Osmania University
Hyderabad- 7

SCHEME & SYLLABUS OF INSTRUCTIONS

of

B.E. CIVIL ENGINEERING
(III to IV Semesters)
ACADEMIC YEAR 2025-26

FOR BATCH 2024-2028

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Osmania University, Hyderabad.

B.E. (Civil Engineering)

III – SEMESTER

S.No	Code	Course Title	Scheme of Instructions			Contact Hrs/ Wk	Scheme of Evaluation			Credits
			L	T	P		Hrs	CIE	SEE	
Theory Courses										
1	BS 301 MT	Partial Differential Equations & Statistics	3	1	-	3	3	30	70	4
2	ES 302 CE	Engineering Mechanics	3	-	-	3	3	30	70	3
3	PC 302 CE	Building Materials and Construction Practices	3	-	-	3	3	30	70	3
4	PC 303 CE	Surveying and Geomatics	3	-	-	3	3	30	70	3
5	PC 304 CE	Strength of Materials-I	3	-	-	3	3	30	70	3
6	PC 305 CE	Fluid Mechanics-I	3	-	-	3	3	30	70	3
Practical / Laboratory Courses										
7	PC 351 CE	Building Drawing & Drafting Laboratory	-	-	2	2	3	25	50	1
8	PC 352 CE	Surveying and Geomatics Laboratory	-	-	2	2	3	25	50	1
9	PC 353 CE	Fluid Mechanics-I Laboratory	-	-	2	2	3	25	50	1
		Total	**18**	**-**	**6**	**24**		**255**	**570**	**22**

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Partial Differential Equations & Statistics

Common to B.E. (Civil & Mechanical)

Course Code	Course Title				Core/Elective
BS301MT	Partial Differential Equations & Statistics				Core
Prerequisite	Contact hours per week				Credits
	L	T	D	P	4
-	3	1	-	-	

Course Objectives:

1. To introduce the solution methodologies for first and second order Partial Differential Equations
2. Exploring random variables and probability distributions
3. Exploring regression analysis and correlation and applying statistical methods to real-world problems

Course Outcomes:

After completing this course, the students will be able to:

1. Solve field problems in engineering involving PDEs
2. Solution of boundary value problems involving PDEs
3. Evaluate statistical parameters of discrete and continuous probability distribution
4. Perform regression analysis to compute the coefficient of correlation to interpret data
5. Testing of hypothesis of few unknown statistical parameters using types of sampling, Sampling distribution of means, sampling distribution of variance, Estimations of statistical parameters

UNIT-I:

Formation of Partial Differential Equations, First order Partial Differential Equations, solutions of first order linear Partial Differential Equations, Lagrange's equation, Non-linear First Order equations, Charpit's method.

UNIT-II:

Second-order linear equations and their classification, Method of separation of variables, vibration of stretched string wave equation, one dimensional heat equation, solution of Laplace's equation in Cartesian coordinates.

UNIT-II:

Probability distributions: Uniform, Poisson and Normal distributions, Mean, variance, moment generating function, and evaluation of statistical parameters for these distributions, Moments.

Unit-IV:

Curve fitting by the method of least squares- Fitting of straight lines, second degree parabolas and more general curves, Correlation, regression and rank correlation. Test of significance- Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

Unit-V:

Test for single mean, difference of means, and correlation coefficients, test for ratio of variances, Chi-square test for goodness of fit and independence of attributes.

References

1. R.K Jain S.R.K lyengar, Advanced Engineering Mathematics, Narosa Publication. 4h Edition, 2014.
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publication 4rd Edition, 2014.
3. S.C Gupta and V.K Kapoor, Fundamental of Mathematical Statistics, Sultand Chand & Sons New Delhi 2014.

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ENGINEERING MECHANICS

ES 301 CE

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits: 3

Objectives:

The objectives of this course is to impart knowledge of

1. Resultant and equilibrium of force system, concept of friction, analyze the Perfect trusses.
2. Obtaining centroids and moments of inertia for various sections.
3. Basic concepts of dynamics, Kinematics and Kinetics and their applications to problem solving

Outcomes:

After completing this course, the student will be able to:

- Apply the fundamental concepts of forces, Resultant and Equilibrium conditions for static loads.
- Analyse forces in members of a Perfect truss using method of joints and method of sections, analyze friction for single and connected bodies.
- Determine the centroid and moment of inertia for various sections.
- Apply the basic concepts of dynamics for rectilinear and curvilinear motion and kinetics Using D' Alembert's Principle.
- Solve problems involving work energy principles and impulse momentum theory.

UNIT – I

*Introduction to Engineering Mechanics***:** Basic Concepts
*System of Forces***:** Coplanar Concurrent Forces, Components in Space – Resultant of coplanar and spatial systems, Moment of Force and Couple and its Application to coplanar system
*Equilibrium of Systems of Forces***:** Free Body Diagrams, Equations of Equilibrium and applications to Coplanar System.

UNIT – II

*Analysis of Trusses***:** Types of Trusses, Assumptions for forces in members of trusses, Method of joints and Method of sections for Cantilever Trusses, Simply supported Trusses.

UNIT – III

*Centroid***:** Centroid of simple areas (from basic principles), Centroid of Composite areas.
Centre of Gravity: Centre of gravity of simple bodies (from basic principles).
Area Moment of Inertia: Definition, Moment of inertia of simple areas (from basic principles), Polar Moment of Inertia, Transfer formula, Moment of Inertia of Composite areas.

UNIT – IV

*Kinematics***:** Introduction, Types of Rigid bodies, Motion of particle, Rectilinear and Curvilinear motions, Velocity and Acceleration.
Kinetics: Introduction, fundamental equation of kinetics for a particle, D' Alembert's principle for particle motion, connected system.

UNIT – V

*Work - Energy Method***:** Introduction, Equations for Translation, Work-Energy Applications to Particle Motion, Connected System.

*Impulse Momentum Method***:** Linear impulse momentum, law of conservation of momentum, coefficient of restitution, Elastic impact.

Suggested Reading:

- Ferdinand L. Singer, *Engineering Mechanics Statics and Dynamics*, Harper Collins publishers inc, New York, 1994.
- Ferdinand L. Singer, K. Vijaya Kumar Reddy, J. Suresh Kumar, *Singer's Engineering Mechanics*, BS Publications, Hyderabad, 2011.
- S.S Bhavakatti, K. G. Rajashekarappa *Engineering Mechanics*, New age international publishers, Delhi,1994.
- Rajeshakharan, S. and Sankara Subrahmanyam, G., *Engineering Mechanics Statics and Dynamics*, Vikas Publications, Delhi, 2005.
- Junarkar, S.B. and H.J. Shah., *Applied Mechanics*, Charotar Publishing House Pvt. Ltd, Anand, 2015.

