

III SEMESTER

S. No	Course Code	Course Title	Instruction			Examination			Credits
			Hours per week			Max. Marks		Duration of SEE in hours	
			L	T	P	CIE	SEE		
1.	CE301PC	Building Materials, Construction and Planning	3	0	0	40	60	3	3
2.	CE302PC	Concrete Technology	3	0	0	40	60	3	3
3.	CE303PC	Strength of Materials – I	3	0	0	40	60	3	3
4.	CE304PC	Fluid Mechanics	3	0	0	40	60	3	3
5.	EE331ES	Basic Electrical and Electronics Engineering	3	0	0	40	60	3	3
6.	CE351PC	Surveying Laboratory - II	0	1	2	40	60	3	2
7.	CE352PC	Strength of Materials Laboratory	0	0	2	40	60	3	1
8.	CE353PC	Concrete Technology Laboratory	0	0	2	40	60	3	1
9.	EE361ES	Basic Electrical and Electronics Engineering Laboratory	0	0	2	40	60	3	1
10.	*MC301HS	Constitution of India	3	0	0	40	60	3	0
Total			18	1	8	400	600		20

IV SEMESTER

S. No	Course Code	Course Title	Instruction			Examination			Credits
			Hours per week			Max. Marks		Duration of SEE in hours	
			L	T	P	CIE	SEE		
1.	MA401BS	Probability and Statistics	3	1	0	40	60	3	4
2.	CE401PC	Strength of Materials – II	3	0	0	40	60	3	3
3.	CE402PC	Structural Analysis - I	3	0	0	40	60	3	3
4.	CE403PC	Engineering Geology	3	0	0	40	60	3	3
5.	CE404PC	Hydraulics and Hydraulic Machinery	3	0	0	40	60	3	3
6.	CE451PC	Fluid Mechanics and Hydraulic Machinery Laboratory	0	0	2	40	60	3	1
7.	CE452PC	Computer Aided Drafting Laboratory	0	0	2	40	60	3	1
8.	CE453PC	Real-time Research Project/ Field-Based Project	0	0	4	50	--	--	2
9.	*MC451HS	Gender Sensitization Laboratory	0	0	2	40	60	3	0
Total			15	1	10	370	480		20

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3	0	0	3

B.Tech in Civil Engineering
III Semester Syllabus
CE301PC: Building Materials, Construction and Planning

Course Objectives: The objectives of the course are

1. List the construction material.
2. Explain different construction techniques
3. Understand the building bye-laws
4. Highlight the smart building materials

Course Outcomes: After the completion of the course student should be able to

1. **Identify** different building materials and their structural requirements.
2. **Understand** the different types of cement and admixtures.
3. **Appraise** the different alternative materials used for construction.
4. **Extrapolate** importance of building components.
5. **Plan** a Building using appropriate building by laws and **Understand** building Services.

UNIT-I

Stones, Bricks and Aggregates: Properties of building stones -relation to their structural requirements - Classification of stones - stone quarrying - precautions in blasting - dressing of stone -composition of good brick earth - various methods of manufacture of bricks - Comparison between clamp burning and kiln burning - Fine aggregate - Natural and manufactured - Sieve analysis - specify gravity – bulking - moisture content - deleterious materials - Coarse aggregate - Natural and manufactured - Importance of size, shape and texture.

UNIT-II

Cement & Admixtures: Ingredients of cement–manufacture–Chemical composition–Hydration–field & laboratory tests - Types of cement, Properties and applications – introduction to admixtures–Classification - mineral & chemical admixtures–Applications.

UNIT-III

Alternative Materials and Masonry: Wood – structure – properties - seasoning of timber - Classification of wood - defects in timber - Alternative materials for wood - galvanized iron, fiber reinforced plastics, steel, aluminum and glass - Ceramic Tiles- Manufacturing-specifications of Tiles Masonry - types of masonry- English and Flemish bonds - Stone masonry - rubble and ashlar masonry - Composite masonry –Brick-stone composite; Concrete - Reinforced brick masonry.

UNIT-IV

Building Components and Finishing: Lintels – arches - different types of floors-concrete, mosaic and terrazzo floors - Roofs - pitched, flat and curved roofs - lean to-roof - coupled roofs, RCC roofs, madras terrace and shell roofs. Trussed roofs- king and queen post trusses - Foundations: Shallow foundations, spread, combined, strap and mat footings. Stair case- Definitions - technical terms and types of stairs - requirements of good stairs - introduction to geometrical design of stairs – lifts, ramps, elevators and escalators – types and purpose - Finishers - Plastering, Pointing, Painting, Claddings – Formwork –Types - Requirements–Standards–Scaffolding – Shoring - Underpinning.

UNIT-V**Building Planning and Building Services:**

Building planning – significance – scope - principles of building planning - classification of buildings and building by laws - Introduction to National Building Codes (NBC) – guidelines and regulations - Building Services - Plumbing Services - Water Distribution, Sanitary Lines & Fittings; Ventilation - Functional requirements systems of ventilations - Air-conditioning - Essentials and Types; Acoustics –characteristic – absorption – Acoustic design - Fire protection – Fire Hazards – Classification of fire-resistant materials and constructions

TEXT BOOKS

1. Building Materials by S. K. Duggal, New Age International (P) Limited, 4th Edition, 2016, National Building Code (NBC) of India.
2. Building Construction by Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publications (P) Ltd., New Delhi. Twelfth Edition, 2023.
3. Engineering Materials by Rangawala S. C. Charter Publishing House, Anand, India. 43rd Edition, 2019.

