Savitribai Phule Pune University
S.E. (Civil Engineering) 2015 Course

Semester I												
Course Code	**Course**	**Teaching Scheme Hours / Week**			**Semester Examination Scheme of Marks**						**Credit**	
		Theory (TH)	**Tutorials (TUT)**	**Practical (PR)**	**In-Sem**	**End-Sem**	**TW**	**PR**	**OR**	**Total**	**TH / TUT**	**PR/OR/ TW**
201001	Building Technology and Materials	04	--	02	50	50	50	--	--	150	04	01
207001	Engineering Mathematics III	04	01	--	50	50	50	--	--	150	05	
201006	Surveying	04	--	02	50	50	--	50	--	150	04	01
201002	Strength of Materials	04	--	02	50	50	--	--	50	150	04	01
201003	Geotechnical Engineering	04	--	02	50	50	--	--	50	150	04	01
	Audit Course 1 Awareness to Civil Engineering Practices	--	--	--	--	--	--	--	--	--	Grade	
Total		**20**	**01**	**08**	**250**	**250**	**100**	**50**	**100**	**750**	**25**	

Note: For audit courses students are given certificate by the institutes based on the assignment submitted by them.

Abbreviations: TW: Term Work, **OR:** Oral, **PP:** Passed (Only for non credit courses), **NP:** Not Passed (Only for non credit courses).

Savitribai Phule Pune University
S.E. (Civil Engineering) 2015 Course

Semester II												
Course Code	**Course**	**Teaching Scheme Hours / Week**			**Semester Examination Scheme of Marks**						**Credit**	
		Theory (TH)	**Tutorials (TUT)**	**Practical (PR)**	**In-Sem**	**End-Sem**	**TW**	**PR**	**OR**	**Total**	**TH / TUT**	**PR/OR/ TW**
201004	Fluid Mechanics I	04	--	02	50	50	--	--	50	150	04	01
201005	Architectural Planning and Design of Buildings	04	--	02	50	50	--	50	--	150	04	01
201008	Structural Analysis I	03	01	--	50	50	--	--	--	100	04	--
207009	Engineering Geology	04	--	02	50	50	50	--	--	150	04	01
201007	Concrete Technology	04	--	02	50	50	--	--	50	150	04	01
201010	Soft Skill	--		02	--	--	50	--	--	50	--	01
	Audit Course 2 Road Safety Management	--	--	--	--	--	--	--	--	--	Grade	
		19	**01**	**10**	**250**	**250**	**100**	**50**	**100**	**750**	**25**	

Note: For audit courses students are given certificate by the institutes based on the assignment submitted by them.

Abbreviations: TW: Term Work, **OR:** Oral, **PP:** Passed (Only for non credit courses), **NP:** Not Passed (Only for non credit courses).

Savitribai Phule Pune University, Pune
S.E. (Civil Engineering) 2015 Course

201001: Building Technology and Materials
Credits: 04+01

Teaching Scheme:	Examination Scheme:
Theory : 04 hrs/week	In-Semester (Online) : 50 Marks
Practical : 02 hrs/week	End-Semester : 50 Marks
	Term Work : 50 Marks

Prerequisites: Fundamentals of Basic Civil Engineering and Engineering Graphics.

Course Objectives:

1) To enumerate different types of structure and their requirement as building components.
2) To describe all basic activities of construction from foundation to finishing.
3) To study different types of materials used in construction for civil engineering projects.

Course Outcomes:

On completion of the course, learner will be able to:

1) Identify types of building and basic requirements of building components.
2) Explain types of masonry, formwork, casting procedure and necessity of underpinning and scaffolding.
3) Elucidate different types of flooring and roofing materials.
4) Describe types of doors, windows, arches and lintel.
5) Illuminate means of vertical circulation and protective coatings.
6) Explain different materials especially eco-friendly materials and safety measures to be adopted at any construction site.

Course Contents

Unit I: Introduction to Building Construction and Masonry. (08 Hrs)

a) Introduction to building construction– definition, types of building as per National Building Code. Building components and their basic requirements i.e substructure and superstructure requirements. Superstructure: Concept and advantages of a framed structure, types: light framed structures, Timber framed, RCC framed structures. Substructure - shallow and deep foundations and their suitability. General procedure in foundation design, Failure of foundation and its causes, Foundation in black cotton soil, Foundations near existing adjacent old structures. 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.

Unit II: Block Masonry and Form work (08 Hrs)

a) Block Masonry – Cellular lightweight concrete blocks, hollow blocks, concrete blocks, glass blocks, solid blocks, cavity wall construction. Requirement of a good partition wall: metal partitions, asbestos cement partition, wooden partition. Reinforced brick masonry: applications, advantages, materials required and construction procedure. Composite masonry: types, advantages, applications, materials required and construction procedure.

b) Form work and casting procedure for reinforced concrete columns, R.C.C. beams and girders, R.C.C. slabs, curing methods, precast and pre-stressed concrete construction and joints in concrete work. Slip form work: component parts- design criteria, underpinning, Scaffolding: purpose, types and suitability.

Unit III: Flooring and Roofing Materials. (08 Hrs)

a) Flooring and Flooring Materials – Functional requirement of flooring, types 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, tiled flooring, rubber flooring, cork flooring, epoxy asphalt flooring, hollow block and rib floors, Industrial flooring: tremix or Vacuum Dewatered Flooring (VDF).

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:dome, translation shells, space and frame structure: pneumatic structures, grain storage structures, prefabricated structures, fixing details of roof covering.

Unit IV: Doors, Windows, Arches and Lintels. (08 Hrs)

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.

Unit V:Vertical Circulation and Protective Coatings (08 Hrs)

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.

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.

Unit VI: Miscellaneous Materials and Safety in Construction (08 Hrs)

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, advantages and applications of aluminum, stainless steel, fibrous, laminated, particulate, combinations of composite materials: laminated fiber reinforced polymers. Glass: uses, types and properties, application and ingredients, market forms, glass claddings, aluminum composite panel cladding. Ceramic products: ceramic sanitary application, water closet, urinals, washes basins, their common sizes, pipes and fittings. Eco-friendly materials: eco-friendly decorating materials, eco-friendly flooring, thatch, bamboo, linoleum, cork.

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.

Books:

Text:

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

Reference:

1. Building Materials by S. K. Duggal, New Age International Publishers.
2. Civil Engineering Materials by TTTI Chandigrah, Tata McGraw Hill Publications.
3. Materials of construction by D.N Ghose, Tata McGraw Hill.
4. Building Construction by S.C. Rangwala, Charotdar Publications.
5. National Building Code of India 2005.
6. The construction of buildings; seventh edition, Vol.1 & Vol.2 by R. Barry, Oxford: Blackwell Science.
7. Building Materials Technology by Ruth T. Brantley & L. Reed Brantley, Tata McGraw Hill.
8. Properties of Concrete by A. M. Neville, Pearson Education Limited.
9. Mitchell's Advanced Building Construction: The Structure by J. Stroud Foster

e-Resources:

1. http://nptel.ac.in/syllabus/105102088/
2. http://www.theconstructioncivil.org/types-of-brick-bonds
3. http://theconstructor.org/building/types-of-partition-walls/3754
4. https://www.osha.gov/Publications/OSHA3252/3252.html
5. http://www.engineerwing.com/2012/10/tremix-flooring.html
6. http://nptel.ac.in/courses/Webcourse.../Composite%20Materials/.../LNm1.pdf
7. https://en.wikipedia.org/wiki/Fibre-reinforced_plastic.
8. https://cdn.intechopen.com/pdfs-wm/41941.pdf.
9. http://home.iitk.ac.in/~mohite/Composite_introduction.pdf
10. http://www.vdfflooring.in/faqs.html.
11. http://theconstructor.org/building/buildings/eco-friendly-building-materials/720.
12. http://nptel.ac.in/courses/105103093/21.