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BUILDING MATERIALS AND CONSTRUCTION

PC 302 CE

Instruction:3 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits: 3

Objectives:

The objectives of this course is to impart knowledge of:

- Physical properties, uses, manufacturing processes of building materials that are used in structural components
- Application of protective materials for structural members
- Different types of construction procedures for different components of a building

Outcomes:

After completing this course, the student will be able to:

1) Classify the types of construction materials like bricks, stones, steel, timber and their uses
2) Demonstrate the composition, properties and tests of cement and aggregates
3) Explain the manufacturing of concrete, properties and tests of fresh & hardened concrete
4) Discuss the types, properties of miscellaneous building materials like pointing, white & color washing, plastering, paints, varnishes, flooring, glass, bitumen etc.
5) Illustrate the importance of energy conservation, damp proof coarse and fire protection in buildings

UNIT – I

***Stones*:** Uses of stones as building materials. Characteristics of good building stones. Classification of stones. Quarrying, various methods. Dressing and polishing of stones.

***Bricks*:** Composition of brick clay. Methods of manufacturing bricks. Preparation of brick earth. Tempering, Pug mill. Various steps of moulding, drying and method of burning of bricks; clamps, intermittent and continues kilns, Bull's trench kiln, Hoffman's kiln. Characteristics of good building bricks, classification of bricks. Introduction to light weight bricks.

***Building Blocks*:** Hollow building blocks for walls and roofing. Load bearing and non-load bearing blocks. Provisions of IS 2572. Manufacturing process of Fly ash bricks.

UNIT – II

***Cement*:** Chemical composition of the ingredients for manufacturing cement. Outline of manufacturing process, flow diagram. Tests on cement. IS:269 specifications for Ordinary Portland Cement, various types of cements.

***Blended Cements*:** Various type and their uses.

***Fine Aggregate*:** Characteristics of good mortar sand, availability of sand and its classifications. Alternatives to natural sand. Bulking of sand.

***Coarse Aggregate*:** Characteristics of good coarse aggregates for manufacture of concrete. Test on aggregates. Light weight aggregates.

Unit – III

***Mortar*:** Different types of mortars, preparation, setting and curing. Manufacturing methods of mortar.

***Concrete*:** Batching, mixing, transporting, compacting and curing, Ready-mix concrete.

***Reinforcing steel*:** Types of reinforcement, specifications, storage and handling.

UNIT – IV

***Timber*:** Timber as a building material and its uses. Various types of timber. Seasoning and its importance. Preservation of wood. Laminates and their uses.

***Paints, Varnish and Distemper*:** Constituents, characteristics of good paints, Bases, vehicles, thinners and coloring pigments. Painting of different types of surfaces; types of varnish, and application. Types of distemper, and application.

Emerging Building Materials: Energy conservation in buildings. Recycled materials, local materials and industrial waste products as a means of sustainable development, Glass, composites and smart materials.

UNIT – V

***Form work and scaffolding*:** Requirements, types, materials, accessories, reuses and maintenance.

***Floors*:** Characteristics of good floors. Common types of floors. Stone flooring, concrete flooring, terrazzo flooring. Ceramic and mosaic tiles. Industrial floors. Methods of construction and maintenance.

***Plastering, Pointing and White / Color Washing*:** Types of plastering, preparation of surfaces, and defects. Types of pointing, preparation of surfaces. Preparation and application of white wash and colour wash.

***Fire protection in structures*:** Classification of fire, general causes of fire, detection of fire, methods for fire control, Analysis for structural components for fire resistance (wood, steel, concrete and masonry).

Damp Proofing: Causes of dampness, effects of dampness, methods of damp proofing

Suggested Reading:

- VN. Vazirani, and S.P. Chandola, ***Engineering Materials***, Khanna Publishers 1993.
- Sushil Kumar, ***Building Construction***, Standard Publilshers 1992.
- S.P. Arora and S.P. Bindra, ***Text book on Building Construction***, Dhanpath Raj Publications, 1999.
- National Building Code of India, 2005.
- Gurucharan Singh, ***Building materials and construction***, Standard book house, 2010
- Central Building Research Institute, *Advances in Building Materials and Construction*, Roorkee, 2004.

Additional Reading :

- IS 432 : 1982, *Indian Standard Specification for Mild Steel and Hard-Drawn Steel Wire for Concrete Reinforcement*, Part I and II, Bureau of Indian Standards, New Delhi, 1982.
- IS 1077 : 1992, *Indian Standard Common Burnt Clay Building Bricks _ Specification,* Bureau of Indian Standards, New Delhi, 1992.
- IS 1786 : 1985 *Indian Standard Specification for High Strength Deformed Steel Bars and Wires for Concrete Reinforcement, Bureau of Indian Standards, New Delhi, 1985.*
- IS 2117 : 1991, *Indian Standard Guide for Manufacture of Hand-made Common Burnt Clay Building Bricks*, Bureau of Indian Standards, New Delhi, 1991.

- IS 2248: 1992, *Indian Standard Glossary of Terms relating to Clay Products for Buildings*, Bureau of Indian Standards, New Delhi, 1992.
- IS 2572: 1963 *Indian Standard Code of Practice for Construction of Hollow Concrete Block Masonry*, Bureau of Indian Standards, New Delhi, 1963.
- IS 3495 (Parts 1 - 4): 1992, *Indian Standard Method of Test for Burnt Clay Building Bricks*, Bureau of Indian Standards, New Delhi, 1992.
- IS 11650: 1991, *Indian Standard Guide for Manufacture of Common Burnt Clay Building Bricks by Semi-Mechnised Process*, Bureau of Indian Standards, New Delhi, 1991.
- IS 12269: 1987, *Indian Standard Specifications for Grade 53 Ordinary Portland cement*, Bureau of Indian Standards, New Delhi, 1990.
- IS 13767: 1993, *Indian Standard Burnt Clay Flash Building Bricks Specification*, Bureau of Indian Standards, New Delhi, 1993.
- IS 14867: 1999, *Indian Standard False Work for Concrete Structures Guidelines*, Bureau of Indian Standards, New Delhi, 1999

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SURVEYING AND GEOMATICS

PC 303 CE

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 3

Course Objectives:

The objectives of this course is to impart knowledge of:

- Concepts & Principles of basic and modern Surveying
- Field applications and concepts of leveling survey, trigonometrical levelling & Contouring
- Importance of theodolite, EDMs, total station and their practical applications

Course Outcomes:

After completing this course, the student will be able to:

1) Explain the terminologies and concepts involved in basic and modern surveying equipment & technologies and also defines the concepts of horizontal and vertical curves,
2) Demonstrate the working principles and applications of basic and modern surveying instruments like chain, prismatic compass, plane table, dumpy level, theodolite and total station.
3) Apply the knowledge of surveying & levelling in calculating lengths, bearings, reduced levels, elevation differences and plotting of a ground,
4) Apply the knowledge of theodolite and trigonometry in finding horizontal and vertical angles, heights of inaccessible points,
5) Set out horizontal and vertical curves for the purpose of roadway and railway alignment.

UNIT – I

INTRODUCTION TO SURVEYING: Classification and principles of surveying;

Linear Measurements*:* Accessories for linear measurements; Ranging; Chain and Tape corrections; Principle of Chain surveying- Well conditioned triangle; Offset; Cross staff.