REFERENCE BOOKS

1. Building Materials and construction by Sushil Kumar, Standard Publishers, 20th Edition, reprint, 2015.
2. Building Materials by P C Vergese, PHI Learning Pvt. Ltd, 2nd Edition, 2015.
3. Building Materials and Components, CBRI, India, 1990.
4. Alternative Building Materials Technology by Jagadish. K.S., New Age International, 2007.
5. Concrete Technology by M. S. Shetty, S. Chand & Co. New Delhi, 2005

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B.Tech in Civil Engineering
III Semester Syllabus
CE302PC: Concrete Technology

Course Objectives:

The objectives of the course are to

1. **Understand** the mechanism of hydration of cement and learn the properties of aggregates to produce quality concrete
2. **Understand** the properties of concrete in plastic and hardened stage.
3. **Design** economic concrete mix proportion and know understand its importance in estimation of composition of materials.
4. **Know** various types of special concretes & its application.

Course Outcomes:

After the completion of the course student should be able to

1. **Explain** the properties of concrete ingredients i.e., cement, sand, coarse aggregate
2. **Summarize** the effects of the rheology of the behavior of fresh concrete and testing methods adopted.
3. **Understand** the behavior of hardened concrete and destructive, non-destructive testing on hardened concrete
4. **Design** the concrete mix by BIS method of mix design and understand the factors Influencing concrete mix
5. **Define** special concretes, their application for practical purpose.

UNIT-I

Cement: Grades of cement – Hydration of cement – Structure of Hydrated cement

Aggregate: Classification of aggregate – Bond, strength & other mechanical properties of aggregates – Soundness of aggregate – Alkali aggregate reaction – Thermal properties– Fineness modulus – Grading curves – Grading of fine, Manufactured sand and coarse Aggregates – Gap graded aggregate – Maximum aggregate size – Properties of Recycled aggregate.

UNIT-II

Fresh Concrete: Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing, vibration and re-vibration of concrete–steps in manufacture of concrete – Quality of mixing water.

UNIT-III

Hardened Concrete: Water / Cement ratio – Abram’s Law – Gel/space ratio – Gain of strength of concrete – Maturity concept – Strength in tension and compression – Factors affecting strength – Relation between compression and tensile strength-Curing.

Testing of Hardened Concrete: Compression tests– Tension tests – Factors affecting strength – Flexure tests – Splitting tests – Pull-out test, Non-destructive testing methods – codal provisions for NDT.

Elasticity, Creep & Shrinkage – Modulus of elasticity – Dynamic modulus of elasticity – Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep–Shrinkage–types of shrinkage.

UNIT-IV

Mix Design: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods– BIS method of mix design.

UNIT-V

Special Concretes: Introduction to Light weight concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Polymer concrete – High performance concrete –Self compacting concrete, Nanosilica and Nano Alumina concrete.

TEXTBOOKS:

1. Concrete Technology by M.S.Shetty - S.Chand & Co.;2004
2. Concrete Technology by A.R.Santhakumar, 2nd Edition, Oxford university Press, New Delhi
3. Concrete Technology by M.L.Gambhir.–Tata Mc.Graw Hill Publishers, 5th Edition, New Delhi

REFERENCEBOOKS:

1. Properties of Concrete by A.M.Neville – Low priced Edition– 4th edition
2. Concrete: Micro structure, Properties and Materials – P.K. Mehta and J.M.Monteiro, Tata Mc.Graw Hill Publishers

IS Codes:

IS 383 :2016

IS 516 :2018 (Part-1-4)

IS 10262-2019

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B.Tech in Civil Engineering
III Semester Syllabus
CE303PC: Strength of Materials – I

Course Objectives:

The objective of this Course is

1. To understand the nature of stresses developed in simple geometries such as bars and beams for various types of simple loads.
2. To calculate the elastic deformation occurring in simple members for different types of loading.
3. To show the plane stress transformation with a particular coordinate system for different orientation of the plane.
4. To know different failure theories adopted in designing of structural members.

Course Outcome:

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

1. **Describe** the concepts and principles, understand the theory of elasticity including strain/displacement and Hooke's law relationships; and perform calculations, related to the strength of structured and mechanical components.
2. **Analyse** the beams for various types of loads to calculate the variation of Shear force and Bending Moment across the span
3. **Recognize** various types of loads applied on structural components of simple framing geometries and understand the nature of internal stresses that will develop within the components.
4. **Evaluate** the strains and deformation that will result due to the elastic stresses developed within the materials for simple types of loading.
5. **Analyse** various situations involving structural members subjected to plane stresses and applications of Mohr's circle of stress.

UNIT – I

Simple Stresses and Strains: Concept of stress and strain - St. Venant's Principle-Stress and Strain Diagram - Elasticity and plasticity – Types of stresses and strains- Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain - Pure shear and Complementary shear - Elastic moduli, Elastic constants and the relationship between them – Bars of varying section – composite bars – Temperature stresses. Strain Energy – Resilience – Gradual, sudden, and impact loadings – simple applications.

