FACULTY OF ENGINEERING

Scheme of Instruction & Examination

(AICTE Model Curriculum for the Academic Years 2020-2024)

and

Syllabi

B.E. III to IV Semester

of

Four Year Degree Programme

in

Civil Engineering

(With effect from the academic year 2020– 2021)

(As approved in the faculty meeting held on xx-11-2020)

Issued by

Dean, Faculty of Engineering

Osmania University, Hyderabad – 500 007

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For the academic years 2020-2024

SCHEME OF INSTRUCTION & EXAMINATION

B.E. (Civil Engineering) III – SEMESTER

S. No.	Course Code	Course Title	Scheme of Instruction			Scheme of Examination		Credits
			L	T	Pr/ Drg	CIE	SEE	
Theory Courses								
1	BS 205 MT	Mathematics – III	3	1	-	30	70	4
2	ES 301 EE	Basic Electrical Engineering	3	-	-	30	70	3
3	PC 401 CE	Building Materials and Construction	3	-	-	30	70	3
4	PC 402 CE	Solid Mechanics	3	-	-	30	70	3
5	PC 403 CE	Fluid Mechanics	3	-	-	30	70	3
6	PC 404 CE	Surveying and Geomatics	3	-	-	30	70	3
Practical/ Laboratory Courses								
7	PC 451CE	Fluid Mechanics Laboratory	-	-	2	25	50	1
8	PC 452CE	Surveying Laboratory	-	-	2	25	50	1
9	ES 354CE	Building Drawing & Drafting Laboratory	-	-	2 x 3 hrs	25	50	3
			20	**1**	**10**			**24**

MATHEMATICS - III

BS 205 MT

Instruction: 3 + 1 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 4

Objectives:

The objectives of this course is to impart knowledge of:

- Solution methodologies for second order Partial Differential Equations with applications in engineering
- Formulate second order linear equations, boundary conditions, wave and diffusion equations.
- Overview of probability and statistics to engineers

Outcomes:

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

- Solve problems in engineering involving PDEs.
- Evaluate second-order linear equations & initial and boundary conditions
- Find solutions for heat diffusion and vibration problems
- Formulate and solve problems involving random variables
- Apply statistical methods and hypothesis testing for analyzing experimental data

UNIT – I

Definition of Partial Differential Equations, First order partial differential equations, solutions of first order linear PDEs; Solution to homogenous and non-homogenous linear partial differential equations of second order by complimentary function and particular integral method.

UNIT – II

Second-order linear equations and their classification, Initial and boundary conditions, D'Alembert's solution of the wave equation; Heat diffusion and vibration problems, Separation of variables method to simple problems in Cartesian coordinates. The Laplacian in plane, one dimensional diffusion equation and its solution by separation of variables

UNIT – III

Discrete random variables, expectation of discrete random variables, moments, variance of a sum, continuous random variables & their properties, distribution- functions, and densities.

UNIT – IV

Basic Statistics, Measures of Central tendency: Moments, skewness and Kurtosis – Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation. Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves.

UNIT – V

Test of significance; Large sample test for single proportion, difference of properties, Tests for single mean, difference of means, and difference of standard deviations. Test for ratio of variances – Chi- square test for goodness of fit and independence of attributes.

Suggested Reading:

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 2000.
2. Advanced Engineering Mathematics, R.K. Jain & Iyengar, Narosa Publications.
3. Engineering Mathematics, P. Sivaramakrishna Das & C. Vijaya Kumar, Pearson India Education Services Pvt. Ltd.
4. N.P. Bali and M. Goyal, "A text book of Engineering Mathematics", Laxmi Publications, 2010.
5. E. Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, 2006.
6. P. G. Hoel, S. C. Port and C. J. Stone, "Introduction to Probability Theory", Universal Book Stall,2003.
7. S. Ross, "A First Course in Probability", Pearson Education India, 2002.
8. W. Feller, "An Introduction to Probability Theory and its Applications", Vol. 1, Wiley, 1968.
9. T. Veerarajan, "Engineering Mathematics", Tata McGraw-Hill, New Delhi, 2010.
10. Mathematical Statistics, S.C. Gupta & V.K. Kapoor, S. Chand Publications.

