



ख्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)
Khwaja Moinuddin Chishti Language University, Lucknow, U.P. (India)

U.P. STATE GOVERNMENT UNIVERSITY,
(Recognised Under Section 2(f) & 12(B) of the UGC Act, 1956 & B.Tech. Approved by (AICTE))

FACULTY OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

Bachelor of Technology (B. Tech)

Curriculum Structure

(Applicable from Session 2024-25 for New Entrants)



SECOND YEAR

III- Semester

Effective From Session

2024-2025



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ENGINEERING MATHEMATICS-III

SUBJECT CODE: AS 303

L-T-P: 3-1-0

Credit: 4

COURSE OBJECTIVES

The subject aims to provide the student with:

1. Mathematics Fundamental necessary to formulate, solve and analyse the Engineering Problems
2. An understanding of Fourier Transforms, Laplace Transforms and Z Transforms.
3. An understanding of Numerical Techniques and Statistical Techniques.

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Solve Problems in Engineering domain related to Laplace Transforms
CO-2	Analyse and solve Statistical Techniques.
CO-3	Analyse and solve Numerical Techniques.
CO-4	Understand the different type of numerical technique method
CO-5	Analyse and solve Complex Fourier transform



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ENGINEERING MATHEMATICS-III

SUBJECT CODE: AS 303

Unit	Topic
I	Laplace Transform : Laplace transform, Existence theorem, Laplace transforms of derivatives and integrals, Initial and final value theorems, Unit step function, Dirac- delta function, Laplace transform of periodic function, Inverse Laplace transform, Convolution theorem, Application to solve simple linear and simultaneous differential equations.
II	Statistical Techniques: Moments, Moment generating functions, Skewness, Kurtosis, Curve fitting, Method of least squares, Fitting of straight lines, Polynomials, Exponential curves, Correlation, Linear, non-linear and multiple regression analysis, Binomial, Poisson and Normal distributions, Tests of significations: Chi-square test, t-test.
III	Numerical Techniques-I: Zeroes of transcendental and polynomial equations using Bisection method, Regula-falsi method and Newton-Raphson method, Rate of convergence of above methods. Interpolation: Finite differences, Newton's forward and backward interpolation, Lagrange's and Newton's divided difference formula for unequal intervals.
IV	Numerical Techniques-II: Solution of system of linear equations, Matrix Decomposition methods, Jacobi method, Gauss- Seidel method. Numerical differentiation, Numerical integration, Trapezoidal rule, Simpson's one third and three-eighth rules, Solution of ordinary differential equations (first order, second order and simultaneous) by Euler's, Picard's and fourth-order Runge- Kutta methods.
V	Integral Transforms: Fourier integral, Complex Fourier transform, Inverse Transforms, Convolution Theorems, Fourier sine and cosine transform, Applications of Fourier transform to simple one dimensional heat transfer equations, wave equations and Laplace equations, Z- transform and its application to solve difference equations.

Text/ Reference Books:

1. Peter V. O'Neil, Advance Engineering Mathematics Thomson Learning, 2007
2. Jain, Iyenger & Jain, Numerical Methods for Scientific and Engineering Computation, New Age International, New Delhi.
3. JN Kapur, Mathematical Statistics, S. Chand & company Ltd.
4. BS Grewal, Higher Engineering Mathematics, Khanna Publishers.



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DEPARTMENT OF CIVIL ENGINEERING

SOLID MECHANICS

SUBJECT CODE: CE 301

L-T-P: 3-1-0

Credit: 4

COURSE OBJECTIVES

1. To provide the basic concepts and principles of strength of materials.
2. To give an ability to calculate stresses and deformations of objects under external loadings.
3. To give an ability to apply the knowledge of strength of materials on engineering applications and design problems.

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Understand the concept of stress and strain under different conditions of Loading.
CO-2	Understanding the shear force and bending moment in beams and understanding bending of beams.
CO-3	Determine the deflection and strains in the members subjected to axial, bending and torsional loads
CO-4	Calculate the slope, deflection and buckling of loaded members
CO-5	Understanding the behavior of thin, thick cylinder and sphere against load.