Angular Measurements**:** Types of meridians; Bearing systems and conversions; magnetic declination; Fore & Back Bearings and local attraction. Principle of Compass surveying; Traversing - Open & Closed traverse and their checks. Prismatic and Surveyor's compass.

Plane Table surveying: Accessories of Plane Table; Orientation and its importance; methods of plane table surveying - Radiation, Intersection, Traversing, Resection- Two point problem; Advantages & Disadvantages of Plane Tabling.

UNIT – II

Levelling: Definitions; Dumpy and Auto level; Temporary Adjustment of level; Types of levelling operations; Curvature & refraction corrections; Sensitiveness of bubble tube;

Reciprocal levelling; Calculation of reduced level - HI & Rise and fall methods.

Contouring: Characteristics and uses of contours; Methods of contouring - Direct and Indirect

Computation of Areas - Using Simpson's and Trapezoidal rule;

Computation of Volumes - Using Simpson's and Trapezoidal rule for a Level Section.

UNIT – III

Theodolite Survey: Introduction to Theodolite; Definitions; Fundamental lines of a Theodolite; Temporary Adjustments; Measurement of horizontal and vertical angle; Coordinates & their computations, Omitted measurements; **Basics of Tacheometry**, Trigonometric levelling: Calculations of elevations and distances of accessible and inaccessible objects by single and double plane methods.

Modern Field Survey Systems: Principle & Types of EDM instruments

Total Station: Parts of a Total Station; Advantages and Applications

UNIT – IV

Curves: Theory of simple curves, setting out of simple curves by linear and angular methods; Elements of simple compound curve & Reverse curve; Elements of Transition curve: length of transition curve; Vertical Curves-Types of vertical curves - Length of vertical curve

UNIT – V

Photogrammetric Surveying: Vertical, Tilted and oblique photographs; Flying height and Scale of a Vertical Photograph

***Global Positioning Systems*:** Segments; GPS measurements; errors.

Remote Sensing: Introduction; Classification of remote sensing; Idealised Remote sensing system

Geographic Information System: Definition; Components of GIS; Recent trends and applications of GIS

Suggested Reading:

- B.C. Punmia, Surveying Vol.1, 2 & 3, Lakshmi Publishers, NewDelhi,1994.
- Basak, N. N. Surveying & Levelling. McGraw-Hill Education, 1994.
- Arora K.R., Surveying Vol. 1 & 2, Standard Book House, New Delhi, 2005.
- T.M. Lillesand and R.W. Kiefer, Remote Sensing and Image Interpretation, John Wiley & Sons,1994.
- M. Chandra, Advanced Surveying, New Age International Publishers, New Delhi, 2000.
- Anji Reddy, M., Remote Sensing and Geographical Information System, B.S. Publications, 2001

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STRENGTH OF MATERIALS - I

PC 304 CE

Instruction: 3periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 3

Objectives:

The objectives of this course is to impart knowledge of and problem solving skills in:

- Concepts of the stresses and strains, evaluating compound stresses, evaluation of stresses & strains in thin-walled pressure vessels
- Evaluating shear forces and bending moments in beams, determination of the bending stresses, shearing stresses, combined action of direct load and bending moment in beams
- Pure torsion theory and application to different types of springs

Outcomes:

After completing this course, the student will be able to:

1. Calculate the deflections of determinate structures such as cantilever, simply supported and overhanging beams.
2. Evaluate the crippling load of columns for various end conditions using different formulas.
3. Analyse unsymmetrical bending of beams, concept of shear centre. Evaluate static and kinematic indeterminacy of structures.
4. Analyse statically indeterminate structures such as Propped cantilevers, fixed and continuous beams.
5. Analyse the beams and frames and to find the deflections by energy methods

UNIT – I

Simple Stresses and Strains: Definitions of stresses and strains, Hooke's Law, Modulus of Elasticity, Stress- Strain curve for ductile materials, Elastic constants, compound bars and temperature stresses.

***Strain Energy*:** Strain energy and resilience in statically determinate bars subjected to gradually applied, suddenly applied, impact and shock loads (axial loads only).

UNIT – II

***Shear Force and Bending Moment*:** Different types of beams and loads, shear force and bending moment diagrams for cantilever, and simply supported beams with and without over hangs subjected to different kinds of loads viz., point loads, uniformly distributed loads, uniformly varying loads and couples.

***Bending Stresses in Beams*:** Assumptions in theory of simple bending, Derivation of flexure equation, Moment of resistance, calculation of stresses in statically determinate beams for different loads and different types of structural sections.

UNIT – III

Shear Stress in Beams: Derivation of equation of shear stresses, distribution across rectangular, circular, T and I section.

***Direct and Bending Stresses*:** Direct loading, Eccentric loading, limit of eccentricity, Core of sections, rectangular and circular, solid and hollow sections

UNIT – IV

***Compound Stresses*:** Stresses on oblique planes, principal stresses and planes. Mohr's circle of stress.

***Application to pressure vessels*:** Thin cylinders subjected to internal fluid pressure, volumetric change. Thick Cylinders: Lame's equations, stresses under internal and external fluid pressures, Compound cylinders, Shrink fit pressure.

UNIT – V

***Torsion*:** Theory of pure torsion in solid and hollow circular shafts, shear stress, angle of twist, strength and stiffness of shafts, Transmission of Power. Combined torsion and bending for determination of principal stresses and maximum shear stress. Equivalent bending moment and equivalent twisting moment.

***Springs*:** Close and open coiled helical springs under axial load and axial twist, Carriage springs.

Suggested Reading:

1) D.S. Prakash Rao, *Strength of Materials- A Practical Approach*, Universities Press, Hyderabad, 1999.
2) R. K. Bansal, *A Textbook of Strength of Materials (Mechanics of Solids – S.I. Units)*, Laxmi Publications Pvt. Ltd., 6th Edition, 2015
3) R.K. Rajput, *A Textbook of Strength of Materials*, S. Chand Publications, New Delhi, 2007.
4) R. Subramanian, *Strength of Materials*, Oxford University Press, New Delhi, 2016.
5) S. S. Bhavikatti, Strength of materials, Vikas Publishing House, Delhi, 2002.
6) Ferdinand P Beer, Johnston and De Wolf., *Mechanics of Materials*, Tata McGraw- Hill, Delhi, 2004.

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FLUID MECHANICS -I

PC 305 CE

Instruction: 3 periods per week *Duration of SEE: 3hours*
CIE: 30 marks *SEE: 70marks*
Credits: 3

Objectives:
The objectives of this course is to impart knowledge of:

- Concepts and principles of fluid mechanics–statics, kinematics and dynamics
- Properties of fluid pressure, pressure measurements and problems in fluid statics
- Fluid kinematics, including types of flows, fluid path lines and continuity equations

Outcomes:

After completing this course, the student will be able to:

a. Classify fluids based on their physical and engineering properties; solve problems on lubrication mechanics and to solve problems on pressure measurements.

b. Classify fluid flows, state law of mass conservation and apply tools like flow nets to visualize the flow pattern.

c. Apply principles of energy to analyze fluid flow and to study the vortex flow.

d. Measure velocity and discharge in pipes, open channels and tanks and obtain relevant equations for computing flow in pipes.

e. Develop and apply laws of mass and energy in compressible flow.