List of Laboratory Assignments

It shall consist of the following exercises and seminar.

A) Measurement drawing exercise of an existing residential building (G+1)
Draw a detailed plan, elevation and section using suitable scale on same sheet.
Following sketches pertaining to the above plan (with Standard Dimensions).
a. Door- Panelled door
b. Window
c. Stair.

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. Details of the shallow footings.
2. Details of arch showing different components

D) Two site visits and technical report on the visit.
1. Site visit based on existing residential building (G+1) as noted in part A above.
2. Any on-going Construction Site (visit report should contain: details of the project, stage of construction, sketches of components with cross section & dimensions, materials used and site plan, etc.)

E) 1. Collection of advertisements of modern construction materials and tools used in construction.
2. Visit to a construction related exhibition.

Term work: Based on above syllabus.

Savitribai Phule Pune University, Pune
S.E. (Civil Engineering) 2015 Course
207001: Engineering Mathematics III
Credits: 04+01

Teaching Scheme:	**Examination Scheme:**
Theory : 04 hrs/week	**In-Semester (Online) : 50 Marks**
Tutorials : 02 hrs/week	**End-Semester : 50 Marks**
	Term Work : 50 Marks

Prerequisites : Differential and Integral Calculus, Taylor series and Infinite series, Differential equations of first order and first degree, Fourier series, Measures of central tendency and dispersion, Vector algebra.

Course Objectives:

After completion of the course, students will have adequate background, conceptual clarity and knowledge of mathematical principles related to:

1) Ordinary and Partial differential equations applied to structural analysis and fluid dynamics in civil engineering.
2) Numerical methods for analyzing problems in hydraulics, geotechnics and structures in civil engineering.
3) Statistical methods such as correlation, regression analysis and probability theory for experimental data to quantify risk and safety in their designs.
4) Vector differentiation and integration applied to problems in fluid mechanics.

Course Outcomes:

On completion of the course, learner will be able to

1) Solve higher order linear differential equations and apply to civil engineering problems such as bending of beams and whirling of shafts.
2) Solve system of linear equations using direct and iterative numerical techniques and develop solutions to ordinary differential equations using single step and multistep methods applied to structural systems.
3) Apply statistical methods like correlation, regression analysis in analyzing and interpreting experimental data and probability theory applied to construction management.
4) Perform vector differentiation and integration, analyze the vector fields and apply to fluid flow problems.
5) Solve various partial differential equations such as wave equation, one and two dimensional heat flow equations.

Course Contents

Unit I: Linear Differential Equations (LDE) and Applications (09 Hrs)

LDE of n^{th} order with constant coefficients, Method of variation of parameters, Cauchy's & Legendre's Differential Equations, Simultaneous & Symmetric simultaneous Differential Equations. Modeling of problems on bending of beams, whirling of shafts and mass spring systems.

Unit II: Numerical Methods (09 Hrs)

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 4^{th} order and Predictor-Corrector methods.

Unit III: Statistics and Probability (09 Hrs)

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.

Unit IV: Vector Differential Calculus (09 Hrs)

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 Hrs)

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, Streamlines, Equations of motion, Bernoulli's equation.

Unit VI: Applications of Partial Differential Equations (PDE) (09Hrs)

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.

Books:

Text:

1. Advanced Engineering Mathematics, Ninth edition, by Erwin Kreyszig (Wiley India).
2. Advanced Engineering Mathematics, seventh edition, by Peter V. O'Neil (Cengage Learning).

Reference:

1. Advanced Engineering Mathematics, second edition, 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, second edition, by Thomas L. Harman, James Dabney and Norman Richert (Brooks/Cole, Thomson Learning).

Guidelines for Tutorial and Term Work

1. Tutorial shall be engaged in four batches (batch size of 20 students maximum) per division.
2. Term work shall be based on continuous assessment of six assignments (one per each unit) and performance in internal tests.

Term work: Based on above syllabus.

Savitribai Phule Pune University, Pune
S.E. (Civil Engineering) 2015 Course

201006: Surveying
Credits: 04+01

Teaching Scheme:		Examination Scheme :	
Theory :	04 hrs/week	In-Semester (Online)	: 50 Marks
Practical :	02 hrs/week	End-Semester	: 50 Marks
		Practical	: 50 Marks

Prerequisites: Fundamentals of Basic Civil Engineering and Engineering Mathematics.

Course Objectives:

1) To learn the basics of plane surveying and different types of instruments used for plane surveying.
2) To learn different methods of surveying.
3) To understand advancements in plane surveying such as electronic instruments and softwares.

Course Outcomes:

On completion of the course, learner will be able to

1) Operate and use surveying equipment.
2) Draw plan or map of the existing permanent features on the ground.
3) Classify the ground features from the map or plan.
4) Analyze temporary adjustments and check permanent adjustments of the Theodolite.

Course Contents

Unit I: Compass and Plane Table Surveying. (08 Hrs)

a) Definition, objective and fundamental classification of surveying (Plane and Geodetic), concept of Scale, Ranging, Chaining, Offsetting and Traversing. 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.

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

Unit II: Levelling and Contouring. (08 Hrs)

a) Introduction to leveling, Types of leveling, Types of bench marks, Study 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 leveling, curvature and refraction corrections, distance to the visible horizon.

b) Contouring – direct and indirect methods of contouring, uses of contour maps, study and use of topo-sheets, profile leveling and cross-sectioning and their applications.

Unit III: Theodolite Surveying. (08 Hrs)

a) Study of vernier transit 20" theodolite, uses of theodolite for measurement of horizontal angles by repetition and reiteration, vertical angles, measurement of deflection angles using transit theodolite and magnetic bearing, prolonging a line, lining in and setting out an angle with a theodolite. Fundamental axes of theodolite: testing and permanent adjustments of a transit theodolite.

b) Theodolite traversing – computation of consecutive and independent co-ordinates, adjustment of closed traverse by transit rule and Bowditch's rule, Gales traverse table. Checks, omitted measurements, area calculation by independent co-ordinates.

Unit IV: Tacheometry& Electronic Measurement Techniques. (08 Hrs)

a) Tacheometry – application and limitations, principle of stadia tacheometry, fixed hair method with vertical staff to determine horizontal distances and elevations of points, finding tacheometric constants. Tacheometric contouring.

b) Surveying using total station – Study and use of Electronic Tacheometer (Total station) types, functions (remote elevation measurements, remote distance measurements, area measurement).

Unit V: Curves. (08 Hrs)

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 and compound 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.