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SOLID MECHANICS

SUBJECT CODE: CE-301

Unit	Topic
I	Stresses and Strain: Introduction, normal stress and strain, shear stress and strain, stresses on inclined section, strain energy, impact loads and stresses, state of plane stress, principal stress and strain, maximum shear stress Mohr's stress circle: Three dimensional states of stress and strain, equilibrium equations, generalized Hook's law, theories of failure, Thermal stresses and elastic constants, Poisson's ratio,
II	Shear force and bending moment – shear force and bending moment diagrams for simply supported, over-hanged, cantilever beams and continuous beam subjected to point load, UDL, UVL, moments etc. Bending Stresses: Derivation of formula, pure bending, bending stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections, composite beam
III	Deflection of beam: deflection of beams by Macaulay's method, Moment Area method, Unit Load Method. Strain Energy Methods, and conjugate beam method, Castiglione's theorem first and second. Torsion- Derivation of torsion equation and its assumptions. Applications of the equation of the hollow and solid circular shafts, torsional rigidity, Combined torsion and bending of circular shafts, principal stress and maximum shear stresses, series and parallel shafts
IV	Columns and struts: Theory of columns—long column and short column, Buckling and Stability, slenderness ratio, Euler's Crippling Load, Buckling Loads for columns with various end conditions. Rankine Gordon formula. Combined bending and direct stress, middle third and quarter fourth rules. Spring: Type of Spring, open, close and helical spring. Curved Beams: equation and its assumptions, Bending of beams with initial curvature. Unsymmetrical Bending. Shear Centre
V	Thin cylinders & spheres: Hoop and axial stresses and strain. Volumetric strain. Thick cylinders: Radial, axial and circumferential stresses in thick cylinders subjected to internal or external pressures, Compound cylinders Stresses due to interference fits.

Text/ Reference Books:

1. S. Ramamrutham & R. Narayanan (2005), Strength of Materials, Dhanpat Rai publications.
2. Mechanic of Materials by R.C. Hibbeler, Pearsons
3. Solid Mechanics by S.M.A. Kazimi, Tata Mcgraw Hill.
4. Engineering Mechanics of Solids By E.P. Popov, Pearson Education.
5. Engineering Mechanics by R.K. Bansal
6. Strength of Materials by R.K. Rajput



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DEPARTMENT OF CIVIL ENGINEERING

FLUID MECHANICS

SUBJECT CODE: CE 302

L-T-P: 3-1-0

Credit: 4

COURSE OBJECTIVES

1. This course deals with the basic concepts of fluid mechanics
2. To give an ability to calculate the fluid pressure.
3. To give an ability to apply the knowledge of fluid mechanics on engineering applications and design problems.

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	To understand the property of fluid for analysing state of fluid.
CO-2	To understand the pressure measurement of the fluid and analysis of force/pressure on the floating body in water.
CO-3	To understand the various type of simple flow and importance of dimensional analysis.
CO-4	To obtain the velocity and pressure variations of fluid flow and losses of energy.
CO-5	To understand the complex nature of fluids in disturbed conditions and analysis of many problems in aerodynamics, including wing stall, the skin friction drag on an object, and the heat transfer that occurs in high speed flight.



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FLUID MECHANICS
SUBJECT CODE: CE 302

Unit	Topic
I	Properties of Fluid -Definition of fluid; Types of Fluid; Properties of fluids & Units and dimensions: mass density, specific density, specific volume, specific gravity; Compressibility, Viscosity, cause of viscosity, variation of viscosity with temperature and pressure, Kinematics viscosity, Newton's law of viscosity, Vapour pressure and cavitation; Surface tension, Cause of surface tension, effect of temperature, Capillarity.
II	Manometry -Pressure: Fluid pressure at a point, Pascal's law, Pressure variation in a fluid at rest, absolute, gauge, atmospheric and vacuum pressures; hydrostatic law; Measurement of Pressure: manometers, mechanical gauges; Simple Manometers: Piezometer, U-tube manometer, single column manometer; Differential Manometers: U-tube differential manometer, inverted U-tube differential manometer. Buoyancy and Floatation Archimedes Principle, Principal of Flotation, Definition of Buoyancy, Centre of buoyancy, Meta-Centre, Meta-centric height, Analytical method for meta-centric height problems, Condition of equilibrium of a floating and submerged bodies: stability of a submerged body, stability of a floating body; Time period of oscillation.
III	Kinematics of Fluid Flow Introduction, Concept of Continuum: Knudsen number, slip flow, transition flow, free molecular flow; Method of fluid motion; Types of fluid flow: steady and unsteady flows, uniform and non-uniform flows, laminar and turbulent flows, compressible and incompressible flows, rotational and irrotational flows, 1D, 2D and 3D flows; Discharge; Continuity equation; Continuity equation in 3D; Velocity potential function; Streamline function. Dimensional Analysis -Dimensional homogeneity; Methods of dimensional analysis: Rayleigh's method, Buckingham Pi Theorem, Procedure for solving Buckingham Pi Theorem; Type of forces acting on fluid; Dimensionless Numbers
IV	Dynamics of Fluid Flow Introduction, Equation of motion, Euler's equation, Bernoulli's equation from Euler's equation, Assumptions in Bernoulli's equation, Bernoulli's equation for real fluid, Application of Bernoulli's equation: Venturimeter, Orifice meter or orifice plate, Pitot-tube; Orifices: Introduction, Classification, flow through an orifice, Hydraulic Co-efficient. Flow Through Pipe -Introduction, Energy losses (Head losses) in pipe; Major energy loss: frictional loss (Darcy Welsbach equation), frictional coefficient in terms of wall shear stress; Minor energy loss: loss due to sudden expansion, loss due to sudden contraction, loss at entry of pipe, loss at exit, losses due to pipe bend, obstruction in pipe, losses due to fitting, Chezy's formula; Energy gradient line or Total energy line, Hydraulic gradient line; Pipe Connection: Series connection, Parallel connection; Flow through branch pipe; Pipe Network: Hardy cross method; Flow through syphon; Water hammer in pipes.
V	Laminar and Turbulent Flow Laminar Flow: Introduction, Reynold's experiment, Reynold's number, Critical flow, Introduction of boundary layer development, Velocity profile at different point at pipe, hydro-dynamically developed flow, fully developed flow, Variations of shear stress, Shear stress distribution in fully developed laminar flow, velocity profile in fully developed laminar flow, Laminar flow through two fixed parallel plate; Turbulent flow: Frictional loss in pipe flow- expression for loss of head due to friction in pipe, expression for co-efficient of friction in terms of shear stress; Shear stress in turbulent flow- Reynold expression for turbulent shear stress, prandtl mixing length theory for turbulent shear stress. Boundary Layer Theory Introduction, Definition: Laminar and turbulent boundary layer, laminar sub-layer, boundary layer thickness, displacement thickness, momentum thickness; Characteristics of boundary layer, velocity profile shape factor; stream line body and bluff body; concept of lift and drag force; local and average co-efficient of drag and lift; concept of terminal velocity.

