite Gneisse, Hornblende Gneisse, Mica Schist, Biotite Schist With Garnet, Muscovite Schist,

Chlorite Schist With Magnetite, Hornblende Schist, Chlorite Schist, Talc Schist, Talc Chlorite Schist, Talc Mica Schist, Talc Actinolite Schist, Quartz Sericite, Schist, Graphite Schist, Khondalite, Charnockite,Amphibolite,

3. Interpretation and construction of geological sections from contoured geological maps (Total 8).

4. Solution of engineering geological problems such as alignment of dams, tunnels, roads, canals, bridges, etc. based on geological maps (Total 3). #(From A. G. Series 8 maps and 2 maps constructed   by the faculty members)

5. Logging of drill core and interpretation of drilling data with graphical representation of bore log.

6. Visit report I based on study of various geological features and their application, covering details from section I .

7. Visit report I based on study of various geological features and their application, covering details from section II .

8.Assignment on any one of the following softwares

   a) GRAM++ software   b) ARC GIS   c) Any geological software

  Text Books:
  1.   Text Book of Engineering Geology by R.B. Gupte 2001, P.V.G. Publications,Pune.
  2. Engg. Geology-Subinoy Gangopadhyay-Oxford University Press
  3. A Text Book of Engineering Geology by N. Chenna Kesavulu. 2010, McMillan India Ltd.
  Reference Books:

  1. Principles of Engineering Geology by S.K.Garg.1999, Khanna Publ, New Delhi
  2. Principles of Engineering Geology by D. Venkat Reddy. 2010, Vikas Publishers.
  3. Geology and Engineering by K. V. G. K. Gokhale,
  4. Geology of India and Burma By. M. S. Krishnan,1982, CBS Publishers, New Delhi

  5. Physical Geology by Arthur Holmes-ELBS Publication.
  6. Structural Geology by M. P. Billings
  7. Principles of Engineering Geology and Geotechniques – D P Krynine & W R Judd CBS Publishers, New Delhi
  8. Engineering Geology by F G H Blyth and De Frietus,2006, Reed Elsevier India Ltd.,
  9 Engineering Geology by Bell.
General Reading Suggested:
  1.   IS Codes (List attached)
  2.   PGE Codes
  3.   AICTE Earthquake Handbook
  4.   NPTEL, IIT Kharagpur Study Material.

List of I.S .Codes

Sr. No	No. of the IS code	Title of the IS Code
1	IS 1123:1998	Method of identification of Natural building stone.
2	IS 4078:1967	Code of Practice for Indexing and Storage of drill cores
3	IS 4453: 1967	Code of Practice for exploration by Pits, Trenches, Shafts and Drafts
4	IS 5313: 1969	Guide lines for core drilling observations
5	IS 6926: 1973	Code of Practice for diamond core drilling for site investigations for river valley projects
6	Handbook	PWD Handbook Ch No. 6 Part II: 1980 published By Govt. of Maharashtra
7	IS 7779(Part II Sec. 1,2,3) :1979	Schedule of properties and availability of stones for construction purposes
8	IS 13030:1991	Method of test for lab determination of Water Content, Porosity, Density and related properties of rock material
9	IS 9143:1996	Method of determination of Unconfined Compressive Strength of rock material
10	IS 1124: 1998	Method of test for determination of Water absorption, Apparent Sp. Gravity, and porosity of natural building stone
11	IS1122: 1998	Method of test for determination of Sp. Gravity of natural building stone
12	IS 2386 Part VIII: 1997	Methods of test for Petrographic Examination
13	Code No. 653	An Introduction to Earthquake Hazards: AICTE handbook
14	IRC Sec. 2400	Surface and Subsurface Geotechnical Explorations

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Concrete Technology (201007)

Teaching Scheme

Lectures: 04 hours/week

Examination Scheme

1st Online Exam.: 25Marks (30min.)
2nd Online Exam. : 25 marks (30min.)
Theory Examination: 50 marks

Unit I: Introduction to Concrete as a Construction Material: General Perspective Ingredients of Concrete.

a) Cement – manufacture of Portland cement, basic chemistry of cement, hydration of cement, classification of cement, types of cement, tests on cement-field tests& laboratory tests Fly Ash: Classification of fly ash , properties of fly ash, tests on fly ash.

  b) Aggregate and water – Different classifications, Fine aggregate, coarse aggregate , mechanical properties, physical properties, deleterious materials, soundness, alkali-aggregate reaction, sieve analysis: fineness tests on aggregates, artificial and recycled aggregate, mixing water, curing water, tests on water.
Admixtures – functions, classification, types: mineral and chemical, IS: specifications (9103 and 456), compatibility of admixtures.