UNIT – I

***Fluid Properties*:** Basic Concepts and Definitions: Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; variation of viscosity with temperature, Newton law of viscosity; vapour pressure, boiling point, cavitation; surface tension, capillarity, Bulk modulus of elasticity, compressibility.
Fluid Statics: Fluid Pressure: Pressure at a point, Pascal's law, Piezometer, Manometer, Differential Manometer, Micromanometers. Pressure gauges, transducers.

UNIT – II

***Fluid Kinematics*:** Classification of fluid flow-steady and unsteady flow, uniform and non-uniform flow, laminar and turbulent flow, rotational and irrotational flow, compressible and incompressible flow, ideal and real fluid flow, one ,two-and three-dimensional flows. Streamline, pathline, streakline and stream tube.
Law of mass conservation: Continuity equation from control volume and system analysis. Definition and properties of Stream function, velocity potential function and uses of flownets.

UNIT – III

Fluid Dynamics: Convective and local acceleration. Surface and body forces. Euler's

equations of motion.
Law of energy Conservation: Bernoulli's equation from Euler's equation. Application of Bernoulli's equation.
Vortex flow- definition, types-free vortex and forced vortex motion.

UNIT – IV

Measurement of Velocity: Pitot Static Tube, hot wire anemometer.
Measurement of discharge in pressure conduits: Venturimeter, orifice meter, orifices, mouth pieces, nozzle meter, elbow meter and rotameter.
Measurement of discharge in free surface flows: Notches and weirs, spillways. Measurement of discharge in tanks: orifices(free discharging and submerged), mouth pieces(external cylindrical and Borda's mouthpiece).

UNIT – V

Compressible Flow: Compressibility of liquids and gases, Differential form of continuity equation, Bernoulli's energy equation for isothermal and adiabatic conditions, Velocity of pressure wave, wave velocity for adiabatic and isothermal conditions, Mach Number and Mach cone, stagnation pressure, density and temperature.
Suggested Reading:

1. Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House, 2017
2. K. Subramanya, 'Theory and Applications of Fluid Mechanics', Tata McGraw-Hill Publishing Company Ltd., New Delhi,1993
3. Vijay Gupta and Santosh K. Gupta, 'Fluid Mechanics and its applications', Wiley Eastern Ltd., New Delhi, 1984
4. K.L.Kumar,'Engineering Fluid Mechanics',Eurasia Publishing House Pvt Ltd.,New Delhi,2009

5. Vallentine,H.R., 'Applied Hydrodynamics', Butterworths & Co Ltd., London,1959

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BUILDING DRAWING AND DRAFTING LABORATORY

Course Code						Core / Elective
PC 351 CE	BUILDING DRAWING AND DRAFTING LABORATORY					Core
Prerequisite	Contact Hours Per Week				CIE	SEE	Credits
-	L	T	D	P			
	-	-	-	2	25	50	1

Course Objectives (COBJ)

The course aims to:

The objectives of this course is to impart knowledge of:

1. Skill sets to prepare computer aided engineering drawings
2. Details of construction of different building elements
3. Visualizing the completed form of the building and the intricacies of construction based on the engineering drawings.

Course Outcomes (COs)

After completing this course, the student will be able to:

1. Understand the building bye-laws, plan various buildings as per the building by-laws.
2. Plan the individual rooms with reference to functional and furniture requirements.
3. Prepare different sign conventions and bonds
4. Learn the skills of drawing building elements like doors and windows.
5. Develop the skills of Drawing Plans, Sections and Elevations of different buildings.

UNIT-I

BUILDING BYELAWS AND REGULATIONS: Introduction - terminology - objectives of building Bye laws - floor area ratio - floor space index - principles under laying building bye laws - classification of buildings - open space requirements - built up area limitations- height of buildings- wall thickness - lightening and ventilation requirements.

UNIT -II

RESIDENTIAL AND PUBLIC BUILDINGS

Residential buildings: Minimum standards for various parts of buildings -requirements of different rooms and their grouping- characteristics of various types residential buildings.

Public buildings: Planning of educational institutions, hospitals, dispensaries, office buildings, banks, industrial buildings, hotels & motels, buildings for recreation.

UNIT-III

SIGN CONVENTIONS AND BONDS : Brick, stone, plaster, sand filling, concrete, glass, steel, cast iron, copper alloys, aluminum alloys etc., earth, rock, timber and marbles. English bond and Flemish bond- odd and even courses for one, one-half, two and two & half brick walls in thickness at the junction of a corner.

UNIT- IV

DOORS, WINDOWS, VENTILATORS AND ROOFS: Panelled door, panelled and glassed door, glassed windows, paneled windows, swing ventilators, fixed ventilators, coupled roof, collar roofs. King Post truss, Queen Post truss Sloped and flat roof buildings: drawing plans, Elevations and Cross Sections of given sloped roof buildings.

UNIT-V

PLANNING AND DESIGNING OF BUILDINGS: Draw the Plan, Elevation and sections of a Residential & Public buildings from the given line diagram.

Text /Reference Books:

1. Planning and Design of buildings by Y.S. Sane.
2. Planning, designing and scheduling by Gurucharan Singh and Jagadish Singh
3. Building planning and drawing by M. Chakravarthi.
4. 'A' Series & 'B' Series of JNTU Engineering College, Anantapur.
5. Building drawing by Shah and Kale.

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SURVEYING LABORATORY

PC 352 CE

Instruction: 2 periods per week *Duration of SEE: 3 hours*
CIE: 25 marks *SEE: 50 marks*
Credits: 1

Course Objectives:

The objectives of this course is to impart knowledge of:

- Study and understanding the different methods involved in survey field work
- Importance of theodolite, total station and their practical applications
- Basic concept of trigonometrical leveling and field applications

Course Outcomes:

After completing this course, the student will be able to:

1. Illustrate the working principles and handling procedures of basic surveying instruments like chain, prismatic compass, plane table in finding out linear and angular measurements
2. Make use of surveying equipment in computing lengths, areas & bearings of given field work
3. Demonstrate the levelling instruments and apply the knowledge of levelling in finding out the reduced levels of ground
4. Demonstrate the working principles and handling procedures of theodolite and total station
5. Apply the knowledge of trigonometrical levelling in finding out reduced levels of elevated objects which are both accessible and inaccessible using theodolite and total station

List of Experiments:

1. Applications of chain traversing to locate a building and field objects by taking perpendicular and oblique offsets and recording in the field book.
2. Study of prismatic compass and setting out a polygon
3. Plane table survey: Radiation & Intersection methods
4. Introduction to levelling: Differential levelling using dumpy/Auto level
5. Profile and cross-sectional levelling using Dumpy/Auto level
6. Measurement of horizontal angles by repetition and reiteration methods using Vernier Theodolite.
7. Measurement of vertical angle: Application to simple problems of height and distance by measuring angle of elevation and depression
8. Single plane method: Determination of R.L. of an elevated Object using two Instrument Stations which are placed in a same vertical plane- when the base of the Object is inaccessible.
9. Two plane method: Determination of R.L. of an elevated object using two Instrument Stations which are not placed in the same vertical plane- when base of the object inaccessible.