Text/ Reference Books:

1. Dr. R. K. Bansal, fluid mechanics and hydraulics machines, Laxmi pub. Delhi
2. Hydraulics and Fluid Mechanics, P M Modi and S M Seth, Stand. Book House
3. Er. R.K. rajput, Fluid mechanics, S. Chand & Company Ltd.



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DEPARTMENT OF CIVIL ENGINEERING

BUILDING MATERIAL AND CONSTRUCTION

SUBJECT CODE: CE 303

L-T-P: 2-0-0

Credit: 2

COURSE OBJECTIVES

1. This course deals with the basic properties of building material
2. To give ability to knowledge about stone, bricks cement.
3. To give an ability to apply the knowledge of material behaviour on engineering applications and constructions problems.

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	To understand the properties of cement and uses.
CO-2	To know the different type of aggregate and properties
CO-3	To know the mixing of aggregate and different type of aggregate
CO-4	Understanding the origin of rock and manufacturing process of bricks
CO-5	To understand the advanced materials



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BUILDING MATERIAL AND CONSTRUCTION

SUBJECT CODE: CE 303

Unit	Topic
I	Stones: classification of stone, Requirement of good building stones, characteristics of building stones and their testing. Common building stones. Method of preservation of stones. stone masonry construction Bricks: Manufacturing process of clay bricks, classification of clay bricks. Properties of clay bricks, testing methods for clay bricks. Problems of efflorescence & lime bursting in bricks & tiles. Bricks masonry construction
II	Timber: Classification and identification of timber, fundamental Engineering Properties of timber, Defects in timber, factors affecting strength of timber, Methods of seasoning and preservation of timber. Wood based products. Cement: raw materials used, Process of manufacturing, Chemical composition, compounds formed and their effect on strength, Types of cement, Testing of cement properties, Uses of cement.
III	Lime: Manufacture of limes, classification of limes, properties of limes. Gypsum: properties of gypsum plaster, building products made of gypsum and their uses Pozzolona: Chemical composition and requirements for uses, Natural and Artificial flyash, Surkhi (burnt clay pozzolona), rice husk and ash pozzolona, properties and specifications for use in construction,
IV	Paints, Varnishes and Distemper: Common constituents, types and desirable properties, Cement paints. Glass: Ingredients, properties, types and use in construction. Insulating Materials: Thermal and sound insulating material, desirable properties and types.
V	Buildings: Components of building, Construction Principle and Methods for layout, Damp proofing, antitermite treatment in buildings, Vertical circulation: stair cases and their types, design and construction. Different types of floors, and flooring materials (Ground floor and upper floors). Bricks and stone masonry construction. Cavity wall & hollow block construction. Doors and Windows: Construction details, types of doors and windows and their relative advantages & disadvantages. Types of roof, Lintel and Chhajja, Principles of building Planning.

Text/Reference Books

1. Building Materials by S K Duggal
2. Shetty, M.S (2002), Concrete Technology, S. Chand & Company Ltd.
3. Sharma &Kaul (1998), Building Construction, S.Chand& Company Pvt, New Delhi.
- 4.American Society for Testing and Materials (ASTM), Annual Book of ASTM Standards (post 2000)
5. M.L. Gambhir, Concrete Technology, McGraw Hill Book Company, Fifth Edition, 2017.



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DEPARTMENT OF CIVIL ENGINEERING

BASIC SURVEYING

SUBJECT CODE: CE 304

L-T-P: 2-0-0

Credit: 2

COURSE OBJECTIVES

1. To provide the basic concepts and principles of surveying.
2. To give an ability to calculate bearing and levelling.
3. To give an ability to apply the knowledge of surveying on engineering applications and design problems.