For the academic years 2020-2024

BASIC ELECTRICAL ENGINEERING

ES 301 EE

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:

- Basics in Electrical circuits.
- Working principles of Electrical Machines and single phase transformers
- Different Electrical installations

Outcomes:

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

- Analyse Electrical circuits to compute and measure the parameters of Electrical Energy.
- Illustrate the working principles of Electrical DC Machines.
- Identify and test various Electrical switchgear, single phase transformers and assess the ratings needed in given application.
- Describe the working principles of electrical AC machines.
- Discuss the various Electrical Installations

UNIT – I

DC Circuits: Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems.

UNIT – II

AC Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, and RL, RC, RLC combinations (series only). Three phase balanced circuits, voltage and current relations in star and delta connections.

UNIT – III

Transformers and 3-ph Induction Motors: Transformers: Electromagnetic induction, Faradays laws, statically induced emf, Lenz law, BH characteristics, ideal and practical transformer, losses and efficiency, Auto-transformer and three-phase transformer connections.
Three Phase Induction motor: Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, squirrel cage IM, slip-ring IM, Applications.

UNIT – IV

***Single-phase induction motor & DC Machines: Single-phase induction motor*:** Construction and principle of operation, Capacitor start & capacitor run motor, applications
DC Generators: Dynamically induced emf, Flemming's Right hand and Left hand rules, Construction and principle of operation of DC generator, EMF equation, Types of DC Generators, OCC characteristics, applications
DC Motors: principle of operation of DC Motor, Types of DC motors, applications.

UNIT – V

Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Suggested Reading:

1. N.K. De, "Basic Electrical Engineering", Universities Press, 2015.
2. J.B. Gupta, "Fundamentals of Electrical Engineering and Electronics" S.K. Kataria & Sons Publications, 2002.
3. J.B. Gupta, "Utilization of Electric Power and Electric Traction" S.K. Kataria & Sons Publications, 2010
4. Abhijit Chakrabarti, Sudipta Nath, Chandan Kumar Chanda, "Basic Elactrical Engineering" Tata McGraw Hill, Publications,2009
5. Abhijit Chakrabarti, Sudipta Nath, Chandan Kumar Chanda, "Basic Elactrical Engineering" Tata McGraw Hill, Publications,2009

BUILDING MATERIALS AND CONSTRUCTION

PC 401 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:

- Classify the types of construction materials like bricks, stones, steel, timber and their uses
- Demonstrate the composition, properties and tests of cement and aggregates
- Explain the manufacturing of concrete, properties and tests of fresh & hardened concrete
- Discuss the types, properties of miscellaneous building materials like pointing, white & color washing, plastering, paints, varnishes, flooring, glass, bitumen etc.
- 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:

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

Additional Reading :

1. 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.
2. IS 1077 : 1992, *Indian Standard Common Burnt Clay Building Bricks __ Specification,* Bureau of Indian Standards, New Delhi, 1992.
3. IS 1786 : 1985 *Indian Standard Specification for High Strength Deformed Steel Bars and Wires for Concrete Reinforcement, Bureau of Indian Standards, New Delhi, 1985.*
4. IS 2117 : 1991, *Indian Standard Guide for Manufacture of Hand-made Common Burnt Clay Building Bricks,* Bureau of Indian Standards, New Delhi, 1991.