10. Setting out of a simple circular curve by linear method
11. Setting out of a simple circular curve by angular method
12. Introduction to Total station and applications: To determine difference in elevation of any two given points. The introduction includes, setting up of the Total station over a station, input values, field measurements, downloading of the data into a computer.
13. Total station and applications: Application to simple problems of height and distance by measuring angle of elevation and depression and determination of R.L of the target object.
14. Total station and applications: Determination of area enclosed in a closed traverse having minimum 5 stations. Plot the measured values by using a software package.
15. Global Positioning System (GPS): Determination of Latitude and Longitude of any four stations and computation of the area.

Note: At least 10 experiments must be performed during the semester

Suggested Reading:

- http://nptel.ac.in/
- http://mhrd.gov.in/e-contents
- http://vlab.co.in/

FLUID MECHANICS –I LABORATORY

PC 353 CE

Instruction: 2periods per week

Duration of SEE: 3 hours
CIE: 25 marks *SEE: 50 marks*
Credits :1

Objectives:

The objectives of this course is to impart knowledge of:

- To verify the principles studied in fluid mechanics
- To calibrate various flow measuring devices by determining coefficient of discharge.
- To verify Bernouilli's principle and to identify laminar and turbulent flow characteristics.

Outcomes:

After the completion of the course, the student will be able to:

1. To measure flow in closed conduits(pipes) using venturimeter and orificemeter.
2. To measure flow in open channels or flumes using rectangular and triangular notch or a weir.
3. To measure flow in tanks using a small orifice and cylindrical mouthpiece.
4. To understand and prove the Bernoulli's principle using the Bernoulli's apparatus.
5. To compute frictional losses in pipes.

List of Experiments:

1. Determination of Coefficient of discharge of a Rectangular Notch with end corrections
2. Determination of Coefficient of discharge of a V- Notch
3. Determination of Coefficient of discharge of a Venturimeter
4. Determination of Coefficient of discharge of an Orificemeter
5. Determination of Coefficient of discharge of a Circular Orifice
6. Determination of Coefficient of discharge of a Mouth Piece
7. Determination of basic characteristics of a hydraulic jump
8. Classification of flow by Reynolds Experiment
9. Determination of Darcy's friction factor
10. Verification of Bernoulli's theorem
11. Study of free vortex flow.

Suggested Reading:

1 S. K. Som, and Biswas, G, 'Fluid Mechanics and Fluid Machines', Tata McGraw-Hill Publishing Co., New Delhi, 1998
2 Yuan, S. W., 'Foundation of Fluid Mechanics', Prentice-Hall India Pvt. Ltd., New Delhi, 1976
3 C.S.P. Ojha, R.Berndtsson, P.N. Chandramouli, 'Fluid Mechanics and Machinery', Oxford University Press, New Delhi, 2010
4 A.K.Mohanty, 'Fluid Mechnics', Prentice-Hall India Pvt. Ltd., New Delhi, 1994
5 P.N. Modi, 'Hydraulics and Fluid Mechanics Including Hydraulics Machines', Standard Book House, New Delhi, 2013.

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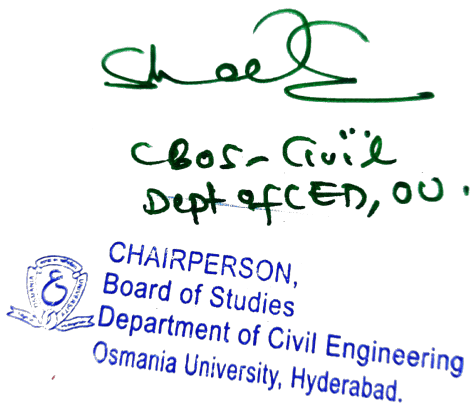
IV SEMESTER

S.No	Code	Course Title	Scheme of Instruction			Contact Hrs/Wk	Scheme of Evaluation			Credits
			L	T	P		Hrs	CIE	SEE	
Theory Courses										
1	HS 103CM	Finance and Accounting	3	-	-	3	3	30	70	3
2	PC 401 CE	Hydrology and Water Management	3	-	-	3	3	30	70	3
3	PC 402 CE	Strength of Materials-II	3	-	-	3	3	30	70	3
4	PC 403CE	Fluid Mechanics-II	3	-	-	3	3	30	70	3
5	PC 404 CE	Construction Engineering & Management	3	-	-	3	3	30	70	3
6	PC 405 CE	Engineering Geology	3	-	-	3	3	30	70	3
Practical / Laboratory Courses										
7	PC 451 CE	Strength of Materials Laboratory	-	-	2	2	3	25	50	1
8	PC 452 CE	Fluid Mechanics-II Laboratory	-	-	2	2	3	25	50	1
9	PC 453 CE	Engineering Geology Laboratory	-	-	2	2	3	25	50	1
		Survey Camp *								
		Total	**18**	**0**	**6**	**24**		**255**	**570**	**21**

- Survey Camp is to be conducted during summer vacation. To be evaluated in the Vth Sem.



FINANCE AND ACCOUNTANCY

HS 103 CM

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits: 3

Objectives:

The objectives of this course are to impart knowledge of:

- Basic understanding of Financial and Accounting aspects of a business unit
- Inputs to evaluate the viability of projects
- Skills necessary to analyse the financial statements

Outcomes:

After successful completion of the course the students will be able to:

1. E valuate the financial performance of the business unit.
2. Take decisions on selection of projects.
3. Compute the procurement of finances
4. A nalyze the liquidity, solvency and profitability of the business unit.
5. valuate the overall financial functioning of an enterprise.

UNIT – I

Basics of Accounting: Financial Accounting–Definition- Accounting Cycle – Journal - Ledger and Trial Balance-Cash Book-Bank Reconciliation Statement (including Problems)

UNIT – II

Final Accounts*:* Trading Account-Concept of Gross Profit- Profit and Loss Account-Concept of Net Profit- Balance Sheet (including problems with minor adjustments)

UNIT – III

Financial System and Markets: Financial System-Components-Role-Considerations of the investors and issuers- Role of Financial Intermediaries. Financial Markets-Players- Regulators and instruments - Money Markets Credit Market- Capital Market (Basics only)

UNIT – IV

Basics of Capital Budgeting techniques: Time Value of money- Compounding- Discounting- Future Value of single and multiple flows- Present Value of single and multiple Flows- Present Value of annuities- Financial Appraisal of Projects– Payback Period, ARR- NPV, Benefit Cost Ratio, IRR (simple ratios).

UNIT – V

Financial statement Analysis: Financial Statement Analysis- Importance-Users-Ratio Analysis- liquidity, solvency, turnover and profitability ratios.