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Understand the fundamental principles of surveying and levelling.
CO-2	Understanding the basic principles of surveying and studying various methods for horizontal and vertical measurements.
CO-3	In-depth knowledge of levelling, contouring and study of contour maps curves
CO-4	Understanding the Plane table, area and volume measurement
CO-5	Knowledge on advanced surveying techniques in terms of curve surveying and tringulation



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BASIC SURVEYING

SUBJECT CODE: CE 304

Unit	Topic
I	Introduction: Introduction, Classification of Survey, Principles of Surveying, Plans and Maps, Scale, Accuracy and Errors Horizontal Distance Measurement: Chain Surveying, Chains, Tapes, Accuracy of Chaining, Running Survey lines, Linear measurements with chains, Errors in chaining
II	Compass Surveying: Bearing and Angles, Theory of Magnetic Compass, The Prismatic Compass, The Surveyor's Compass, Magnetic Declination, Local Attraction, Error in Compass Surveying Theodolite Surveying: Classification of Theodolite, Temporary adjustments, Permanent adjustments, measurement of horizontal angles, measurement of vertical angles, Electronic theodolite Traversing: Methods of Traversing, Plotting Traverse Survey, Checks, Closing Errors, Balancing Traverse, Adjustment of Bearings, Omitted measurements
III	Levelling: Methods of Levelling, Temporary adjustment of a level, Theory of direct levelling, Differential levelling, Balancing Back sight and Fore sight, Curvature and Refraction, Reciprocal Levelling, Cross Sectioning, Trigonometric Levelling, Methods of Trigonometric Levelling Contouring: Contour Interval, Characteristics of Contours, Methods of Locating contours, Interpolation of contours, Contour gradient, Uses of Contour Maps
IV	Plane Table surveying: instruments and accessories, advantages and disadvantages of plane table surveying, methods – radiation, intersection, traversing, resection – Two- and three-point problems, errors in plane table surveying. Map preparation with plane table. Tacheometric Surveying: Methods of Tacheometric, Fixed hair methods, Anallactic Lens, Subtense Method, Tangential Method, Range Finding Area and volume computation: area by Simpson's rule and Trapezoidal rule. Volume of level and two level sections, Trapezoidal and prismoidal formulae with corrections.
V	Triangulation: Geodetic Surveying, Classification of Triangulation System, Reconnaissance, Signals and Towers, Base Line Measurements, Measurement of Horizontal Angles, Satellite Station, Extension of Base Curve surveying – Definitions, designation of curve, elements of simple curve, setting of simple circular curve, compound and reverse curve, transition curve. Vertical curves.

Text/ Reference Books:

1. Punmia B.C. (1994), Surveying and Levelling, Vol. I & II, Laxmi Publications.
2. Arora, K.R., Surveying, Vol-I, II and III, Standard Book House, 2015.
3. Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2010.
4. Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros, 2011.



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SOLID MECHANICS LAB

SUBJECT CODE: CE-351

L-T-P: 0-0-2

Credit: 1

Note :- At least **Eight** experiments are to be conducted from the following list.

1. To conduct Tensile test of the given specimen on UTM and draw stress-strain diagram.
2. To conduct Compression test of the given specimen on UTM.
3. To conduct Torsion test of the given specimen.
4. To conduct Bend test of the given sample on UTM.
5. To conduct impact test of the given sample by Charpy and determine the impact strength of given specimen.
6. To conduct impact test of the given sample by Izod and determine the impact strength of given specimen.
7. To determine the stiffness of spring.
8. To conduct Hardness Test of the given specimen by Brinell"s and Rockwell"s method.
9. To conduct Hardness Test of the given specimen by Vicker"s method.
10. To determine critical buckling loads for columns with support
11. To examine the Euler"s theory of buckling.
12. To investigate the influence of different material parameters on buckling..



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FLUID MECHANICS LAB

SUBJECT CODE: CE- 352

L-T-P:0-0-2

Credit:1

Note:-At least **Eight** experiments are to be conducted from the following list.

1. To verify the momentum equation using the experimental set-up on impact of jet.
2. To determine the metacentric height of a ship model experimentally.
3. To determine the coefficient of contraction, velocity and discharge of an orifice.
4. To calibrate an orifice meter and study the variation of the co-efficient of discharge with the Reynolds number.
5. To calibrate a venturi meter and study the variation of the co-efficient of discharge with the Reynolds number.
6. To calibrate a bend meter and study the variation of the co-efficient of discharge with the Reynolds number.
7. To verify the Bernoulli's theorem.
8. To calibrate and to determine the coefficient of discharge for rectangular and triangular notches.
9. To study the transition from laminar to turbulent flow and to determine the lower critical Reynolds number using Reynolds apparatus.
10. To study the velocity distribution in a pipe and also to compute the discharge by integrating the velocity profile for steady laminar flow..
11. To study the variation of friction factor f for turbulent flow in commercial pipes.
12. To determine the loss coefficients for a sudden enlargement & sudden contraction in a pipe.