Unit VI: Construction Survey & Space Based Positioning System (SBPS) (08 Hrs)

a) Introduction to construction survey, establishing of horizontal and vertical controls, setting out of buildings, maintaining verticality of tall buildings, survey for open traverse (roadway, railways, drainage lines, water lines, canals).

b) Introduction to SBPS, SBPS systems - GPS, GLONASS, Galileo, GAGAN, BeiDou and their features, Segments of SBPS (Space, Control and User), applications of SBPS in surveying.

Books:

Text:

1. Surveying and Levelling Vol. I and Vol. II by T. P. Kanetkar and S.V.Kulkarni , Pune Vidyarthi Griha Prakashan.
2. Surveying and Levelling by Subramanian, Oxford University Press.
3. Surveying, Vol. I & II by Dr. B. C. Punmia, Ashok K. Jain, ArunK.Jain , Laxmi Publications.
4. Textbook of Surveying by C. Venkatramaiah , University Press.
5. Surveying for Engineers by John Uren & Bill Price, Palgrave Macmillan.
6. Surveying, Vol. I & II by S. K. Duggal, TataMc-Graw Hill.

Reference:

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

Codes:

1. IRC: SP: 19 -Manual for Survey, Investigation and Preparation of Road Projects
2. IRC: SP: 35 - Guidelines for Inspection and Maintenance of Bridges
3. IRC: SP: 54 - Project Preparation Manual for Bridges
4. IRC: SP: 42 - Guidelines on Road Drainage
5. IRC: SP: 50 - Guidelines on Urban Drainage
6. IRC: 73 - Geometric Design Standards for Rural (Non-Urban) Highways
7. IRC: 86 - Geometric Design Standards for Urban Roads in Plains
8. IRC: 38 - Design Tables for Horizontal Curves for Highways
9. IRC SP: 23 - Vertical Curves for Highways

e-Resources:

1. http://www.bis.org.in/sf/wrd/p_449.pdf
2. http://www.bis.org.in/sf/wrd/WRD10(491).pdf
3. http://www.bis.org.in/sf/wrd/WRD10(491).pdf
4. http://sbq.com.au/member/board-publications/code-of-practice/
5. http://usa.autodesk.com/adsk/servlet/pc/index?id=3091031&siteID=123112
6. http://www.cadacademynoida.com/?page=civileng3
7. http://www.sitetopo.com

List of Laboratory Assignments

Perform any five out of 1 to 7 and All projects 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 survey by Intersection method.
3. Finding horizontal and vertical distance using Tacheometer.
4. Simple and differential levelling with at least three change points using digital level.
5. Measurement of horizontal angles (by repetition method) using Vernier Transit Theodolite.
6. Setting out a circular curve by Rankine's method of deflection angles.
7. Setting out a building from a given foundation plan (minimum six co-ordinates).

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).

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, Auto-civil, Foresight etc. (minimum contour interval 1 meter).

Project III: Traversing using a total station (up to 2 acres area).

Savitribai Phule Pune University, Pune
S.E. (Civil Engineering) 2015 Course
201002: Strength of Materials
Credits : 04+01

Teaching Scheme:		Examination Scheme:	
Theory :	04 hrs/week	In-Semester (Online)	: 50 Marks
Practical :	02 hrs/week	End-Semester	: 50 Marks
		Oral	: 50 Marks

Prerequisites : Fundamentals of Physics, Mathematics and Engineering Mechanics.

Course Objectives:

1) To study the different types of stresses due to load, temperature, etc.
2) To learn concept of Shear Force and Bending Moment Diagram for determinate beams.

Course Outcomes:

On completion of the course, learner will be able to

1) Compute different type of stresses in determinate, indeterminate, homogeneous and composite structures.
2) Develop bending and shear stress diagram.
3) Determine the torsional stresses and stresses due to strain energy for different loading conditions.
4) Explain the concept of principal stresses due to combined loading and able to compare the values of analytical and graphical (Mohr's circle) method.
5) Plot loading diagram, Shear Force Diagram (SFD) and Bending Moment Diagram (BMD).
6) Analyze axially and eccentrically loaded column

Course Contents

Unit I: Simple Stresses and Strains. (08 Hrs)

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), strain s(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.

Unit II: Bending and Shear Stresses. (08 Hrs)

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 and shear connectors.

Unit III: Torsion and Strain Energy. (08 Hrs)

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.

Unit IV: Principal Stresses and Strains. (08 Hrs)

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

Unit V: Shear Force and Bending Moment Diagram. (08 Hrs)

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

Unit VI: **Axially and Eccentrically Loaded Columns. (08 Hrs)**

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.

Books:

Text:

1. Mechanics of Structures Vol. II by S. B. Junnarkar and Dr. H. J. Shah, Twenty second edition, Charotar Publishing House Pvt Ltd.
2. Strength of Materials by D. Ghosh A. K. Datta, New Age International Publishers
3. Strength of Materials by R. Subramanian, Oxford University Press.
4. Strength of Materials by S. S. Ratan, Tata McGraw Hill.
5. Mechanics of solids by R Vaidynathan, P Perumal and S Lingedwari, Scitech Publication (India) Pvt Ltd.

Reference:

1. Elements of Strength of Materials by Timoshenko and Young, East-West Press Ltd.
2. Strength of Materials by F.L. Singer and Andrew Pytel , Harper and Row Publication.
3. Mechanics of Materials by Beer and Johnston, McGraw Hill Publication.
4. Introduction to Mechanics of Solids by E.P. Popov, Prantice Hall Publication.
5. Mechanics of Materials by Gere & Timoshenko, CBC publisher.

List of Laboratory Experiments

Sr. No.	Group A
1	**Metals** 1. Tension test on mild and TMT steel. 2. Shear (Single & Double)test on mild steel. 3. Torsion test on mild steel. 4. Impact (I & C) test on mild steel, aluminum, brass.
	Group B
2	**Timber & Ply wood** 1. Compression test on timber (Parallel & Perpendicular) 2. Bending test on timber and plywood.
	Group C
3	**Bricks &Tiles** 1. Field tests, Water absorption and efflorescence test on bricks. 2. Compressive strength test on bricks 3. Flexural strength of flooring tiles. 4. Abrasion test of flooring tiles.

Term Work : Based on above syllabus

Savitribai Phule Pune University, Pune
S.E. (Civil Engineering) 2015 Course
201003: Geotechnical Engineering
Credits: 04+01

Teaching Scheme:		Examination Scheme:	
Theory :	04 hrs/week	In-Semester	: 50 Marks
Practical :	02 hrs/week	End-Semester	: 50 Marks
		Oral	: 50 Marks

Prerequisites : Fundamentals of Engineering Mathematics and Engineering Mechanics.

Course Objectives:

1) To describe soil properties, classification and its behavior under stress.
2) To learn methods for measurements and determination of index & properties of soil.
3) To study the interaction between water and soil and the effects of static vs flowing water on soil strength.

Course Outcomes:

On completion of the course, learner will be able to

1) Differentiate the different types of soil and their engineering properties and classify them;
2) Determine the soil properties in laboratory and develop a proficiency in handling experimental data;
3) Understand of the concept of effective stress and its influence on soil behavior.
4) Develop an understanding of the influence of water flow on the engineering behaviour of soils.
5) Analyze engineering properties like compaction, permeability, soil shear strength.
6) Compute the lateral thrust due to backfill on the retaining walls.
7) Classify soil slopes and identify their modes of failure.