Suggested Reading:

1 Satyanarayana. S.V. and Satish. D., Finance and Accounting for Engineering, Pearson Education
2 Rajasekharan, Financial Accounting, Pearson Education
3 Sharma.S.K. and Rachan Sareen, Financial Management, Sultan Chand
4 Jonathan Berk, Fundamentals of Corporate Finance, Pearson Education
5 Sharan, Fundamentals of Financial Management, Pearson Education

HYDROLOGY AND WATER MANAGEMENT

PC 401 CE

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits: 3

Course Objectives:
The objectives of this course is to impart knowledge of:

- Importance of Hydrology and its applications
- Introduction to Hydrological processes and estimation of Design flood
- Assessment of soil-water-plant relationship

Course Outcomes
After completion of course student will be able to:

1) Describe the importance of Hydrology and its applications
2) Discuss the importance of abstraction from precipitation and its applications.
3) Develop the Rainfall – Runoff relationship
4) Compute the drawdown and yield of the acquifer.
5) Estimate the crop water requirement.

UNIT – I

Introduction – Hydrologic cycle, Importance and scope of hydrology, Application of hydrology. **Precipitation-**Forms of precipitation, types of rainfall, Characteristics of precipitation in India, measurement of rainfall, types of rain gauges, rain gauge network design, mean rainfall over an area, estimation of missing precipitation data, presentation of rainfall data, probable maximum precipitation(PMP), rainfall data in India.

UNIT – II

Abstractions from Precipitation- Evaporation process, evaporimeters, analytical methods of evaporation estimation, reservoir evaporation and methods for its reduction; Transpiration process; Evapotranspiration- measurement of evapotranspiration, evapotranspiration equations; Infiltration, infiltration capacity, measurement of infiltration, infiltration indices.

UNIT – III

Runoff- Definition, runoff process, factors affecting runoff, determination of runoff volume by-empirical formulae, rational method, SCS-CN method, UNIT hydrograph method (def, limitation, application, derivation of unit hydrograph from direct runoff hydrograph and vice versa).

Floods: Definition, causes and impact of floods, control measures of floods, estimation of floods, flood frequency studies- Weibul's and Gumble's method.

UNIT – IV

Ground Water-Forms of sub surface water, vertical distribution of sub surface water, geologic formations of aquifers, saturated formation, types of aquifers, aquifer properties, Darcy's law, types of wells, steady radial flow into wells in confined and unconfined aquifer, yield of open wells, safe yield, constant level pumping test and recuperation test.

UNIT – V

Irrigation-Definition, necessity of irrigation, frequency of irrigation, types of irrigation methods, advantages and ill-effects of irrigation.

Soil water-plant Relationship-Water requirement of crops, crops and crop seasons in India, cropping pattern. Vertical distribution of soil moisture, soil moisture tension, soil moisture stress, soil moisture constants, plant water relationship, moisture stress and plant response, consumptive use, crop factor, duty and delta, factors affecting duty.

Suggested Reading:

- K. Subramanya, ***Engineering Hydrology*****,** Tata McGraw Hill Publishing Co.Ltd. 1996.
- H.M. Raghunath, ***Hydrology – Principles, Analysis and Design***, New Age International Publishers, 1996.
- Michael, A.M, ***Irrigation Theory & Practice***, Vikas Publishing House, New Delhi, 1978
- Ray K. Linsley, Jr, Max A. Kohler, Joseph L. H. Paulhus, ***Hydrology for Engineers***, McGraw-Hill Book Company, 1980
- Ven Te Chow, ***Hand book of Applied Hydrology***, McGraw-Hill Book Company, New York, 1964

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STRENGTH OF MATERIALS - II

PC 402 CE

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits: 3

Objectives:

The objectives of this course is to impart knowledge of and problem solving skills in

- Methods of evaluation of deflections of beams due to transverse loads, Phenomenon of buckling of columns.
- Analysis of Unsymmetrical Bending, Concept of Shear centre, Static and Kinematics Indeterminacy
- Analysis of indeterminate beams, Concept of strain energy principle and its applications to evaluate the displacements and redundant forces using energy principles

Outcomes:

After completing this course, the student will be able to:

1. Calculate the deflections of determinate beams due to transverse loads by various methods
2. Evaluate the crippling load of columns for various end conditions using different formulas
3. Analyze the Unsymmetrical Bending, Locating the Shear centre, Determining Static and Kinematics Indeterminacy
4. Analyze statically indeterminate beams such as propped cantilever, fixed beams and continuous beams and draw the shear force and bending moment diagrams
5. Analyze the beams and frames and to find deflections by energy principle

UNIT – I

***Deflections in Beams*:** Slope and deflection by double integration method for cantilever, simply supported beams and overhanging beams carrying one, two point loads, uniformly distributed load and uniformly varying load over entire span. Moment area method and conjugate beam method.

UNIT – II

***Columns and Struts*:** Euler's theory for long columns, different end conditions, equivalent length, Rankine's theory, Secant & Perry formula for eccentrical loading.

***Unsymmetric bending*:** Centroidal principal axes of section, moments of inertia referred to any set of rectangular axes, Stresses in beams subjected to unsymmetrical bending, principal axes, Resolution of bending moment into two rectangular axes through the centroid, Location of neutral axis.

UNIT – III

***Shear Centre*:** Concept and importance of shear center, shear flow and determination of shear center of simple sections such as T sections and Channel sections with one axis of symmetry

***Static and Kinematic indeterminacy*:** Determination of static and kinematic indeterminacy of beams, pin jointed and rigid jointed frames.

UNIT - IV

***Propped Cantilevers*:** Cantilever beams on elastic and rigid props for point loads and uniformly distributed load only. Calculation of reactions, Bending moment and Shear force diagrams, and deflections.

***Fixed Beams*:** Determination of shear force, bending moment slope and deflection in fixed beams with and without sinking of supports for point loads uniformly distributed load.

***Continuous Beams*:** Determination of moments in continuous beams with and without sinking of supports by theorem of three moments, bending moment and shear force diagrams.

UNIT – V

***Energy Methods*:** Elastic Strain energy for various types of loading, Determination of deflections in statically determinate beams and trusses using Work-energy principle, Castigliano's theorems, Unit load method. Maxwell's theorem of reciprocal deflections

***Redundant Trusses and Frames*:** Analysis of plane trusses with one degree of redundancy (internal /external) and plane frames with one degree of redundancy, Lack of fit and temperature effect.

Suggested Reading:

1. D.S. Prakash Rao, *Strength of Materials- A Practical Approach*, Universities Press, Hyderabad, 1999.
2. R.K. Rajput, *A Textbook of Strength of Materials*, S. Chand Publications, New Delhi, 2007.
3. R.K. Bansal, *Strength of materials*, Laxmi Publications, New Delhi, 2010.
4. S. S. Bhavikatti, *Strength of materials*, Vikas Publishing House, Delhi, 2002
5. S. S. Bhavikatti, *Structural Analysis I & II*, Vikas Publishing House, Delhi, 2002.

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FLUID MECHANICS - II

PC 403 CE

Instruction: 3periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 3

Objectives:
The objectives of this course is to impart knowledge of:

- Various hydraulic engineering problems in open channel flows
- Principles of turbines and pumps
- Theory and practice problems in hydraulic engineering

Outcomes:
After completing this course, the student will be able to:

1. Explain transient flow conditions and solve problems of flow through pressure conduits
2. To understand the concept of dimensional analysis and hydraulic similitude and also understand
3. the phenomenon of unsteady flow in pipes.
4. Explain development of uniform flow in open channels and apply uniform flow equations to
5. analyze, solve open channel flow problems and to describe the hydraulic jump and its uses.
4. Apply fluid mechanics knowledge to solve the problems of hydraulic turbines.
5. Apply fluid mechanics knowledge to solve the problems of hydraulic pumps.