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BUILDING, MATERIAL LAB

SUBJECT CODE: CE- 353

L-T-P: 0-0-2

Credit: 1

Note:-At least **Eight** experiments are to be conducted from the following list.

1. To determine the Normal Consistency and Initial & final setting time of cement.
2. To determine the Compressive strength & tensile strength of cement
3. To determine the Fineness of cement by air permeability and Le-chatailers apparatus.
4. To determine the Soundness of cement by Le-Chatelier method and autoclave method
5. To determine the crushing value & Impact value of aggregate
- 6.To determine the Water absorption of aggregate
7. Sieve Analysis of Aggregate
8. To determine the Specific gravity & bulk density
9. To determine the Bulking of sand
10. To determine the Water absorption of bricks
11. To determine the Dimension Tolerances of bricks
12. To determine the Compressive strength of bricks
13. To determine the Efflorescence of bricks



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BASIC SURVEYING LAB
SUBJECT CODE: CE-354

L-T-P: 0-0-2
Credit: 1

Note: - At least **Eight** experiments are to be conducted from the following list.

1. Measurement of distance and locating various objects by chain & cross staff surveying.
2. Measurement of bearings of sides of traverse with prismatic compass and computation of correct included angle.
3. Measurement of horizontal and vertical angles with theodolite.
4. Determination of elevation of various points with dumpy level
5. Creation of L-Section and cross section of road.
6. Determination of elevation of point by trigonometric levelling.
7. Creation of Contour plan of given area.
8. Solution of two point problem by plane table.
9. Solution of three point problem by plane table.
10. To set out a simple circular curve by Rankines method.



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DEPARTMENT OF CIVIL ENGINEERING

Bachelor of Technology (B. Tech)

Curriculum Structure

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SECOND YEAR

IV- Semester

Effective From Session

2024-2025



ख्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)

Khwaja Moinuddin Chishti Language University, Lucknow, U.P. (India)

U.P. STATE GOVERNMENT UNIVERSITY,

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DEPARTMENT OF CIVIL ENGINEERING

STRUCTURAL ANALYSIS-I

SUBJECT CODE: CE 401

L-T-P: 3-1-0

Credit: 4

COURSE OBJECTIVES

1. To give the knowledge of different type of structures.
2. To give an ability to calculate shear force and bending moment of objects under external loadings.
3. To give an ability to apply the knowledge of structure analysis on engineering applications and design problems.

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Explain type of structures and method for their analysis. Three moment theorem
CO-2	Apply the concept of strain energy method and draw the shear force and bending moment diagram
CO-3	Apply the concept of slope deflection method
CO-4	Apply the concept of moment distribution method
CO-5	Apply the concept of influence lines and moving loads to compute bending moment and shear force at different sections.



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STRUCTURAL ANALYSIS - I

SUBJECT CODE: CE -401

Unit	Topic
I	Structures: Classification of Structures, Types of structural frameworks and Load transfer Mechanisms, degrees of freedom, Static and Kinematic Indeterminacy for beams, trusses and building frames. Theorem of Three Moments: Theorem of three moments-analysis of propped cantilevers- fixed & continuous beam - bending moment and shear force diagram.
II	Strain Energy Method: Maxwell's reciprocal & Betti's theorem, Castiglione's theorems, Calculations of deflections: Strain Energy Method, area moment theorem & for statically determinate beams, frames and trusses. Deflection of determinate beams by Conjugate beam method.
III	Slope Deflection Method: Slope deflection method-analysis of continuous beam and portals frame-bending moment and shear force diagram.
IV	Moment Distribution Method -analysis of continuous beams and portals frame -bending moment and shear force diagram
V	Rolling loads and influence line diagrams: for determinate beams and trusses, Absolute maximum bending moment and shear force. Muller-Breslau's principle & its applications for determinate structures.

Text/ Reference Books:

1. Structural Analysis by Pandit & Gupta, Tata Mc Graw Hill.
2. Intermediate Structural Analysis by C. K. Wang, Tata Mc Graw Hill.
3. S. Ramamrutham (2004), Theory of structures, Dhanpat Rai publications.
4. B.C.Punna, Ashok kumar Jain & Arun Kumar Jain (2005), Theory of Structures, Laxmi Publications, India



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DEPARTMENT OF CIVIL ENGINEERING

DESIGN OF CONCRETE STRUCTURE-I

SUBJECT CODE: CE 402

L-T-P: 3-1-0

Credit: 4

COURSE OBJECTIVES

1. This course deals with the contemporary professional aspects in the analysis, design and construction of Concrete Structures along with the basic understanding of fundamental concepts.
2. To give an ability to apply the knowledge of structure design on engineering applications and design problems

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	To know the Basic concept of design approach, working stress and limit state method of design
CO-2	Analyse and Design RCC beams for flexure by IS methods
CO-3	Analyse and Design RCC beams for shear by IS methods.
CO-4	Analyse and Design RCC slabs and staircase by IS methods
CO-5	Design the RCC compression members by IS methods.