Course Contents

Unit I: Introduction and Index Properties. (08 Hrs)

a) Introduction to Geotechnical Engineering and its applications to Civil Engineering, Types 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.

Unit II: Permeability and Seepage. (08 Hrs)

a) Soil water, permeability definition 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 5529 Part-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.

Unit III: Compaction and Stress Distribution. (08 Hrs)

a) Compaction – Introduction, Comparison between compaction and consolidation, 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 equipment 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.

Unit IV: Shear Strength of Soil. (08 Hrs)

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 V: Earth Pressure. (08 Hrs)

a) Earth Pressure – Introduction, Rankine's state of Plastic Equilibrium in soils- Active and Passive states due to wall movement, Earth Pressure at 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.

Unit VI: Stability of Slopes and Introduction to Geo-environmental engineering.(08Hrs)

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 Geo-environmental 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.

Books:

Text:

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. Geotechnical Engineering by Dr. B. J. Kasmalkar, Pune Vidyarthi Griha Prakashan.

Reference:

1. Geotechnical Engineering by C. Venkatramaiah, New Age International Publishers.
2. Principles of Geotechnical Engineering by Braj M.Das, Cengage Learning.
3. Geotechnical Engineering by P Purushothma Raj , Tata McGraw Hill.
4. Geotechnical Engineering by 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.

e- Resources:

1. http://ascelibrary.org/page/books/s-gsp.
2. http://accessengineeringlibrary.com/browse/geotechnical-engineers-portable-handbook-second-edition.
3. http://nptel.ac.in/courses/105101084/
4. http://nptel.ac.in/courses/105106142/

List of Laboratory Experiments / Assignments

The term work shall consist of a journal giving details of at least 11 out of 13 of the following experiments. Assignments - Sr. No 14 and 15 are compulsory.

1. Water content determination by any two methods a) Oven drying method, b) Infrared moisture method, c) calcium carbide method
2. Specific gravity determination by Pycnometer /density bottle.
3. Sieve analysis, particle size determination and IS classification as per I.S. Codes.
4. Determination of Consistency limits and their use in soil classification as per I.S. Codes.
5. Field density test by a) Core cutter b) Sand Replacement and c) Clod method
6. Determination of coefficient of permeability by a) Constant head and b) Variable head method.
7. Direct shear test.
8. Unconfined compression test.
9. Vane Shear test.
10. Standard Proctor test / Modified Proctor test.
11. Differential free swell test.
12. Triaxial test
13. Swelling Pressure test
14. Collection of sample soil investigation report for any construction project and write report about interpretation of index properties of soil.
15. 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.
    c) Flow net construction for sheet pile or earthen dam.

Note: Performance based oral examination on the above Term Work.

Savitribai Phule Pune University, Pune
S.E. (Civil Engineering) 2015 Course
Awareness to Civil Engineering Practices
Audit Course
(Certificate to be issued by institute based on performance assessment)

Civil Engineering is the oldest engineering profession comprising of a variety of sub-disciplines such as structural engineering, geotechnical, water resources, environmental engineering, construction, transportation etc. Undergraduate programmes are designed with different theoretical approaches on the application of basic sciences to solve different societal problems by engineering knowledge. However, there is a need to make the students aware about how the Civil Engineering industry operates and how theories taught in different courses are applied in practice. The students can learn from the experience gained from different workplaces such civil engineering consultancies, contracting companies, construction sites etc. The course aims to provide insight of the different practices followed by the industry such use of different contracts in civil engineering practice, local by-laws, duties and responsibilities of the Engineers, site records and diaries, Health and Safety practices on site, etc.

Course Objectives:

1) To provide basic overview of functioning of different civil engineering related industries / firms.
2) To provide awareness on application of different drawings, contract documents in civil engineering.
3) To provide insight of code of ethics, duties and responsibilities as a Civil Engineer.

Course Outcomes:

On completion of the course, learner will be able to understand

1) Different types of civil engineering industries and their functioning.
2) Applications of different documents, drawings, regulations in Civil Engineering industries.
3) Code of ethics to be practiced by a Civil Engineer and understand duties and responsibilities as a Civil Engineer
4) Different safety practices on the site.

Course Contents

1. Awareness lectures by professionals.
2. Visit to construction site/ architectural firms/ structural engineering firms etc.
3. Discuss on issues such as sustainability, eco-friendly techniques, use of locally available materials etc. directly related to techno economic development of society.

Guidelines for assessment

1. Presentation
2. Visit report
3. Group discussion

Savitribai Phule Pune University, Pune
S.E. (Civil Engineering) 2015 Course
201004: Fluid Mechanics-I
Credits: 04+01

Teaching Scheme:		Examination Scheme :	
Theory	**: 04 hrs/week**	**In-Semester (Online)**	**: 50 Marks**
Practical	**: 02 hrs/week**	**End-Semester**	**: 50 Marks**
		Oral	**: 50 Marks**

Prerequisites : Fundamentals of Engineering Mechanics, Engineering Mathematics and Engineering Physics.

Course Objectives:

1) To study basics of Fluid Mechanics, Fluid properties and concept of submerged & floating structure in a static fluid.
2) To make use of principles of continuity, momentum, and energy as applied to fluid motions.
3) To apply fundamental principles of fluid mechanics for the solution of practical civil engineering problems.

Course Outcomes:

On completion of the course, learners will be able to:

1) Use fluid properties, dimensional analysis for solving problems of fluid flow.
2) Solve fluid statics problems.
3) Measure fluid pressure.
4) Calibrate discharge measuring instrument like ventrurimeter, orifice meter.
5) Distinguish between various types of fluid flows and find the fluid velocity using principles of Kinematics and Dynamics.
6) Design pipes to carry particular amount of discharge.

Course Contents

UNIT I: Properties of Fluids & Dimensional Analysis (08 Hrs)

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 (Reynolds No., Froude No., Euler No., Mach no. and Weber No) and their significance , Model Laws (Froude's Law and Reynold's law)

UNIT II: Fluid Statics, Buoyancy (08 Hrs)

a) The basic equation of hydrostatics, concept of pressure head, measurement of pressure (absolute, gauge), application of the basic equation of hydrostatics, Pressure measuring devices (simple manometers, differential manometers: U tube, inclined, Mechanical gauges and precision manometers, pressure transducers and their types), Centre of pressure, total pressure on plane and curved surfaces, practical applications.

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

UNIT III: Fluid Kinematics (08 Hrs)

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; compressible and incompressible; rotational and irrotational; critical, sub critical and supercritical 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 (graphical and electrical analogy), uses and limitations of flow net.

UNIT IV: Fluid dynamics, Bernoulli's equation (08 Hrs)

a) Forces acting on fluid mass in motion, Euler's equation of motion along a streamline and its integration, assumptions of Bernoulli's equation, Modified Bernoulli's equation, its applications and limitations, Hydraulic grade line and total energy line. Linear momentum equation and kinetic energy correction factor, momentum correction factor (Only information).

b) Venturimeter, Orifice and orifice meter, Rotameter, Flow through sharp edged circular orifice discharging free, Hydraulic coefficients for orifice, Pitot tube.