5. IS 2248: 1992, *Indian Standard Glossary of Terms relating to Clay Products for Buildings,* Bureau of Indian Standards, New Delhi, 1992.
6. IS 2572: 1963 *Indian Standard Code of Practice for Construction of Hollow Concrete Block Masonry,* Bureau of Indian Standards, New Delhi, 1963.
7. IS 3495 (Parts 1 - 4): 1992, *Indian Standard Method of Test for Burnt Clay Building Bricks,* Bureau of Indian Standards, New Delhi, 1992.
8. 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.
9. IS 12269: 1987, *Indian Standard Specifications for Grade 53 Ordinary Portland cement,* Bureau of Indian Standards, New Delhi, 1990.
10. IS 13767: 1993, *Indian Standard Burnt Clay Flash Building Bricks Specification,* Bureau of Indian Standards, New Delhi, 1993.
11. IS 14867: 1999, *Indian Standard False Work for Concrete Structures Guidelines,* Bureau of Indian Standards, New Delhi, 1999

SOLID MECHANICS

PC402CE

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:

- Apply the fundamental concepts of stress and strain in the analysis and design of axially loaded members
- Analyze the combined stresses at a point to evaluate principal stresses and their applications in evaluating failure criteria in various materials and pressure vessels
- Analyze determinate beams to draw shear forces, bending moments and to determine the bending stress distribution in beams
- Determine the shear stress distribution in beams and also the stresses in beams subjected to combined axial and bending loads.
- Evaluate the stresses of circular members subjected to torsion and analyze different types of springs.

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.

FLUID MECHANICS

PC403 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:

- 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:

- Classify the fluids based on their properties
- Solve problems on pressure calculations, hydrostatic forces on bodies and buoyancy
- Relate types of flows with the corresponding mathematical equations
- Apply Euler's, Bernoulli's and Momentum equation to solve fluid dynamic problems
- Apply principles of fluid dynamics to make flow measurement calculations

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-andthree-dimensionalflows.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

SURVEYING AND GEOMATICS

PC 404 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:

- Explain the terminologies and concepts involved in basic and modern surveying equipment & technologies and also defines the concepts of horizontal and vertical curves
- Demonstrate the working principles and applications of basic and modern surveying instruments like chain, prismatic compass, plane table, dumpy level, theodolite and total station.
- Apply the knowledge of surveying & levelling in calculating lengths, bearings, reduced levels, elevation differences and plotting of a ground
- Apply the knowledge of theodolite and trigonometry in finding horizontal and vertical angles, heights of inaccessible points
- Make use of knowledge of curves concept in surveying, in setting out both 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:

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

FLUID MECHANICS LABORATORY

PC 451 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:

- verifying the principles studied in fluid mechanics
- calibrating various flow measuring devices by determining coefficient of discharge.
- verification of Bernoulli's principle and to identify laminar and turbulent flow characteristics.

Outcomes:

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

- Compute discharge flowing through streams and canals.
- Determine discharge through pipes and losses in pipes.
- Apply Bernoulli's principle in hydraulics
- Determine discharge flowing through tanks and open channels .
- Identify the type of flow in pipe a pipe.

List of Experiments:

1. Determination of coefficient of discharge of a Rectangular Notch with end contractions
2. Determination of coefficient of discharge of a Circular orifice
3. Determination of coefficient of discharge of a Mouth piece
4. Determination of coefficient of discharge of V- Notch
5. Determination of coefficient of discharge of a Venturimeter
6. Determination of coefficient of discharge of an Orifice meter
7. Classification of flow by Reynold's Experiment
8. Determination of Darcy's friction factor
9. Verification of Bernoulli's theorem
10. 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 Mechanics', Prentice-Hall India Pvt. Ltd., New Delhi, 1994*
5 *P.N. Modi and S. N. Seth 'Hydraulics and Fluid Mechanics Including Hydraulics Machines', Standard Book House, New Delhi, 2013.*

SURVEYING LABORATORY

PC 452 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:

- Illustrate the working principles and handling procedures of basic surveying instruments like chain, prismatic compass, plane table in finding out linear and angular measurements
- Make use of surveying equipments in computing lengths, areas & bearings of given field work
- Demonstrate the levelling instruments and apply the knowledge of levelling in finding out the reduced levels of ground
- Demonstrate the working principles and handling procedures of theodolite and total station
- 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:

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

BUILDING DRAWING AND DRAFTING LABORATORY

ES 354 CE

Instruction: 6 periods per week *Duration of SEE: 3 hours*
CIE: 25 marks *SEE: 50 marks*
Credits: 3

Objectives:

The objectives of this course is to impart knowledge of:

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

Outcomes:

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

- Illustrate the basic principles of building planning and drawings as per codal provisions
- Apply the tools of AUTOCAD software to prepare structural drawings of various building components
- Draw plan, elevation and sectional drawings of residential, hostel, hospital, school buildings in AutoCAD software
- Create electrical, plumbing and sanitary drawings of a building.
- Develop isometric views of Single storey and Double storey residential buildings.

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Sheet No	Description of the Topic	Contact Hours	
		Lecture	Drawing
Introduction to Computer Aided Drafting			
1	Introduction to 2D, co-ordinate systems, reference planes, Commands - Initial settings, Line commands, Edit Commands, Copy commands, Move Commands, Modify commands, Layers, Text and Dimensioning, Blocks.	2	1
Drawing related to different building elements			
2	**Brick Masonry Bonds** Detailed drawing (section and elevation) of English Bond and Flemish Bond in odd and even courses - One brick wall and one and half brick wall,	1	2
3	**Doors & Windows** Detailed drawing (plan, section and elevation) of doors and windows – framed paneled and glazed	1	2
4	**Staircase** Detailed drawing (plan, section and elevation) of different forms of staircases – open well and dog legged.	1	2
5	**Footings** Detailed drawing (Plan and section) of different types of footings	1	2
6	**Roofs and floors** Detailed drawing (section elevation) of different types of	1	2

	floors – cement concrete, terrazzo, mosaic, roofs- pitched , curved and flat		
7	**Trusses** Detailed drawing (sectional elevation) of different types of roof trusses – king post, queen post, steel, composite - detailed elevations and enlarged detail of joints in trusses	1	2
Planning of buildings			
8	Classification of buildings, General requirements of site and building. Building codes, Acts and Bye-laws, Licensing of building works. Functional planning of building such as residential, institutional, public, commercial, industrial buildings, checking for circulation, ventilation, structural, preparing sketch plan, working drawing etc.	2	-
Comprehensive drawing of buildings (Site plan, floor plan, elevation and sections in accordance with functional requirements for the following):			
9	Simple residential buildings with flat and pitched roof	1	4
10	School, rural hospital, library and hostel buildings	1	4
11	Five floors apartment building	1	4
12	Workshop – Trussed roof-North light roof truss	1	4
13	Elevations of different buildings	1	2
14	Electrical Drawing of a Building	1	1
15	Plumbing and Sanitary Drawing of a Building	1	1
Isometric view of buildings			
16	Single storey residential building	1	2
17	Double storey residential building	1	2

Note:

1. At least 12 sheets must be covered.
2. All drawings must be through commercially available software like AutoCAD, etc.

Suggested Readings:

1 Gurucharan Singh and Jagdish Singh, *Building planning, designing and scheduling*, Standard Publishers-Delhi, 2005

2 S.N Lal, "*Engineering Drawing with Introduction to Auto CAD",* Cengage Learning India Pvt Ltd, New Delhi, 2018.

3 Malik R.S., Meo, G.S. (2009) "*Civil Engineering Drawing",* Computech Publication Ltd New Asian

4 Sikka, V.B. (2013), "*A Course in Civil Engineering Drawing*", S.K.Kataria& Sons.

5 M.G. Shah, C.M. Kale and S.Y. Patki, *Building Drawing*, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2009

6 National Building Code, Bureau of Indian Standards, New Delhi, 2005.

7 IS:962 – 1967 Code of Practice for Architectural and Building Drawing.

8 IS:4021 – 1983 Specification for Timber Door, Window and Ventilator Frames

For the academic years 2020-2024