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DESIGN OF CONCRETE STRUCTURE -I

SUBJECT CODE: CE-402

Unit	Topic
I	Introduction: Attributes of structural design, material properties of RCC making materials, Basic design approach, and working stress and limit state method of design, assumptions, analysis and design of a rectangular singly and doubly reinforced section by working stress design method.
II	Design of Beam: Assumptions in Limit State Design Method, Design of Rectangular Singly and Doubly Reinforced beams, T-beams, L-beams by Limit State Design Method.
III	Shear Beam: Behaviors of RC beam in Shear, Shear Strength of beams with and without shear reinforcement, Minimum and Maximum shear reinforcement, Design of beam in shear, Introduction to development length, Anchorage bond, flexural bond. (Detailed Examples by Limit State Design Method), Failure of beam under shear, Concept of Equivalent Shear and Moments.
IV	Design of Slab: Design of one way and two way solid slabs by Limit State Design Method, Serviceability Limit States, Control of deflection, cracking and vibrations. Stairs: Type of RCC stairs, load and load effect on stairs, design of stairs, spanning transversally
V	Design of Columns: by Limit State Design Method- Effective height of columns, Assumptions, Minimum eccentricity, Short column under axial compression, Requirements for reinforcement, Column with helical reinforcement, Short column under axial load and uni-axial bending, Design of columns under bi-axial loading by Design Charts.

Text/ Reference Books:

1. S. Ramamrutham & R. Narayanan (2004), Design of reinforced concrete structures, Dhanpat Rai Publishing.
2. Varghese (2005), Advanced Reinforced Concrete Design, Prentice-Hall of India. Gurcharan Singh (2005),
3. Design of R.C.C. Structures in S.I.Units, Standard Publishers Distributors.
- 4.B.C.Punmia (2003), Design of reinforced concrete structures, Lakshmi Publishers.



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DEPARTMENT OF CIVIL ENGINEERING

HYDRAULICS ENGINEERING

SUBJECT CODE: CE 403

L-T-P: 3-1-0

Credit: 4

COURSE OBJECTIVES

1. This course deals with the basic concepts of hydraulic and machines for engineering applications.
2. To understand the working principle of common fluid machines, particularly hydraulic machines.
3. To give an ability to apply the knowledge of hydraulic machine on engineering applications and problems

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Understanding the methodology for application of the dimensional analysis and model study to understand and solve complex problems associated with fluid flow.
CO-2	To know the properties of uniform flow
CO-3	To know the properties of gradually varied flow and its computation in GVF profile
CO-4	Understand the behavior of RVF and Hydraulic jump
CO-5	To know the working principle of turbines and pumps.



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HYDRAULICS ENGINEERING

SUBJECT CODE: CE 403

Unit	Topic
I	Introduction: Difference between open channel flow and pipe flow, channel geometry, hydraulic parameters of various shapes of channels, types of open channel flow, velocity and pressure distribution, mass, energy and momentum conservation principles for prismatic and non-prismatic channels, continuity equation for steady and unsteady flow. Energy-Depth Relations: Concept of specific energy, specific force, critical flow and its computation, flow in vertical and horizontal channel transitions
II	Uniform Flow: Continuity Equation, Energy Equation and Momentum Equation, Characteristics of uniform flow, Chezy's formula, Manning's formula. Factors affecting Manning's Roughness Coefficient. Most economical section of channel Normal depth.
III	Gradually Varied Flow: Dynamic equation of gradually varied flow and its limitations, classification and analysis of flow profiles, control sections, transitional depth. Computation of GVF Profile: Integration of varied flow equation by analytical, graphical and advanced numerical methods, flow profiles in dividing and combining channels, role of end conditions. Spatially Varied Flow: Differential SVF equations for increasing and decreasing discharge conditions.
IV	Rapidly Varied Flow: Types of RVFs, hydraulic jump, types of jump, characteristics of jump in rectangular and non-rectangular channels on horizontal and sloping beds, length and location of jump, jump as an energy dissipator. RVF Measurement: Flow in sharp crested, narrow crested and broad crested weirs, critical depth flumes, sluice gates, end depth in a free over fall.
V	Pumps: Reciprocating Pumps, working principal of both double and single reciprocating pump, indicator diagram frictional loss, centrifugal pump, their advantages over reciprocating pump, classification of centrifugal pump, operation of centrifugal pump in series and parallel. Turbine: General layout of hydroelectric power plant, impulse and reaction turbines, efficiency of turbines, classification based on discharge, head and specific speed, unit power and unit discharge

Text/ Reference Books:

1. Fluid Mechanics by Daugherty, Robert L., McGraw Hill.
2. Fluid Mechanics by A.K.Jain, Khanna Publishers.
3. V.T.Chow (1996), Open Channel Hydraulics, McGraw Hill Publishing Co.
Modi & Seth (2001), Fluid Mechanics and Hydraulic Machinery, Standard Publications.