UNIT V: Laminar flow & boundary layer theory (08 Hrs)

a) Reynolds experiment, laminar flow through a circular pipe, flow between two fixed parallel plates: Couette flow (only introduction), methods of measurement of viscosity (Newton's Law of Viscosity: Rotating cylinder viscometer:, Stokes' law: Falling sphere viscometer, Hagen Poiseuille Equation : Redwood Viscometer), Darcy's law, Transition from laminar to turbulent flow.

b) Concept of boundary layer, 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.

Unit VI : Turbulent flow & Flow through Pipes (08 Hrs)

a) Characteristics of flow, instantaneous velocity, temporal mean velocity, scale of turbulence and intensity of turbulence, Prandtl's mixing length theory.

b) Flow through pipes: energy losses in pipe flow (major losses and minor losses), Darcy Weisbach 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, flow through siphon.

Books:

Text:

1. Hydraulics & Fluid Mechanics by Dr. P. N. Modi and Dr. S. M. Seth, Standard Book House.
2. Fluid Mechanics and Hydraulic Machines by McGraw Hill Education (India).

Reference:

1. Fluid Mechanics by Yunus Cengel, Jhon Cimbala, Tata Macgraw Hill,New Delhi.
2. Fluid Mechanics by R. J. Garde, A.J Mirajgaonkar, SCITECH Publication.
3. Fluid Mechanics by Streeter & Wylie, Tata McGraw Hill.
4. Fluid Mechanics by Dr. A. K. Jain, Khanna Publishers.
5. Fluid Mechanics by K. Subramanya, McGraw Hill.
6. Fluid Mechanics by Frank White, McGraw Hill.
7. Fluid Mechanics and Fluid Machinery by R. K. Bansal, Laxmi Publications.

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

List of Laboratory Experiments / Assignments

The term work shall consist of a journal giving details of a minimum 8 out of the following experiments. **First Six experiments are compulsory.**

1. Measurement of viscosity by Redwood viscometer.
2. Measurement of pressures using different pressure measuring devices (including transducers /state of arts digital instruments also).
3. Determination of stability of floating bodies using ship models.
4. Experimental verification of Bernoulli's theorem with reference to loss of energy
5. Calibration of Venturimeter / Orifice meter.
6. Drawing flow net by electrical analogy for flow below weir (with & without sheet pile)
7. Plotting the pattern of laminar flow using Reynolds apparatus or Heleshaw's apparatus.
8. Transition of Laminar and turbulent flow through pipes.
9. Determination of, minor loss in a pipe system/friction factor for a given pipe.
10. Measurement of surface tension.
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. Determination of friction factor for a pipe using any programming language.
3. Application of any fluid mechanics software to analyze the problem.
4. Developing a demo model related to any fluid flow phenomenon (physical model/ soft model).
5. Assignment on drawing of flow net graphically.

Note: Performance based oral examination on the above Term Work.

Savitribai Phule Pune University, Pune
S.E. (Civil Engineering) 2015 Course

201005: Architectural Planning and Design of Buildings
Credits: 04+01

Teaching Scheme:	Examination Scheme:
Theory : 04 hrs/week	In-Semester (Online) : 50 Marks
Practical : 02 hrs/week	End-Semester : 50 Marks
	Practical : 50 Marks

Prerequisites : Basic Civil Engineering, Building Technology and Materials, National Building Code-2005, Developing Control Rules and Green building concepts.

Course Objectives:

1) To understand necessity of Town planning, principles of planning, principles of architecture and byelaws.
2) To study the planning for building services such as noise and acoustics, ventilation, lighting, plumbing work and safety practices.
3) To develop the plan, elevation and section of load bearing and framed structures.

Course Outcomes:

On completion of the course, learner will be able to:

1) Make use of principles of planning and principles of architectural Planning.
2) Analyze the available primary or secondary data and plan different types of structures considering futuristic need of an area.
3) Improve the status of existing structures by proposing appropriate green measures.
4) Plan effectively various types of buildings according to their utility with reference to different codes.
5) Understand and resolve contemporary issues at multi-dimensional functional levels.

Course Contents

Unit I: Town planning and legal aspects. (08 Hrs)

a) Town Planning : Necessity and evolution of town planning in India. Development plan and its importance, Objectives and Contents of DP, Land use zoning, Introduction to different zones of land in town planning, Requirements of various zones, Height zoning and Density zoning.

b) Legal Aspects : Role of Plan sanctioning authority, 7/12 abstract, meaning of different terms of 7/12 abstract, Form 6 and its types, Concept of TDR, List of documents to be submitted to local authority, Procedure for seeking Commencement and Occupancy Certificate, Various NOCs required.

Unit II: Architectural Planning , Building bye laws and introduction to Green Buildings (08 Hrs)

a) Principles of Architectural design relation between form and function, utility, aesthetics. Necessity of bye-laws, plot sizes, road width, open spaces, floor area ratio (F.A.R.), concept of V.P.R. Marginal distances, building line : control line, height regulations, room sizes, Area calculations (built-up area, carpet area etc.), Rules for ventilation, lighting, Vertical circulation, Sanitation and Parking of vehicles.

b) Green buildings: salient features, benefits, planning concepts (site selection, orientation, sun path and wind diagram etc.), Rating systems (LEED, GRIHA etc.)

Unit III: Architectural Drawing and Safety Aspects (08 Hrs)

a) Introduction to Architectural drawing : i) Line plan, ii) Developed Plan, iii) Elevation, iv) Section, Selection of scales for various drawings, dimensioning, abbreviations and conventions as per IS 962, Elements of perspective drawings, parallel and angular perspective of small building elements.

b) Safety Aspects: Fire load, grading of occupancies by fire loads, Evacuation Time, fire escape elements, Need for earthquake resistant structures, planning considerations, disaster management.

Unit IV: Building Services (08 Hrs)

a) Noise and Acoustics – Sound insulation, Acoustical defects, Reverberation time, Sabine's formula, sound absorbents, planning for good acoustics.

b) Ventilation – Necessity of Ventilation, Natural ventilation: stack effect and wind effect, Thermal Insulation, Mechanical ventilation and its types, air conditioning systems.

c) Lighting – Principles of day lighting, design of windows, artificial illumination, SC, ERC, IRC, Daylight factor, Solar energy systems for lighting (BIPV).

d) Plumbing – Water storage tanks at ground level and on terrace (capacity), Plumbing systems, various types of traps, Fixtures and Fittings, Rain Water Harvesting etc.

e) Other services – Telecommunication, Electrical, Smart services and Waste management etc.

Unit V: Planning of Residential Buildings (08 Hrs)

a) Functional requirements of Bungalows, Twin bungalows, Row houses, Ownership flats, and Apartments.

b) Developed Plan, Elevation and Sectional Elevation of above mentioned categories.

Unit VI: Planning of Public Buildings (08 Hrs)

a) Functional requirements and planning of industrial buildings, commercial buildings, School, Colleges , Hostel, Auditorium, Restaurant/ Hotel building, Primary Health Center/ Hospital, Shopping complex, Sports complex, Vegetable market, Post office, Bank buildings etc .

b) Dimensioned line plans of above public buildings.