UNIT – II

Shear Force and Bending Moment: Types of beams – Concept of shear force and bending moment - S.F and B.M diagrams for cantilever, simply supported including overhanging beams subjected to point loads, uniformly distributed load, uniformly varying load, couple and combination of these loads

–Point of contra-flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III

Flexural Stresses and Shear Stresses: Theory of simple bending – Assumptions – Derivation of simple bending equation- Section Modulus - Determination of flexural/bending stresses of rectangular and circular sections (Solid and Hollow), I ,T, Angle and Channel sections - Introduction to shear stress, Derivation of formula for shear stress distribution – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle and channel sections– Design of simple beam sections .

UNIT – IV

Deflection of Beams: Slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay’s methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, U.D.L, Uniformly varying load and couple -Mohr’s theorems – Moment area method – Conjugate Beam Method -Application to simple cases.

UNIT – V

Principal Stresses and Theories of failures: Introduction – Stresses on an oblique plane of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Principal stresses – Mohr’s circle of stresses – ellipse of stress - Analytical and graphical solutions – Introduction to Theories of Failures – Analysis of beams for various theories of failures

TEXT BOOKS:

1. Strength of Materials by R. K Rajput, S. Chand & Company Ltd.
2. Mechanics of Materials by Dr. B.C Punmia, Dr. Ashok Kumar Jain and Dr. Arun Kumar Jain
3. Strength of Materials by R. Subramanian, Oxford University Press

REFERENCE BOOKS:

1. Mechanics of material by R.C. Hibbeler, Prentice Hall publications
2. Engineering Mechanics of Solids by Egor P. Popov, Prentice Hall publications
3. Strength of Materials by T.D.Gunneswara Rao and M.Andal, Cambridge Publishers
4. Strength of Materials by R.K. Bansal, Lakshmi Publications House Pvt. Ltd.
5. Strength of Materials by B.S.Basavarajaiah and P. Mahadevappa, 3rd Edition, Universities Press.

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**B.Tech in Civil Engineering
III Semester Syllabus**

CE304PC: Fluid Mechanics

Course Objectives:

The objectives of the course are to:

1. Introduce the concepts of fluid mechanics useful in Civil Engineering applications
2. Provide a first level exposure to the students to fluid statics, kinematics and dynamics.
3. Learn about the application of mass, energy and momentum conservation laws for fluid flows
4. Train and analyze engineering problems involving fluids with a mechanistic perspective.
5. To obtain the velocity and pressure variations in various types of simple flows
6. To prepare a student to build a good fundamental background useful in the application of intensive courses covering hydraulics, hydraulic machinery and hydrology.

Course Outcomes:

Upon completion of this course, students should be able to:

1. **Identify** fluid properties and to **determine** the forces on plane and curved surfaces.
2. **Classify** the fluid flow and **Analyze** the continuity principles
3. **Apply** the momentum and energy principles in order to **solve** problems related to pipes, notches and weirs
4. **Estimate** the losses in pipes, design and analyze pipe networks.
5. **Solve** laminar and turbulent boundary layers and **analyze** the lift and drag forces on objects.

UNIT-I

Properties of Fluid: Distinction between a fluid and a solid - basic Properties of fluids-Viscosity - Newton law of viscosity - vapor pressure - surface tension - capillarity - Bulk modulus of elasticity - compressibility.

Fluid Pressure: Pressure at a point - Pascal's law - Hydrostatic law - Piezometer - U-Tube Manometer - Single Column Manometer - U-Tube Differential Manometer - Micro-manometers.

Fluid Statics: Hydrostatic pressure force for horizontal, vertical, inclined plane surfaces and curved surfaces.

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 in-compressible flow - ideal and real fluid flow - One, two-and three-dimensional flows;

Streamline, path line, streak line and stream tube - stream function - velocity potential function - flow net - three-dimensional continuity equations in Cartesian co-ordinates and its applications - Acceleration and its types.

Fluid Dynamics

Surface and Body forces - Euler's equation - Bernoulli's equation - Bernoulli's equation to real fluid flows - Kinetic energy correction factor.

UNIT-III

Applications of Bernoulli's equation: Introduction to Orifice - types of orifices -Venturi meter - Orifice meter and Pitot tube - flow through rectangular, triangular and trapezoidal & stepped notches and weirs - Concept of end contractions and velocity of approach and discharge through Broad crested weir

Momentum equation : Momentum equation and Its application on pipe bend - momentum correction factor.

UNIT-IV**Flow through Pipes:**

Reynolds number and Reynolds experiment - Characteristics of laminar and turbulent flow - Laminar flow through circular pipes, and fixed parallel plates - Loss of head through pipes in turbulent flow- Darcy-Wiesbach equation - minor losses - total energy line - hydraulic gradient line - Pipes in series, equivalent pipe, pipes in parallel - power transmission through pipes - Water hammer in pipes and control measures.

UNIT-V**Boundary Layer Concepts:**

Concept of boundary layer theory - characteristics of boundary layer over a flat plate - Boundary layer thickness - displacement, momentum and energy thickness - Momentum integral equation of boundary layer - concepts of laminar and turbulent boundary layers on a flat plate - Local and average friction coefficients - Laminar sub-layer – Boundary layer separation and Control methods - Drag and Lift forces and types of drag - Magnus effect.