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DEPARTMENT OF CIVIL ENGINEERING

ADVANCE SURVEYING

SUBJECT CODE: CE 404

L-T-P: 2-0-0

Credit: 2

COURSE OBJECTIVES

1. The course deals with the basics of surveying and levelling, concepts of total station
2. To provide knowledge on Photogrammetric and GPS surveying.

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Understand various applications, concepts of photogrammetric survey
CO-2	Knowledge on concept of total station survey and EDM.
CO-3	To understand the concept of remote sensing and application
CO-4	To study basic components and concept of GIS system
CO-5	Knowledge on advanced surveying techniques in terms of Photogrammetric and GPS surveying.



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ADVANCE SURVEYING

SUBJECT CODE: CE 404

Unit	Topic
I	Photogrammetric Survey: basic principles, elevation of a point, determination of focal length of lens, aerial camera, scale of a vertical photograph, relief displacement of a vertical photograph, height of object from relief displacement, scale of a tilted photograph, tilt distortion, relief displacement of a tilted photograph, combined effects of tilt and relief, flight planning for aerial photography, selection of altitude, interval between exposures, crab and drift, stereoscope parallax, parallax in aerial stereoscopic views, parallax equations. Photogrammetry – analog, analytical and digital photogrammetry.
II	Electronic Distance Measurement (EDM): Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments. Total Station: Total Station – Parts of a Accessories – Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey; Trilateration.
III	Remote Sensing: Introduction, concepts and physical basis of Remote Sensing, Electromagnetic spectrum, radiation laws, atmospheric effects, image characteristics. Remote sensing systems; sources of remote sensing information, spectral quantities spectral signatures and characteristics spectral reflectance curves for rocks, soil, vegetation and water. Introduction to Aerial and space borne platforms. Optical, thermal and microwave sensors and their resolution, salient features of some of operating Remote Sensing satellites.
IV	GIS system: Definition terminology and data types, basic components of GIS software, data models, data acquisition, both raster based and vector based data input and data processing and management including topology, overlaying and integration and finally data product and report generation. GIS applications in civil engineering.
V	GPS: Global Navigation Satellite System (GNSS), GLONASS, GALILEO and GPS: Space segment, Control segment, User segment, GPS satellite signals, Datum, coordinate system and map projection, Static, Kinematic and Differential GPS, GPS Applications.

Text/ Reference Books:

1. Surveying, B. C. Punmia and Jain Vol. 2 & 3 Laxmi Publications, New Delhi.
2. Advanced Surveying, Agor, Khanna Publications, Delhi.
3. Surveying-Bannister, Raymond and Baker, Pearson Education
4. Wolf, P.R., (1998), Elements of Photogrammetry, Mc.Graw – Hill International Book Company



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DEPARTMENT OF CIVIL ENGINEERING

CONCRETE TECHNOLOGY

SUBJECT CODE: CE 405

L-T-P: 2-0-0

Credit: 2

COURSE OBJECTIVES

1. This course deals with the basic concrete properties and concrete materials
3. To give an ability to apply the knowledge of concrete technology on engineering applications and problems

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Understand the properties of constituent material of cement and different type of cement
CO-2	Understand the properties of concrete and its necessity
CO-3	Understand the properties of constituent material of concrete and different type of concrete
CO-4	Understand the strength of concrete and its special concreting techniques
CO-5	Design the concrete mix for various strengths using difference methods