Books:

Text:

1. Building Drawings with an integrated Approach to Built-Environment by M. G. Shah, C. M. Kale and S. Y. Patki, New Delhi, Tata McGraw Hill. (5th edition.)
2. Building science and planning by Dr. S. V. Deodhar, Khanna Publishers.
3. Building Services Engineering by David V. Chadderton, sixth edition, London & New York.
4. Drawing for Civil Engineering by Jan A. Van Der Westhuizen

Reference:

1. National Building Code (latest).
2. Building Design and construction by Frederick Merrit, Tata McGraw Hill.
3. Times Saver standards of Architectural Design Data by Callender, Tata McGaw Hill.
4. I.S. 962 – 1989 Code for Practice for Architectural and Building Drawings.
5. Development plan and DCP Rules of urban local body, New Delhi, Volume 12.
6. Model building bye laws by MoUD, GoI.

e-Resources :

1. http://www.grihaindia.org/
2. http://new.usgbc.org/
3. http://www.hcd.ca.gov/hpd/green_build.pdf
4. http://ncict.net/Examples/Examples1.aspx
5. http://www.igbc.in/site/igbc

List of Laboratory Assignments

Students shall prepare working drawings of any type of building from the list given in Unit V or Unit VI (**Individual project to be planned and manually drafted to suitable scale*):***

1. Layout/ Site plan indicating water supply and drainage line (with area statement).
2. Floor Plan/ Typical floor plan (with construction notes, schedule of openings).
3. Elevation and Sectional Elevation (preferably to be drawn on same sheet).
4. Developing measurement drawing exercise done in BTM course using CAD and Printout of the same.
5. Perspective drawing of a small building element.
6. Report file: It shall consist of data given for the project, Planning considerations and line plans, Design calculations.

Practical examination will be based on above syllabus and exercises mentioned in the list.
It will consist of :

i) Planning exercise on development of line plan or drawing the line plan using suitable Software or manual drafting.

ii) Exercise on D.C. Rules / numerical thereon or perspective drawing.

Assessment criteria: Line work, Planning/ designing abilities, Presentation and Understanding based on oral examination of relevant exercises.

Savitribai Phule Pune University, Pune
S.E. (Civil Engineering) 2015 Course

201008: Structural Analysis I
Credits : 04

Teaching Scheme:
Theory : 03 hrs/week
Tutorial : 01 hrs/week

Examination Scheme :
In-Semester (Online) : 50 Marks
End-Semester : 50 Marks

Prerequisites : Fundamentals of Physics, Mathematics, Engineering Mechanics and Strength of Materials.

Course Objectives:

1) To understand the basics configuration and classification of structures.
2) To analyze the determinate and indeterminate structures.

Course Outcomes:

On completion of the course, learner will be able to:

1) Understand the basic concept of static and kinematic indeterminacy, slope and deflection of determinate and indeterminate beams for analysis of structures.
2) Analyze indeterminate beams structures and frames.
3) Evaluate determinate and indeterminate trusses and its application in the field.
4) Apply influence line diagrams for the analysis of structures under moving load.
5) Analyze two and three hinged arches and its application.
6) Apply plastic analysis for indeterminate steel structures by limits state method.

Course Contents

Unit I: Fundamentals of Structure, Slope and Defection (08 Hrs)

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

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

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

Unit II: Analysis of Indeterminate Beams and Frames. (08 Hrs)

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

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

Unit III: Analysis of Pin Jointed Plane Trusses. (08 Hrs)

a) Joint displacement of determinate trusses by Castigliano's first theorem.

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

Unit IV: Influence Line Diagram. (08 Hrs)

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.

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.

Unit V: Analysis of Arches (08 Hrs)

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.

Unit VI: Plastic Analysis of Structure. (08 Hrs)

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.

b) Plastic analysis of determinate and indeterminate beams, single bay single storied portal frame

.

Books:

Text:

1. Structural Analysis: A matrix approach by G.S. Pandit and S. P. Gupta, Tata Mc Graw Hill.
2. Analysis Structures: Strength and behavior by T. S. Thandavamoorthy, Oxford University Press.
3. Mechanics of solids and Structures Volume I by R. Vaidynathan, P. Perumal and S Lingedwari, Scitech Publication (India) Pvt Ltd.
4. Structural Analysis Vol-1, third edition, By S S Bhavikatti, Vikas publishing House, PVT, LTD.

Reference:

1. Mechanics of Structures Vol. II by S B Junnarkar and Dr. H J Shah, Twenty second edition, Charotar Publishing House Pvt. Ltd.
2. Basic Structural Analysis by C. S. Reddy, Second Edition, Tata Mc Graw Hill.
3. Structural Analysis by R. C. Hibbler, sixth edition, Pearson Education.
4. Plastic Methods of Structural Analysis by B. G. Neal, Champman and Hall.
5. Elementary Structural Analysis by Senol Utku, Charles Head Norris, John Benson Wilbur, TMH.
6. Intermediate Structural Analysis by C K Wang, Tata McGraw Hill.

Savitribai Phule Pune University, Pune

S.E. (Civil Engineering) 2015 Course

207009: Engineering Geology

Credits: 04+01

Teaching Scheme:	**Examination Scheme:**
Theory : 04 hrs/week	**In-Semester (Online) : 50 Marks**
Practical : 02 hrs/week	**End-Semester : 50 Marks**
	Term Work : 50 Marks

Prerequisites : Fundamentals of Basic Civil Engineering, Building Technology and Materials, Geotechnical Engineering.

Course Objectives:

1. To study basic of engineering geology and introductory part of the earth science.
2. To understand the utility and application of geological principles in various phases of civil engineering activities.
3. To describe the sources, and characterization of common Building materials.
4. To learn the basic aspects occur due to structural features like folds and faults.
5. To explain various natural hazards and their implications on structures and effects on society.

Course Outcomes:

After completing this course students of civil engineering will be able to:

1. Explain the basic concepts of engineering geology.
2. Differentiate between the different rock types, their inherent characteristics and their application in civil engineering.
3. Understand physical properties, mechanical properties of the minerals and their application in civil engineering. .
4. Identify favourable and unfavourable conditions for the buildings, roads, dam, tunneling etc through the rocks.
5. Explain mass wasting processes, effects of mass wasting process on the civil engineering structures and remedial measures.
6. Interpret geohydrological characters of the rocks present at the foundations of the dams, percolation tanks, tunnels.
7. Understand Seismic activities and its effect on the civil engineering construction.
8. Identify geological hazards and presence of ground water.

Course Contents

Unit I: Mineralogy, Petrology and General Geology. (08 Hrs)

a) Introduction to the subject, scope and sub divisions.

b) Introduction to mineralogy: Properties of Minerals, Classification of Minerals.

c) Introduction to petrology: Rock Cycle, broad classification of rocks.

Igneous Petrology: Plutonic, Hypabyssal and Volcanic rocks, Structure, Texture and Classification of Igneous rocks. Study of common rock types prescribed in practical work and their engineering applications.