TEXTBOOKS:

1. Hydraulics and Fluid Mechanics including Hydraulic Machines by Modi .P.N. and. Seth. S.M, , Standard Book House, 2009.
2. Fluid Mechanics and Hydraulic machines by Rajput. R.K., S.Chand & Company, 2010.
3. Fluid Mechanics including Hydraulic Machines by Jain. A. K., , Khanna Publishers (rs),2004

REFERENCEBOOKS:

- 1.Fluid Mechanics and Hydraulic Machines by Bansal. R. K. , Laxmi Publications Pvt. Ltd, 2010
- 2.Fluid Mechanics and Hydraulic Machines problems and solutions by Subramanya. K. , McGraw Hill Education Pvt. Ltd, 2014 .
- 3.Introduction to Fluid Mechanics and Fluid Machines by S.K.Som, Gautam Biswas, Suman Chakraborty, , McGraw Hill Education,PrivateLimited,2014 .

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**B.Tech in Civil Engineering
III Semester Syllabus**

**EE331ES: Basic Electrical and Electronics Engineering
(CE)**

Prerequisite: Mathematics and Physics

Course Objectives:

1. To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
2. To impart the knowledge of various electrical installations
3. To study and understand the different types of DC/AC machines and Transformers.
4. To introduce the concepts of diodes & filters
5. To impart the knowledge of various configurations, characteristics and applications in transistors and field effect transistors.

Course Outcomes:

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

1. To analyze and solve electrical circuits using network laws and theorems.
2. To introduce components of Low Voltage Electrical Installations
3. To study the working principles of Electrical Machines
4. To understand and analyze basic diode and rectifier configurations
5. To identify and characterize various types of transistors.

UNIT-I: Electrical Circuits

DC Circuits: Electrical circuit elements (Resistor, Inductor & Capacitor), Ohm's Law, voltage and current sources (Independent and Dependent), Kirchhoff's Laws, Mesh Analysis, Nodal Analysis, Delta-Star & Star Delta Conversion

AC Circuits: Representation of sinusoidal waveforms, peak value and rms values, phasor representation, Analysis of single-phase ac circuits with phasor diagrams, Three-phase balanced circuits, voltage and current relations in star and delta connections

UNIT-II: Electrical Installation

Miniature Circuit Breaker (MCB), Types of Wires and Cables, Earthing, Types of earthing, Batteries, Elementary calculations for energy consumption.

UNIT-III: Electrical Machines

Working principle of Single-phase transformer, equivalent circuit, phasor diagram of transformer at no load and load, losses in transformers, efficiency & regulation calculation. Construction and working principle of DC generators, Types of DC generators: Separately excited, Self-Excited (Shunt, Series, Compound), EMF equation. Working principle of DC motors, Types of DC motors, Torque equations Construction and working principle of Three-phase Induction motor, Slip, Torque equations, Construction and working principle of synchronous generators.

UNIT-IV: Electronic Devices

Diodes: Principle of Operation, Forward bias, Reverse bias, Static Volt-Ampere characteristics, Static and dynamic resistances, Operation of Zener diode, Characteristics of zener diode and applications.

Rectifiers and Filters: P-N junction as a rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Filters – Inductor Filters, Capacitor Filters

UNIT-V: Transistors

Bipolar Junction Transistor (BJT) - Construction, Principle of Operation, Common Emitter, configurations, Input and Output Characteristics. Transistor Application: Transistor as Amplifier & Transistor as Switch.

Field Effect Transistor (FET): Construction, Principle of Operation of JFET, Output Characteristics, Transfer Characteristics, JFET applications: JFET as Amplifier & JFET as a Switch, Comparison of Bipolar Junction Transistor and Field Effect Transistor, Biasing of FET.

Suggested Readings:

1. Sukija, TK Nagasarkar Basic Electrical and Electronics Engineering – Oxford University.
2. D.P. Kothari, I J Nagrath, Basic Electrical and Electronics Engineering - McGraw Hill Education.

Reference Books:

1. R. L. Boylestad and Louis Nashelsky, Electronic Devices and Circuits, PEI/PHI, 9th Ed, 2006.
2. Millman and C. C. Halkias, Satyabrata Jit, Millman's Electronic Devices and Circuits, TMH, 2/e, 1998.
3. William Hayt and Jack E. Kemmerly, Engineering circuit analysis, McGraw Hill Company, 6th edition.

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**B.Tech in Civil Engineering
III Semester Syllabus
CE351PC: Surveying Laboratory–II**

Course Objectives:

1. Student will be able to learn and understand the various basic concept and principles used in surveying like Chain Surveying, Compass Surveying, Plane Table Surveying and Levelling .
2. Student will be able to learn and understand about theodolite and total station in surveying.
3. Student will learn and understand how to calculate Area of plot and Ground.
4. Student will learn and understand about Horizontal Angle, Vertical Angle, Horizontal distance and Vertical distance to study the ground profile using total station.

Course Outcomes:

- At the end of the course student will be able to:
1. **Apply** the principle of surveying for measuring angles, distance, area and constants using theodolite.
 2. **Determination** of distance (inaccessible), heights and elevation using theodolite and total station.
 3. **Developing** of contour maps, drawing profiles and curve setting using total station.