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CONCRETE TECHNOLOGY

SUBJECT CODE: CE 405

Unit	Topic
I	Basics: Historical background, composition of concrete Constituent of Concrete : 1. Cement - Chemical composition, hydration, heat of hydration, hydrated structure, various types of cement, testing of cement as per Indian standard. 2. Aggregates - Utility in concrete, classification, effect of geometry & texture, strength, mechanical properties, moisture content, water absorption, bulking of sand, deleterious substances, sieve analysis, various grading and grading requirements, sampling & testing as per Indian Standards. 3. Water - General Requirements & limiting values of impurities. 4. Admixtures - Additives and admixtures, types, necessity and benefit Mineral admixture - Fly ash, silica fume, blast furnace slag, and other pozzolanic materials. Chemical admixtures - Accelerator, retarder, water reducing elements, plasticizer and super-plasticizer, their functions and dosage.
II	Fresh concrete: Methods of mixing, transporting and placing of concrete. Workability – Definition and requirement, factors affecting workability, various tests as per IS. Segregation and bleeding, stiffening, re-tempering. Curing: necessity and various methods. Hardened concrete: Compressive and tensile strength and their relationship, various tests as per IS. Factors affecting strength – water cement ratio, gel space ratio, aggregate cement ratio, properties of ingredients, effect of age, maturity, aggregate cement-paste inter-face, various finishes of concrete. Introduction to aspects of elasticity, shrinkage and creep.
III	Dimensional Stability and Durability- Creep of concrete, Shrinkage of Concrete, degradation concepts. Concrete in aggressive environment: Alkali – aggregate reaction, sulphate attack, chloride attack, acid attack, effect of sea water, special coating for water proofing, sulphate chloride and acid attack, concrete for hot liquids
IV	Special Concrete: Review of behavior and characteristics of high strength concrete, high performance concrete, fiber reinforced concrete, mass concrete, light weight and heavy weight concrete, Precast concrete. Special concreting techniques: Pumped concrete, concrete, underwater concrete, pre-placed concrete, vacuum dewatered concrete, hot and cold weather concreting, Ready mixed concrete.
V	Mix design- Concrete mix design ,concepts variables in proportioning, methods of mix design Indian Standard method, Factor affecting the test results, Introduction to high performance concrete, high strength concrete, lightweight concrete, Fiber reinforced concrete Tests for strength of concrete: Destructive, semi destructive and nondestructive tests with their limitations, test methods as per IS

Text/ Reference Books:

- Shetty M.S. (2002), Concrete Technology, S. Chand & Company Ltd.
- IS : 383 – 1970, Specification for Coarse and fine natural sources for Concrete, BIS, New Delhi.
- IS : 12269-1987, Specification for 53 grade ordinary Portland Cement, BIS, New Delhi.
- P.K.METHA (2005), Concrete: Microstructure, properties and Materials, McGraw-Hill



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DEPARTMENT OF CIVIL ENGINEERING

HYDRAULICS ENGINEERING

CE-451

L-T-P: 0-0-2

Credit: 1

Note :-At least **Eight** experiments are to be conducted from the following list.

1. To determine the Manning's coefficient of roughness n for the bed of a given flume.
2. To study the velocity distribution in an open channel and to determine the energy and momentum correction factors.
3. To study the flow characteristics over a hump placed in an open channel.
4. To study the flow through a horizontal contraction in a rectangular channel.
5. To calibrate a broad-crested weir.
6. To study the flow over an abrupt drop and to determine the end (brink) depth for a free over fall in an open channel
7. To study the characteristics of free hydraulic jump.
8. To study rotodynamic pumps and their characteristics
9. To study characteristics of Francis turbine.
10. To study characteristics of Kaplan turbine.
11. To study characteristics of Pelton turbine.



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DEPARTMENT OF CIVIL ENGINEERING

ADVANCE SURVEYING LAB

SUBJECT CODE: CE-452

L-T-P: 0-0-2

Credit: 1

Note :-At least **Eight** experiments are to be conducted from the following list.

1. Demonstration and working on Electronic Total Station. Measurement of distances, horizontal & vertical angles and coordinates.
2. Measurement of area of a land parcel using Total Station.
3. To layout a precise traverse in a given area and to compute the adjusted coordinates of survey stations.
4. Demonstration and working with Mirror stereoscopes, Parallax bar and Aerial photographs.
5. Visual Interpretation of standard FCC (False colour composite).
6. Digitization of physical features on a map/image using GIS software.
7. Coordinates measurement using GPS.
8. Contouring of different area



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DEPARTMENT OF CIVIL ENGINEERING

CONCRETE TECHNOLOGY LAB

SUBJECT CODE: CE-453

L-T-P: 0-0-2

Credit: 1

Note :-At least **Eight** experiments are to be conducted from the following list.

A-Test on Fresh Concrete

1. Slump test
2. Compact Factor Test
3. Vee-Bee Test
4. Flow Table Test

B. Test on hardened concrete

5. Compression Test on Cubes &Cylinders
6. Flexure Test
7. Splitting Tensile Test
8. Modulus of Elasticity

C. Non-Destructive Test of Concrete

9. Rebound Hammer
10. Ultrasound pulse velocity (UPV)

11. Effects of Admixture - Accelerator, Retarder, Super Plasticizer.

12. Concrete Mix design computation by IS code method as per 10262-2019 & 456-2000 for given sample



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DEPARTMENT OF CIVIL ENGINEERING

BUILDING PLANNING & CAD LAB

SUBJECT CODE: CE-454

L-T-P: 0-0-2

Credit: 1

Note :-At least **Eight** experiments are to be conducted from the following list.

1. Introduction to computer aided drafting & coordinate system
2. Exercise on Draw & Modify tool bars.
3. Exercise on Layer, Dimension, Texting & Blocks etc.
4. Drawing a plan building and dimensioning using layers
 - (a) Single storied building
 - (b) Multi storied building
5. Developing sections and elevations for given
 - (a) Single storied building
 - (b) Multi storied building
6. Drawing of building components like walls, lintels, Doors and Windows
7. Introduction to 3-D view
8. Exercise on 3-D