UNIT – I

***Flow through Pipes*:** Reynolds experiment and its significance, laminar and turbulent flow, lower critical Reynolds number, characteristics of laminar and turbulent flow.
Velocity and shear distribution in laminar flow through circular pipes-Hagen Poiseuille equation, head loss in laminar flow.
Loss of head through pipes –Darcy Wiesbach equation, Darcy friction factor for laminar flow, velocity profile of turbulent flow, empirical equations for turbulent flows, hydro dynamically smooth and rough boundaries, Moody's diagram.
Minor losses, hydraulic gradient line, Pipe flow systems-pipes in series, equivalent pipes, pipes in parallel.
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UNIT – II

***Dimensional Analysis and Hydraulic Similitude*-** Buckingham pi theorem, Rayleigh method, dimensionless groups, similitude, model studies, types of models. Application of dimensional analysis and model studies to fluid flow problem.
Unsteady flow in pipes: Water hammer phenomenon, pressure rise due to gradual and sudden valve closure, critical period of the pipeline, rigid and elastic pipes.

UNIT – III

Introduction to Open Channel Flow - Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channels, classification of open channel flow, velocity and pressure distribution across channel section.
Uniform Flow - Characteristics and development of uniform flow, Chezy's formula, Manning's formula. Factors affecting Manning's Roughness Coefficient "n". Most economical section of channel. Computation of normal depth in rectangular and trapezoidal channels
Hydraulic jump and its applications.

UNIT – IV

Turbines: Classification of turbines. Work done and efficiency in Pelton Wheel, Francis turbine and Kaplan turbine. Unit quantities and specific speed. Performance characteristics of turbines.

UNIT – V
Centrifugal Pumps: Components and functioning of a centrifugal pump- manometric head and efficiency, work done by impeller, priming of pump and minimum starting speed, specific speed and performance of centrifugal pumps.

Suggested Reading:

1) *Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House, 2017*
2) *Fluid Mechanics And Hydraulic Machines, K. Subramanya, Tata McGraw Hill, 2018*
3) *Flow in Open channel, K. Subramanya, Tata McGraw Hill, 2019*

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CONSTRUCTION ENGINEERING AND MANAGEMENT

PC 404 CE

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits: 3

Objectives:

The objectives of this course is to impart knowledge of:

- Understand the techniques involved in construction project management and practices.
- Apply the concepts of construction planning and scheduling techniques like bar charts, mile stone charts, PERT and CPM.
- Apply various resource management techniques in cost – time analysis and use of project management software for resource optimization in construction projects.
- Understand various types of contracts, labour acts and prepare tender documentation and detailed project reports.
- Acquaint with the concepts and application of optimization and linear programming in monitoring and control of construction projects.

Outcomes:

After completing this course, the student will be able to:

1. Understand the construction industry, construction practices, and management systems to construction projects.
2. Apply various network theories such as PERT, CPM in construction management to construction projects.
3. Analyze cost-time analysis, resource optimization techniques and apply project management software for resource optimization in construction projects.
4. Prepare various types of contract documents, tenders, labour acts in construction practice and acquaintance with various safety measures and safety management practices for construction management projects.
5. Apply optimization techniques and linear programming in construction practice.

Unit-I

Introduction: Introduction to Construction Industry - Significance, objectives and functions, stakeholders, roles, responsibilities and functional relationships, Construction projects – objectives and lifecycle, existing construction practices Regulation and project management systems, Project scale, Economy of scale application in construction cost estimates.

Unit-II

Construction Management through Network Theory: Definitions and different types of Events, activity, dummy, Network rules, Network event numbering (Fulkerson Rule), Hierarchies of complex network, work break down structure, Liner Scheduling methods - bar charts, milestone charts, LOB, their limitations, difference between PERT and CPM, network-based scheduling techniques - PERT, CPM, AON and AOA in construction management. Numerical Problems.

Unit -III

Cost & Resource Optimization Techniques: Cost Model - Direct and Indirect Cost component of Project, Cost Slope, Project Cost-Time analysis and optimization. Resource usage profile, Histograms, Resource allocation, smoothing & levelling techniques. Project Updating. Introduction of Project management software such as PRIMAVERA or any open-source software - Building Information Modelling (BIM), etc.

Unit-IV

Contracts: Introduction, types of construction contracts and their advantages and disadvantages, condition of contracts.

Safety: Health and environment on project sites, accidents their causes, effects and preventive measures, costs of accidents, workmen compensation act, contract labour act.

Tender: Tender form, tender documents, notice inviting tenders, Work order. Project Delivery Methods: BOT, BOO. BOOT, Public Private Partnership (PPP), Detailed project report (DPR).

Unit-V

Linear programming and optimization in construction: Introduction to optimization – Linear programming, Importance of optimization in construction, Simple problems on formulation of LP, Graphical method, Simplex method, Case studies.

TEXT BOOKS:

1. Srinath L.S., “PERT and CPM: Principles and Application”, East-West Press, 2001.
2. Seetharaman S., “Construction Engineering and Management”, Umesh Publications, 2012.

REFERENCE BOOKS:

1. Gahloj. P.S. and Dhiv. B.M., “Construction Planning and Management”, Wiley Eastern Ltd., 2018.
2. Punmia, B. C., and Khandelwal, K. K., "Project planning and control with PERT and CPM”, 2006.

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ENGINEERING GEOLOGY

PC 405 CE

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits: 3

Objectives:

The objectives of this course is to impart knowledge of:

- Mineralogy, rock formation & types and geological structures
- Utility of rocks as a construction material with qualifying properties
- Geological problems associated with dams, reservoirs, tunnels and other geological hazards

Outcomes:

After completing this course, the student will be able to:

1. Identify various minerals, rocks and analyse geological structures.
2. Explain rock weathering, classify various soils and understand hydrogeology.
3. Classify landforms based on their geomorphology and evaluate the engineering properties of rocks**.**
4. Examine rocks for their suitability in various construction applications.
5. Investigate and identify the geological problems in dams, reservoirs and tunnels, and explain the geological causes of earthquakes, tsunamis and landslides.

UNIT-I

Introduction: Engineering geology useful to civil engineering

Mineralogy: Mineral, Origin and composition. Physical properties of minerals, susceptibility of minerals to weathering, Rock forming minerals.

Rocks: Igneous, sedimentary and metamorphic rocks Geological description and Indian occurrence of Granite, Basalt, Dolerite, Gabbro, Laterite, Sandstone Shale, Limestone Slate, Gneiss, Quartzite, Marble, Khondalite and chamockite.

Geological Structures: Folds, joints and faults: Fundamental types, mechanism origin and classification; Field identification and Engineering analysis of geological structures

UNIT-II

Rock Weathering: Processes and end-products of weathering; susceptibility of rocks to weathering, Assessment of the degree of weathering and its classification.