CYCLE-I**Theodolite Surveying:**

1. Measurement of horizontal angles and vertical angles.
2. Distance between two inaccessible points.
3. Measurement of area by theodolite traversing (Gales traverse table).
4. Determination of tachometer constants.
5. Distance between two inaccessible points using the principles of tachometer surveying.
6. Distance between two inaccessible points using the principles of trigonometric surveying

CYCLE -II**Total Station:**

7. Area Measurement
8. Stake Out
9. Remote Elevation Measurement
10. Missing Line Measurement
11. Longitudinal & Cross Section Profile
12. Contouring
13. Providing a Simple Circular Curve
14. Demonstration of applications of GPS

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B.Tech in Civil Engineering
III Semester Syllabus
CE352PC: Strength of Materials Laboratory

Course Objectives:

1. To conduct the Tension test, Compression test on various materials
2. To conduct the Shear test, Bending test on determinate beams
3. To conduct the Compression test on spring and Hardness test using various machines
4. To conduct the Torsion test, Impact test on various materials

Course Outcomes:

After the completion of the course, students should be able to

1. **Determine** the ultimate tensile stress, shear stress of steel and compressive strength of brick and concrete
2. **Determine** modulus of elasticity of beam using bending test.
3. **Determine** the mechanical properties of various materials.

List of Experiments:

1. Tension test
2. Shear test
3. Compression test on concrete.
4. Bending test on (Steel / Wood) Cantilever beam.
5. Bending test on simply supported beam.
6. Verification of Maxwell's Reciprocal theorem on beams.
7. Use of electrical resistance strain gauges.
8. Continuous beam – deflection test.
9. Hardness test
10. Spring test
11. Impact test
12. Torsion test.

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B.Tech in Civil Engineering
III Semester Syllabus
CE353PC: Concrete Technology Laboratory

Course Objectives:

1. To know the various procedures to determine the characteristics of cement
2. To know the test procedures to find the properties of fresh concrete
3. To understand the test procedures to find mechanical properties of hardened concrete

Course Outcomes:

After completion of the course, the student should be able to

1. **Perform** various tests required to assess the characteristics of cement
2. **Design** the concrete mix for required strength and evaluate the fresh concrete
3. **Evaluate** the destructive and non-destructive hardened properties of concrete

LIST OF EXERCISES:**1. Tests on Cement:**

- a) Soundness.
- b) Compressive strength.

2. IS method of mix design of normal concrete as per IS:10262

3. Tests on Fresh Concrete:

- a) Slump cone test.
- b) Compacting factor test.
- c) Vee-Bee consistometer test.
- d) Flow Table test.

4. Tests on Hardened Concrete:

- a) Compression test
- b) Flexure test
- c) Split Tension Test
- d) Modulus of Elasticity of concrete

5. Non-destructive Tests on Hardened Concrete:

- a) Rebound Hammer

6. Demonstration:

- a) UPV
- b) Profometer

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**B.Tech in Civil Engineering
III Semester Syllabus**

**EE361ES: Basic Electrical and Electronics Engineering Laboratory
(CE)**

Prerequisite: Basics of Electrical and Electronics Engineering

Course Objectives:

1. To study a given network by applying various electrical laws
2. To understand the performance characteristics of DC and AC machines
3. To understand the characteristics of PN junction and Zener Diode
4. To understand the applications of diode as rectifiers
5. To understand the characteristics of BJT and FET

Course Outcomes:

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

1. Analyze network by applying various electrical laws
2. Analyze performance characteristics of DC and AC machines
3. Analyze the characteristics of PN junction and Zener Diode
4. Acquire the knowledge of various rectifier configurations
5. Analyze the characteristics of BJT and FET

LIST OF EXPERIMENTS/ DEMONSTRATIONS:

PART A: ELECTRICAL

1. Verification of KVL and KCL
2. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
3. Measurement of Active and Reactive Power in a balanced Three-phase circuit
4. Performance Characteristics of a DC Shunt Motor
5. Performance Characteristics of a Three-phase Induction Motor
6. No-Load Characteristics of a Three-phase Alternator

PART B: ELECTRONICS

1. Study and operation of
 - (i) Multi-meter (ii) Function Generator (iii) Regulated Power Supply (iv) Cathode Ray Oscilloscope.
2. PN Junction diode characteristics
3. Zener diode characteristics and Zener as voltage Regulator
4. Input & Output characteristics of Transistor in CE configuration
5. Full Wave Rectifier with & without filters
6. Input and Output characteristics of FET in CS configuration

Any 5 experiments from PART-A and 5 experiments from PART-B are to be conducted.

Suggested Readings:

1. Basic Electrical and electronics Engineering –M S Sukija TK Nagasarkar Oxford University
2. Basic Electrical and electronics Engineering-D P Kothari. I J Nagarath, McGraw Hill Education

Reference Books:

1. Electronic Devices and Circuits – R. L. Boylestead and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th edition.
3. Network Theory by N. C. Jagan& C. Lakshminarayana, B.S. Publications.
4. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
5. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
6. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989

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**B.Tech in Civil Engineering
III Semester Syllabus**

***MC301HS: Constitution of India
(CE, ME, ECE, MCT & MME)**

Course Objectives:

1. Students will get to know about the history of Indian Constitution.
2. Students will get to know about President Election and his Power.
3. Students will get to know about Council of Ministers and their election procedure and their powers and responsibilities.
4. Students will get to know about Judicial System in India.
5. Students will get to know about Panchayat-raj System in India.