Sedimentary Petrology: Rock weathering, Genetic classification of secondary rocks and grain size classification and Textures, Sedimentary Structures, Digenesis Process. Study of common rock types prescribed in practical work and their engineering applications.

Metamorphic Petrology: Agents, Types of metamorphism, Texture and structures. Study of common rock types prescribed in practical work and their engineering applications.

Unit II: Plate Tectonics and Structural Geology. (08 Hrs)

a) Introduction to plate tectonics and Mountain building activity.

b) Structural geology: Out crop, dip and strike, conformable series, unconformity and overlap, faults and their types, folds and their types, inliers and outlier.

c) Structures: Structural features resulted due to igneous intrusions, concordant and discordant igneous Intrusions, joints and their types, stratification and lamination.

Unit III: Geomorphology and Historical Geology. (08 Hrs)

a) Geomorphology: Geological action of river, Coastal Geology.

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

Unit IV: Preliminary Geological Studies and Remote Sensing. (08 Hrs)

a) Preliminary geological explorations: reconnaissance survey, Desk Study, surface and subsurface Geological Investigation: methods, significance and limitations.

b) Techniques of correlation for surface and subsurface exploration, engineering significance of geological structures and relevant case studies.

c) Remote sensing (RS): Elements of remote sensing for Visual interpretation and geographical information system (GIS), application of remote sensing and geographical information system in Civil Engineering.

Unit V: Role of Engineering Geology in Reservoirs, Dams and Tunneling. (08 Hrs)

a) Geology of dams & Reservoir*:* Strength, stability and water tightness of foundation rocks, influence of geological conditions on the choice and type of dam, preliminary geological work on dam and reservoir sites, precaution to be taken to counteract unsuitable conditions and their relevant treatments with case studies.

b) Tunneling: Preliminary geological investigations, important geological considerations while choosing alignment, difficulties during tunneling as encountered due to various geological conditions, role of groundwater, and suitability of common rock types for excavation and tunneling and case studies.

Unit VI: Geological Hazards, Ground Water and Building Stones. (08 Hrs)

a) Geological hazards: Volcanism, Earthquakes & Seismic zones of India, Landslides and stability of hill slopes and preventive measures

b) Groundwater: Types of ground water, water table and depth zones, influence of hydrogeological properties of rocks, geological work of groundwater, types of aquifers, fluctuations in water table levels, effects of dams and canals, effect of pumping, cone of depression, circle of influence, conservation of groundwater, artesian wells, its geological conditions, artificial recharge of groundwater.

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

Books:

Text:

1. Text Book of Engineering Geology by R.B. Gupte , 2001, P.V.G. Publications, Pune.
2. A Text Book of Engineering Geology by N. Chenna Kesavulu. 2010, Mc Millan India Ltd.
3. Principles of Engineering Geology by S.K.Garg.1999, Khanna Publ, New Delhi.
4. Principles of Engineering Geology by D. Venkat Reddy. 2010, Vikas Publishers.
5. Geology and Engineering by K. V. G. K. Gokhale and D. M. Rao, Tata McGraw-Hill.

Reference:

1. Physical Geology by P. K. Mukarjee, World Press, 2013.
2. Physical Geology by Arthur Holmes, ELBS Publication.
3. Principles of Engineering Geology and Geotechniques by D. P. Krynine & W. R. Judd. CBS Publishers, New Delhi.
4. Engineering Geology by F. G. H Blyth and De Frietus,2006, Reed Elsevier India Ltd.

IS 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 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	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

List of Laboratory Assignments

Following experiments are to be compulsorily performed. Term work shall consist of journal giving details of the experiments performed.

1. Megascopic identification of following mineral specimens (around 50).
Rock Forming Minerals, Economic Minerals and Ore Minerals such as:
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).

a) **Igneous Petrology: Plutonic, Hypabyssal, Volcanic Rock** 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. altered A.B, Giant Phenocryst Basalt (GPB),Amygdaloidal Basalt, Pipe A.B, Volcanic Breccia, Tuff breccia,

b) **Sedimentary Rock: Rudaceous, Areanceous, Argillaceous, Chemical and Organic Deposits:** 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, Grit, Arkose sandstone, Shale (White), Shale (Yellow), Shale (Black)

c) **Metamorphic Petrology: Contact Metamorphic rocks, Dynamothermal Metamorphic rocks**: Kyanite Quartzite 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. Two site visits are desirable to study various geological features And their application, covering details from sections I and II.

7. GRAM++ software and ARC GIS software may be optional to perform.

Savitribai Phule Pune University, Pune
S.E. (Civil Engineering) 2015 Course
201007: Concrete Technology
Credits: 04+01

Teaching Scheme:		Examination Scheme :	
Theory	: 04 hrs/week	In-Semester (Online)	: 50 Marks
Practical	: 02 hrs/week	End-Semester	: 50 Marks
		Oral	: 50 Marks

Prerequisites : Fundamentals of Basic Civil Engineering, Engineering chemistry.

Course Objectives:

1) To know properties of various ingredients of concrete and concept of mix design.
2) To learn the behavior of concrete at its fresh and hardened state.
3) To understand special concrete and their application.
4) To explain deterioration of concrete and study methods of repair.

Course Outcomes:

On completion of the course, learner will be able to:

1) Understand chemistry, properties, and classification of cement, fly ash, aggregates and admixtures, and hydration of cement in concrete.
2) Prepare and test the fresh concrete
3) Test hardened concrete with destructive and nondestructive testing instruments
4) Get acquainted to concrete handling equipments and different special concrete types.
5) Design concrete mix of desired grade
6) Predict deteriorations in concrete and repair it with appropriate methods and techniques.

Course Contents

Unit I: Introduction to Concrete as a Construction Material: General Perspective Ingredients of Concrete. (08Hrs)

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.

b) Aggregate and water – Different classifications, Fine aggregate, coarse aggregate, mechanical properties, physical properties, deleterious materials, soundness, alkali-aggregate reaction, sieve analysis: Fineness and gradation 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.

Unit II: Properties, Production and testing of fresh concrete (08Hrs)

a) Fresh concrete: Workability – factors affecting workability, cohesion and segregation, Bleeding, Laitance, mixing, handling, placing and compaction of concrete, Influence of temperature, maturity rule.

b) Tests of fresh concrete – Workability by Slump cone, Compaction factor, Vee Bee consistometer and flow table test, Marsh cone test.

Unit III: Properties and tests on hardened concrete and Special Concretes (08Hrs)

a) 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.

b) 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, Rebar locator.

Unit IV: Concreting equipments, techniques and Special concretes (08Hrs)

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) 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. Ferrocement: Definition, Basic concepts in forming ferrocement composites, Methods of casting.

Unit V: Concrete Mix Design (08Hrs)

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 for M25 and above grades by IS (10262-2009, 456) and DOE methods with and without fly ash, Demonstration and application of concrete mix design software.

Unit VI: Deterioration and repairs. (08Hrs)

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, Corrosion monitoring techniques & preventive measures.

Books:

Text:

1. Concrete Technology by M. S. Shetty, S Chand, New Delhi-110055.
2. Concrete Technology by M. L. Gambhir, Tata McGraw-Hill.