(08 hours)

Unit II: Properties, Production and Placement of Concrete
a) Fresh concrete: workability – factors affecting workability, cohesion and segregation, Bleeding, Laitance, workability tests, mixing- handling, placing and compaction of concrete, Influence of temperature, maturity rule.
b) Hardened concrete: strength of concrete, factors affecting strength, micro-cracking and stress-strain relationship, other strength properties, relation between tensile and compression strength, impact strength, abrasion resistance, elasticity and creep, shrinkage and swelling   (6hours)

Unit III: Testing of Concrete & Special Concretes
a) Testing of concrete: Testing of fresh concrete, testing of hardened concrete –compression test on cube and cylinder, Flexural test, indirect tensile strength, core test. Non destructive testing: Rebound hammer, Ultrasonic pulse velocity, Pullout test and Impact echo test, Marsh cone test, Rebar locator
 b) Special concretes: light weight concrete, Cellular light weight concrete-Form concrete and autoclave C.L.C, polymer concrete, types of fibers, fiber reinforced Concrete, high density concrete, self compacting concrete and applications.   (6 hours)

Unit IV   Special Concreting Techniques
a) Introduction to concrete related equipments: batching plants, hauling, pumps, Types of concrete mixers –Tilting, Non tilting and Reversible drum mixer, Types of vibrators
Special concreting techniques: pumping of concrete, under water concreting, ready mix concrete, roller compacted concrete Cold weather concreting, hot weather concreting

b) Ferrocement: Introduction ,Definition, Basic concepts in forming ferrocement composites, Comparison with R C C , Properties & specifications of ferrocement materials, Methods of construction ,Applications in construction industry (07 hours)

Unit V: Concrete Mix Design

Concepts of Mix Design, Factors for proportioning of concrete. Factors to be considered, Statistical quality control, Laboratory trial mixes and guidelines to improve mix , methods of Mix Design- IS (10262-2009, 456) and DOE.,Demontration and application of concrete mix design software (06 hours)

Unit VI: Deterioration and repairs.

a) Deterioration: permeability and durability, chemical attack and sulphate attack by seawater, acid attack, chloride attack, carbonation of concrete and its determination, corrosion of reinforcement .

b) Repairs: Symptoms and diagnosis of distress, evaluation of cracks, selection of repair procedure, repair of defects, common types of repairs, shotcrete, Introduction of retrofitting by using FRP, carbon fibers etc, Corrosion monitoring techniques & preventive measures. (6 hours)

Text Books
1. Concrete Technology --M.S. Shetty, S. Chand Publications.
2. Concrete Technology -- A R Santhakumar, Oxford University Press.
3. Concrete technology -- M. L. Gambhir, Tata Mcgraw Hill Publications.

Reference Books
1. Properties of concrete by A. M. Neville, Longman Publishers.
2. Concrete Technology by R.S. Varshney, Oxford and IBH.
3. Concrete technology by A M. Neville, J.J. Brooks, Pearson
4 Ferrocement Construction Mannual-Dr. D.B.Divekar-1030,Shivaji Nagar,Model Colony, Pune
5 Concrete Mix Design-A.P.Remideos--Himalaya Publishing House (ISBN-978-81-8318-996-5)
6. Concrete, by P. Kumar Metha, Gujrat Ambuja.
7. Learning from failures ---- R.N.Raikar
8 Structural Diagnosis ---- R.N.Raikar
9. Concrete Mix Design---Prof. Gajanan Sabnis

General Reading suggested:

1) Codes : 1)IS 456   2)IS 383 3)IS 10262-2009 4)IS 9103

2) Ambuja cement booklets on concrete

3) ACC booklets on concrete

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Testing of Materials (201009)

Teaching Scheme   **Examination Scheme**

Practical: 2 hours/week   Term work: 25marks

                                                       Oral Examination : 50 marks

Term Work

The term work shall consist of a journal giving details of the following.

Part A] I) Metals (All)	
1.	Tension and bend-rebend test on mild and TMT steel.
2.	Shear test on mild and TMT steel.
3.	Torsion test on mild steel and aluminum.
4.	Izod and Charpy impact test on mild steel, aluminum, brass and copper
II) Timber & Ply wood (Any one)	
5.	Compression test on timber. (parallel and perpendicular grain)
6.	Bending test on timber and plywood.
III) Bricks &Tiles (Any two)	
7.	Water absorption, efflorescence test and Compressive strength test on bricks
8.	Flexural strength of flooring and roofing tiles.
9.	Abrasion test of flooring tiles
IV) Cement & fly ash (Any Three)	
10.	Fineness of cement and fly ash (by dry method)
11.	Standard consistency of cement
12.	Initial and Final setting time and Soundness of Cement
13.	Compressive strength of Cement

V) Fine and Coarse Aggregates (Any Three)	
14.	Fineness modulus and grading of fine aggregate and coarse aggregate
15.	Moisture content, silt content, density and Specific gravity of fine aggregate
16.	Moisture content , water absorption, density and Specific gravity of coarse aggregate
17.	Flakiness and Elongation of coarse aggregate
18.	Impact Value and crushing Value of aggregate.
VI) Fresh & Hardened Concrete (Any one out of 19 -20)	
19.	Workability of concrete by slump test, compaction factor, Vee -Bee test, flow table.
20.	Effect of admixture on workability of concrete
21.	Split tensile strength of concrete
22.	Flexural strength of concrete
23.	NDT test by Rebound hammer or Ultrasonic Pulse velocity method.
24.	Concrete mix design by IS code method.(Using software as well as manually)

Part B]

Site Visit : At least two site visits related to term work and technical report of it.

Note: **-** Term Work should include a detailed analysis of practical interpretation, significance and application of test results including above contents and site visit report in form of journal.

Oral Practical examination will be based on term work.

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