Course Outcomes:

1. This enables the Students to know about the Rights of Citizen.
2. This enables the Students to know about Fundamental Duties of People.
3. This enables the Students to Know the Directive principles of State Policy.
4. This enables the Students to know about Functioning of Parliament and its Powers.
5. This enables the Students to know about various Constitutional bodies in India.

Course content

1. Meaning of the constitution, law and constitutionalism
2. Historical perspective of the Constitution of India
 - Drafting Committee
3. Salient features and characteristics of the Constitution of India
 - Preamble
 - Salient Features
 - Major Sources of Indian Constitution
4. Scheme of the fundamental rights
 - Article 13 to 32
 - Scheme of the Fundamental Right to Equality
 - Scheme of the Fundamental Right to certain Freedom
 - Scope of the Right to Life and Personal Liberty
5. The scheme of the Fundamental Duties and its legal status
 - List of Fundamental Duties
 - Justifiability of Fundamental Duties
6. The Directive Principles of State Policy – Its importance and implementation
 - Categories - Gandhian, Socialist and Liberal Principles
 - Significance of Directive Principles of State Policy
 - Relation between Fundamental rights and Directive Principles of State Policy
7. Federal structure and distribution of legislative and financial powers between the Union and the States

- Union List
 - State List
 - Concurrent List
 - Residuary Powers
8. Parliamentary Form of Government in India.
 9. The constitutional powers and status of the President of India vs the constitutional powers and status of the Council of ministers headed by the Prime Minister
 10. Amendment of the Constitution and its Procedure
 - Procedure of Amendment to Constitution of India
 - Important Amendments
 11. Emergency Provisions: National Emergency, President Rule, Financial Emergency
 12. Local Self Government – Constitutional Scheme in India
 - Urban local Self Government
 - Rural local Self Government
 13. Important Constitutional Bodies
 - Election Commission of India
 - Finance Commission of India
 - Union Public Service Commission
 - C-AG

Suggested Readings:

1. Subhash Kashyap, Our Constitution, National Book Trust, 5th Edition, Reprint- 2017.
2. V. N Shukla, The Constitution of India, Law literature Publication, 11th Edition, 2020.

Reference Books:

1. M P Jain, Indian Constitutional Law, Lexis Nexis, 8th Edition, 2018.
2. Samar Aditya Pal, Indian Constitution-Origin& Evolution, Lexis Nexis, 1st Edition, 2019.

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B.Tech in Civil Engineering
IV Semester Syllabus
MA401BS: Probability and Statistics
(CE)

Course Objectives:

1. The theory of random variables and probability distributions and their properties
2. The concept of theoretical distributions
3. The concept of sampling and sampling distributions
4. The testing of hypothesis and making statistical inferences
5. The basic ideas of statistics including measures of central tendency, curve fitting, correlation and regression

Course Outcomes: After completion of the course the students will be able to:

1. Formulate and solve problems involving random variables
2. Understand the theoretical distributions
3. Understand the concept of sampling distributions
4. Apply concept of testing of hypothesis to case studies
5. Apply statistical methods for analyzing experimental data

UNIT-I: Random Variables and Probability Distributions:

Concept of a Random variables - Discrete and Continuous random variables and their distribution functions – Expectation, Variance and standard deviation of random variables.

UNIT-II: Theoretical Distributions:

Binomial, Poisson distributions and its properties, Poisson approximation to the Binomial distribution; Normal distributions and its properties. Normal approximation to Binomial distribution

UNIT-III: Fundamental Sampling Distributions:

Random Sampling, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem, theory of estimation.

UNIT-IV: Tests of Hypotheses:

Test of significance- Basics of testing of hypothesis, Null and Alternate hypothesis, types of errors, level of significance, Critical region, Large sample test - single mean, single proportion, difference of means, difference of proportions; Small sample tests: Student's t-distribution, single mean, difference of means.

UNIT-V: Applied Statistics:

Curve fitting by the method of least squares, fitting of straight lines, second degree parabolas and more general curves – Correlation and regression, Rank correlation.

TEXTBOOKS:

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statistics for Engineers & Scientists, 9th Ed. Pearson Publishers.
2. SC Gupta and VK Kapoor, Fundamentals of Mathematical statistics, Khanna publications.

REFERENCEBOOKS:

1. T.T.Soong, Fundamentals of Probability and Statistics for Engineers, John Wiley & Sons, Ltd, 2004.
2. Sheldon MRoss, Probability and statistics for Engineers and scientists, academic press.

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B.Tech in Civil Engineering
IV Semester Syllabus
CE401PC: Strength of Materials – II

Course Objectives:

The objective of this Course is

1. To understand the nature of stresses developed in simple geometries shafts, springs, columns and cylindrical and spherical shells for various types of simple loads.
2. To calculate the stability and elastic deformation occurring in various simple geometries for different types of loading.
3. To understand the unsymmetrical bending and shear center importance for equilibrium conditions in a structural member of having different axis of symmetry.

Course Outcomes:

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

1. **Describe** the concepts and principles, understand the theory of elasticity, and perform calculations, relative to the strength of structures and mechanical components in particular to torsion and direct compression.
2. **Analyze** strength and stability of structural members subjected to Direct and combined bending stresses.
3. **Evaluate** the combined bending stresses on the columns and struts subjected to axial and eccentric loading.
4. **Analyse** the cylindrical shells for hoop and radial stresses and understand the changes in dimensions.
5. **Understand** and evaluate the shear center and unsymmetrical bending

UNIT – I

Torsion of Shafts and Springs: Introduction to Torsion for circular shafts-Theory of pure torsion – Derivation of Torsion equation -Assumptions made in the theory of pure torsion – Polar section modulus – Power transmitted by shafts – Combined bending and torsion – Design of shafts according to theories of failure-

Introduction to springs– Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple – springs in series and parallel.