Reference:

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 Manual by Dr. D. B. Divekar-1030,Shivaji Nagar, Model Colony, Pune.
5. Concrete Mix Design by A. P. Remideos, Himalaya Publishing House.
6. Learning from Failures: Deficiencies in Design, Construction and Service, R& D Center, 1987.

IS Codes :

IS 456, IS 383, IS 9103, IS 10262 Latest revised editions.

List of Laboratory Assignments

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

1. Fineness and standard consistency of cement.
2. Initial and final setting time and soundness of cement.
3. Compressive strength of cement.
4. Fineness of fly ash
5. Moisture content, silt content, density and Specific gravity of fine aggregate
6. Fineness modulus by sieve analysis of fine aggregate.
7. Moisture content , water absorption, density and Specific gravity of coarse aggregate
8. Fineness modulus by sieve analysis and gradation of fine aggregates.
9. Workability of concrete by slump test, compaction factor, Vee Bee test, effect of admixture and retarders on setting time concrete.
10. Compressive strength test of concrete by crushing and Rebound hammer.
11. Indirect tensile strength and flexural strength of hardened concrete
12. Concrete mix design by IS code method.
13. Site visit to RMC plant

Oral: Based on above syllabus and term work.

Savitribai Phule Pune University, Pune
S.E. (Civil Engineering) 2015 Course

201010: Soft Skill
Credits: 01

Teaching Scheme: **Examination Scheme:**

Practical: 02 hrs/week **Term Work : 50 Marks**

Prerequisites: Basic communication and writing skills in English.

Course Objectives:

1) To help the students in building interpersonal skills.
2) To develop skill to communicate clearly.
3) To enhance team building and time management skills.
4) To learn active listening and responding skills.

Course Outcomes:

On completion of the course, learner will be able to:

1) Make use of techniques for self-awareness and self-development.
2) Apply the conceptual understanding of communication into everyday practice.
3) Understand the importance of teamwork and group discussions skills.
4) Develop time management and stress management.
5) Apply business etiquette skills effectively an engineer requires.

Course Contents

UNIT I: Self Awareness & self Development (04 hrs)

a) Self Awareness: 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) Self Development: Career Planning, Personal success factors, Handling failure, Depression and Habit, relating SWOT analysis & goal setting, prioritization.

UNIT II: Communication Skill (06 hrs)

a) Communication: Importance, 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, and 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 hrs)

a) Corporate / Business Etiquettes: 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.

b) 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 hrs)

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 (GD): 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 hrs)

a) Leadership: Leaders' role, responsibilities and skill required - Understanding good Leadership behaviors, Learning the difference between Leadership and Management, Gaining insight into your Patterns, Beliefs and Rules.

b) Leadership Qualities: 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 hrs)

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 maximize your personal effectiveness, how to say "no" to time wasters, develop your own individualized plan of action.

b) Stress management: understanding the stress & its impact, techniques of handling stress

c) Skills: Problem solving skill, Confidence building Problem solving skill, Confidence building.

Books:

Text:

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

Reference:

1. Ethics in Engineering Practice and Research by Caroline & Whitbeck, Cambridge University Press.
2. NASSCOM-Global Business Foundation Skills: Accenture, Convergys, Dell et.al. Foundation Books: Cambridge University Press.
3. Basic Managerial Skills by E. H. McGrath, Eastern Economy Edition, Prentice hall India.
4. Personality Development and Group Discussions by Barun K. Mitra, Oxford University Press.
5. Group Discussions and Interview Skills by Priyadarshi Patnaik , Foundation Books , Cambridge University Press.
6. Thinks and Grow Rich by Napoleon Hill, Ebury Publishing, ISBN 9781407029252.
7. Awaken the Giant Within by Tony Robbins HarperCollins Publishers, ISBN-139780743409384.
8. Change Your Thoughts; Change Your Life by Wayne Dyer, Hay House India, ISBN-139788189988050.
9. The Power of Your Subconscious Mind by Dr Joseph Murphy Maanu Graphics , ISBN-13 9789381529560.
10. The new Leaders by Daniel Coleman Sphere Books Ltd , ISBN-139780751533811
11. The 80/20 Principal by Richard Koch, Nicholas Brealey Publishings , ISBN-13 9781857883992.
12. Time management from inside out by Julie Morgenstern, Owl Books (NY), ISBN-13 9780805075908.
13. Wonderland of Indian Manageress by Sharu Ranganekar, Vikas Publishing Houses, ISBN-13 9788125942603.
14. You can win by Shiv Khera, Macmillan, ISBN-139789350591932.
15. The Ace of Soft Skills by Attitude, Communication and Etiquette for Success: Gopalaswamy Ramesh, Mahadevan Ramesh.

Guidelines for Laboratory Conduction

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 compulsory 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. Stress management: understanding the stress & its impact, techniques of handling stress.

11. Team Activity: Use of Language laboratory.

Perform any 8 exercises from serial number 1 to serial number 10 and serial number 11 is compulsory

List of Term Work/Assignments

Term work will consist the record of any 8 assignments of following exercises

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**.**

Savitribai Phule Pune University, Pune
S.E. (Civil Engineering) 2015 Course

Road Safety Management
Audit Course
(Certificate to be issued by institute based on performance assessment)

Road transport remains the least safe mode of transport, with road accidents representing the main cause of death of people. The boom in the vehicle population without adequate road infrastructure, poor attention to driver training and unsatisfactory regulation has been responsible for increase in the number of accidents. India's vehicle population is negligible as compared to the World statistics; but the comparable proportion for accidents is substantially large.

The need for stricter enforcement of law to ensure greater safety on roads and an environment-friendly road transport operation is of paramount importance. Safety and security are growing concerns for businesses, governments and the traveling public around the world, as also in India. It is, therefore, essential to take new initiatives in raising awareness, skill and knowledge of students as one of the ibid stake holders who are expected to follow the rules and policies of the government in order to facilitate safety of individual and safe mobility of others.

Course Objectives:

1) To provide basic overview on road safety & traffic management issues in view of the alarming increase in vehicular population of the country.
2) To explain the engineering & legislative measures for road safety.
3) To discuss measures for improving road safety education levels among the public.

Course Outcomes:

On completion of the course, learners will:

1) Show changes in awareness levels, knowledge and understanding.
2) Demonstrate a change in attitudes / behavior e.g. against drink-drive.
3) Utilize remedial education for those who make mistakes and for low level offences where this is more effective than financial penalties and penalty points.
4) Improve road safety together leading to casualty reduction

Course Contents

1. Existing Road Transport Scenario
2. Accident Causes & Remedies
3. Road Accident Investigation & Investigation Methods
4. Vehicle Technology – CMVR & Road Safety
5. Regulatory / Legislative Provisions for Improving Road Safety
6. Behavioral Training for Drivers for Improving Road Safety
7. Road Engineering Measures for Improving Road Safety

Guidelines for Conduction (Any one or more of following but not limited to) 1. Guest Lectures. 2. Visits and reports. 3. Assist authorities like RTO for audits (e.g. Particular road safety audit as critical on-site assessment of the shortcomings in the various elements of the road). 4. Mini Project
Guidelines for Assessment (Any one of following but not limited to) 1. Written Test 2. Practical Test 3. Presentation 4. Report