Geology of Soils**:** Formation, geological classification, description and Engineering use of soils Types of Indian soils.

Hydrogeology: Hydrologic cycle, water table, aquifers, occurrence of ground water in various lithological formations, geological control for ground water movement, springs, ground water exploration and ground water provinces of India.

UNIT–III

Geomorphology: Evolution, characteristics features and Engineering, considerations of fluviatile, Aeolian, glacial and marine land forms.

Rock Mechanics: Engineering properties of rocks Stress-Strain behaviour of rocks. Site Investigation: Aerial Photographs, Electrical: Resistivity and Seismic refraction methods.

UNIT- IV

Rock as a Construction Material: Geological considerations for the selection of Concrete aggregate, Highway and Runway aggregates, building stones, Decorative stones, Roofing and facing stones.

Geology of Dams and Reservoirs: Types of Dams, Problems associated with Dam foundations and reservoirs, Engineering Geological investigations for demand water tightness in reservoir site, Analysis of dam failure; Engineering Geology of major Dam sites of India

UNIT–V

Tunnels: Stand-up time of different rocks, Engineering Geological investigations of tunnels in rock, problems in tunnelling.

Geological Hazards: Geological aspects of Earthquakes, Tsunamis and Landslides;

Suggested Readings:

- F.G. Bell, *Engineering Geology*, Elsevier, 2007.
- Dimitri P. Krynine and William R. Judd, *Principles of Engineering Geology & Geotechnics*, CBS Publishers & Distributors, First Edition, 1998.
- B.P. Attewel and I.W. Fanner, *Principles of Engineering Geology,* Chapman and Hall 1976.
- Officers of the Geological Survey of India, *Engineering Geology Case Histories*, Miscellaneous Pub. No. 29, 1975

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STRENGTH OF MATERIALS LABORATORY

PC 451 CE

Instruction: 2 periods per week
CIE: 25marks *SEE: 50marks*
Credits : 1

Objectives:
The objectives of this course is to impart knowledge of:

- Stress- strain behavior of ductile material and compressive strength of brick.
- Deflection for different types of beams for different materials.
- Rigidity modulus by conducting spring and torsion test, hardness number and Impact strength of different materials

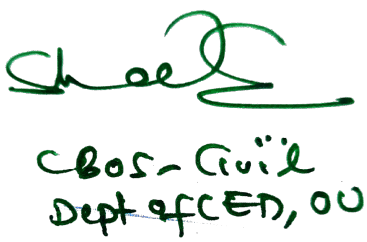
Outcomes:
After the completion of the course, the student will be able to:

1. Demonstrate the Stress-strain behavior of ductile material
2. Compare Young's modulus of different materials by conducting deflection test on different types of beams
3. Calculate rigidity modulus by spring test and torsion test.
4. Evaluate compressive strength of brick.
5. Find Hardness number and Impact strength of given Specimens.

List of Experiments:

1. Uni- axial tension test on a specimen of ductile material.
2. Stress – Strain characteristics of a ductile material.
3. Brinell`s hardness test.
4. Compression test on brick.
5. Bending test on simply supported beam of Timber.
6. Izod impact test
7. Compression test on close coiled helical spring.
8. Torsion test on a specimen of ductile material.
9. Bending test on Cantilever beam of Aluminum.
10. Bending test on Simply supported beam of Steel.
11. Bending test on Fixed beam of Copper.
12. Charpy impact test.

Note: At least 10 experiments should be conducted.



FLUID MECHANICS –II LABORATORY

PC 452 CE

Instruction: 2periods per week *Duration of SEE: 3 hours*
CIE: 25 marks *SEE: 50 marks*
Credits :1

Objectives:

The objectives of this course is to impart knowledge of:

- Practical applications of open and curved channels
- Application of force concepts on jets and hydraulic machines
- Determination of characteristic curves of turbines and pumps

Outcomes:

After the completion of the course, the student will be able to:

1. Illustrate the flow phenomenon in open channels
2. Analyze the force acting due to jets concept and its application in hydraulic machines
3. Demonstrate working principles of hydraulic pumps and turbines
4. Infer the specific energy diagram by tilting flume
5. Determine minor losses in pipes

List of Experiments:

1. Study of Uniform flow in open channels-Smooth and Rough. Determination of Rugosity Coefficients.
2. Determination of a vane coefficient
3. Study of universal characteristic curves of a Pelton Wheel
4. Study of universal characteristic curves of a Francis turbine
5. Study of flow Characteristics over a broad crested weir
6. Determination of basic characteristics of a hydraulic jump
7. Study of flow Characteristics of venture flume.
8. Study of Specific Energy diagram- Tilting flume
9. Study of main characteristic curves of a Centrifugal pump
10. Determination of Minor losses in pipe

Suggested Reading:

1 *S. K. Som, and Biswas, G, 'Fluid Mechanics and Fluid Machines', Tata McGraw-Hill Publishing Co., New Delhi, 1998*
2 *Yuan, S. W., 'Foundation of Fluid Mechanics', Prentice-Hall India Pvt. Ltd., New Delhi, 1976*
3 *C.S.P. Ojha, R.Berndtsson, P.N. Chandramouli, 'Fluid Mechanics and Machinery', Oxford University Press, New Delhi, 2010*
4 *A.K.Mohanty, 'Fluid Mechnics', Prentice-Hall India Pvt. Ltd., New Delhi, 1994*
5 *P.N. Modi, 'Hydraulics and Fluid Mechanics Including Hydraulics Machines', Standard Book House, New Delhi, 2013.*

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ENGINEERING GEOLOGY LABORATORY

PC 453 CE

Instruction: 2 periods per week *Duration of SEE: 3 hours*
CIE: 25 marks *SEE: 50 marks*
Credits : 1

Objectives:
The objectives of this course is to impart knowledge of:

- Hands-on experience to study the geological aspects of various rocks.
- Evaluate the physical and engineering properties of minerals and rocks
- Provides exposure to various geological tests.

Outcomes:
After completing this course, the student will be able to:

1. Identify the physical and engineering properties of minerals and rocks
2. Analyze and measure structural aspects of rocks using models
3. Carry out field experiment and studies such as VES
4. Perform studies such as Stereoscopic study of photographs, seismic refraction survey and Slake durability test
5. Study the topographical and GSI maps

LIST OF EXPERIMENTS

1. Identification and description of physical properties of minerals
2. Identification and description of geological and geotechnical characteristics of rocks
3. Determination of apparent specific gravity, porosity and water absorption of different rocks
4. Study of structural geology models (wooden models)
5. Measurement of dip of planar feature by clinometers compass
6. Vertical electrical sounding VES field experiment
7. Stereoscopic study of aerial photographs pertaining to landforms, vegetation and water bodies
8. Seismic refraction survey to determine depth to bedrock
9. Study of topographical maps
10. Structural geology problems (strike, dip, three point problems)
11. Study of geological survey of India (GSI works) maps and reports
12. Slake durability test on soft rock

Note: At least 10 experiments should be conducted in the semester

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