UNIT - II

Direct and Bending Stresses: Stresses under the combined action of direct loading and bending moment, core of a section – determination of stresses in the case of retaining walls, chimneys and dams – conditions for stability-Overturning and sliding – stresses due to direct loading and bending moment about both axis.

UNIT – III

Columns and Struts: Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler’s theorem for long columns- assumptions-derivation of Euler’s critical load formulae for various end conditions – Equivalent length of a column – slenderness ratio – Euler’s critical stress – Limitations of Euler’s theory– Long columns subjected to eccentric loading – Secant formula – Empirical formulae — Rankine – Gordon formula– Straight line formula – Prof. Perry’s formula.

UNIT – IV

Thin and Thick Cylinders: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in diameter, and volume of thin cylinders – concept of Thin spherical shells. Thick cylindrical shells - Lamé's theory for thick cylinders – Derivation of Lamé's formulae – distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders – Necessary difference of radii for shrinkage.

UNIT – V

Unsymmetrical Bending and Shear Centre: Introduction – 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- Introduction to shear centre - Shear center for symmetrical and unsymmetrical (channel, I, T and L) sections.

TEXT BOOKS:

1. Strength of Materials by R.K Rajput, S. Chand & Company Ltd.
2. Mechanics of Materials by Dr. B. C Punmia, Dr. Ashok Kumar Jain and Dr. Arun Kumar Jain
3. Strength of Materials by R. Subramanian, Oxford University Press.

REFERENCE BOOKS:

1. Mechanics of Materials by R.C. Hibbeler, Pearson Education
2. Engineering Mechanics of Solids by Popov E.P. Prentice-Hall Ltd
3. Strength of Materials by T.D. Gunneswara Rao and M.Andal, Cambridge Publishers
4. Strength of Materials by R. K. Bansal, Lakshmi Publications House Pvt. Ltd.
5. Fundamentals of Solid Mechanics by M. L. Gambhir, PHI Learning Pvt. Ltd.

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B.Tech in Civil Engineering
IV Semester Syllabus
CE402PC: Structural Analysis – I

Course Objectives:

<p>The objective of the course is to</p> <ol style="list-style-type: none"> 1. Differentiate the statically determinate and indeterminate structures. 2. To understand the nature of stresses developed in perfect frames and three hinged arches for various types of simple loads 3. Analyse the statically indeterminate members such as fixed beams, continuous beams and for various types of loading. 4. Understand the energy methods used to derive the equations to solve engineering problems 5. Evaluate the Influence on a beam for different static & moving loading positions
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Course Outcomes:

<p>At the end of the course the student will be able to</p> <ol style="list-style-type: none"> 1. Analyze pin jointed frames by different methods. 2. Apply energy theorems for the analysis of determinate structural elements and to Analyze determinate arches. 3. Analyze Propped cantilever and fixed beams. 4. Analyze continuous beams and simple frames by classical methods. 5. Determine shear force, bending moment and absolute maximum values from Influence line diagrams for moving loads.

UNIT – I

Analysis of Perfect Frames: Types of frames- Perfect, Imperfect and Redundant pin jointed plane frames - Analysis of determinate pin jointed plane frames using method of joints, method of sections and tension coefficient method for vertical loads, horizontal loads and inclined loads.

UNIT – II

Energy Theorems: Introduction-Strain energy in linear elastic system - expression of strain energy due to axial load, bending moment and shear forces - Castigliano's theorem-Unit Load Method – Deflections of simple beams and pin- jointed plane frames - Deflections of statically determinate bent frames.

Three Hinged Arches – Introduction – Types of Arches – Comparison between Three hinged and Two hinged Arches - Linear Arch - Eddy's theorem - Analysis of Three hinged arches - Normal Thrust and radial shear and bending moment - Geometrical properties of parabolic and circular arches - Three hinged parabolic circular arches having supports at different levels.

UNIT - III

Propped Cantilever and Fixed Beams: Determination of static and kinematic indeterminacies for beams - Analysis of Propped cantilever and fixed beams, including the beams with different moments of inertia - subjected to point loads, uniformly distributed load, uniformly varying load, couple and combination of loads - Shear force, Bending moment diagrams and elastic curve for Propped Cantilever and Fixed Beams - Deflection of Propped cantilever and fixed beams - effect of sinking of support – effect of rotation of a support.

UNIT – IV

Continuous Beams: Introduction - Continuous beams - Clapeyron's theorem of three moments- Analysis of continuous beams with constant and variable moments of inertia with one or both ends - fixed-continuous beams with overhang - effect of sinking of supports.

Slope Deflection Method: Derivation of slope-deflection equation - application to continuous beams with and without sinking of supports - Determination of static and kinematic indeterminacies for frames - Analysis of Single Bay, Single storey Portal Frames by Slope Deflection Method including Side Sway - Shear force and bending moment diagrams and Elastic curve.

UNIT – V

Moving Loads and Influence Lines: Introduction - maximum SF and BM at a given section and absolute maximum shear force and bending moment due to single concentrated load, uniformly distributed load longer than the span, uniformly distributed load shorter than the span, two point loads with fixed distance between them and several point loads-Equivalent uniformly distributed load-Focal length - Definition of influence line for shear force and bending moment - load position for maximum shear force and maximum bending moment at a section - Point loads, uniformly distributed load longer than the span, uniformly distributed load shorter than the span.

TEXT BOOKS:

1. Structural Analysis Vol –I & II by V.N. Vazirani and M.M. Ratwani, Khanna Publishers.
2. Structural Analysis Vol I & II by G. S. Pandit and S.P. Gupta, Tata McGraw Hill Education Pvt. Ltd.
3. Structural analysis by T. S Thandavamoorthy, Oxford University Press

REFERENCE BOOKS:

1. Mechanics of Structures Vol – I and II by H.J. Shah and S.B. Junnarkar, Charotar Publishing House Pvt. Ltd.
2. Theory of structures by S.Ramamrutham and R.Narayan,9th edition. Dhanpat Rai publishing company.
3. Basic Structural Analysis by C. S. Reddy, Tata McGraw Hill Education Pvt. Ltd.
4. Basic Structural Analysis by K.U. Muthu et al., I.K. International Publishing House Pvt. Ltd
5. Fundamentals of Structural Analysis by M.L. Gamhir, PHI Learning Pvt. Ltd.

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B.Tech in Civil Engineering
III Semester Syllabus
CE403PC: Engineering Geology

Course Objectives:

The objective of this Course is

1. To give the basics knowledge of Geology that is required for constructing various Civil Engineering Structures, basic Geology, Geological Hazardous and Environmental Geology.
2. To focus on the core activities of engineering geologists – site characterization and geologic hazard identification and mitigation. Planning and construction of major Civil Engineering projects.

Course Outcomes:

At the end of the course, the student will be able to:

1. **Understand** the weathering process and mass movement Geology.
2. **Identify** the types of rocks and their significant importance in Civil Engineering structures.
3. **Distinguish** types of geological structures and their suitability.
4. **Apply** the knowledge of Geophysical investigation in the exploration of subsurface information and ground water potential.
5. **Analyze** geological principles for mitigation of natural hazards and site characterization for dams and tunnels.

UNIT - I

Introduction: Importance of geology from Civil Engineering point of view- Brief study of case histories of failure of some Civil Engineering constructions due to geological drawbacks. Importance of Physical geology, Petrology and Structural geology.

Weathering of Rocks: Its effect over the properties of rocks importance of weathering with reference to dams - reservoirs and tunnels weathering of common rock like “Granite”

UNIT - II

Mineralogy: Definition of mineral - Importance of study of minerals - Different methods of study of minerals - Advantages of study of minerals by physical properties - Role of study of physical properties of minerals in the identification of minerals - Study of physical properties of following common rock forming minerals: Feldspar, Quartz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Study of other common economic minerals such as Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Magnesite, and Bauxite.

Petrology: Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of igneous. Sedimentary and metamorphic rocks. Their distinguishing features, Megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

UNIT - III

Structural Geology: Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints - their important types and case studies - Their importance In situ and drift soils, common types of soils, their origin and occurrence in India -

Stabilization of soils - Ground water - Water table - common types of ground water –springs - cone of depression - geological controls of ground water movement - ground water exploration.

UNIT - IV

Earth Quakes: Causes and effects, shield areas and seismic belts - Seismic waves - Richter scale - precautions to be taken for building construction in seismic areas - Landslides, their causes and effect - measures to be taken to prevent their occurrence.

Importance of Geophysical Studies: Principles of geophysical study by Gravity methods-Magnetic methods - Electrical methods - Seismic methods - Radio metric methods and geothermal method - Special importance of Electrical resistivity methods and seismic refraction methods. Improvement of competence of sites by grouting etc. Fundamental aspects of Rock mechanics and Environmental Geology.

UNIT - V

Geology of Dams, Reservoirs, and Tunnels: Types of dams and bearing of Geology of site in their selection - Geological Considerations in the selection of a dam site - Analysis of dam failures of the past - Factors contributing to the success of a reservoir - Geological factors influencing water Lightness and life of reservoirs - Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (i.e. Tithological, structural and ground water) in tunneling over break and lining in tunnels.

TEXT BOOKS:

1. Engineering Geology by N. Chennakesavulu, McMillan, India Ltd. 2005
2. Engineering Methods by D. Venkat Reddy; Vikas Publishers 2015.
3. Engineering Geology by S K Duggal, H K Pandey Mc Graw Hill Education Pvt Ltd 2014
4. Principles of Engineering Geology by K.V.G.K. Gokhale – B.S publications

REFERENCE BOOKS:

1. Fundamental of Engineering Geology by F.G. Bell, B.S. Publications, 2005.
2. Principles of Engineering Geology & Geotechnics by Krynine & Judd, , CBS Publishers & Distribution
3. Engineering Geology by Subinoy Gangopadhyay, Oxford university press.
4. Engineering Geology for Civil Engineers by P.C. Varghese, PHI

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B.Tech in Civil Engineering
IV Semester Syllabus
CE404PC: Hydraulics and Hydraulic Machinery

Course Objectives:

The objectives of the course is

1. Define the fundamental principles of water conveyance in open channels.
2. Discuss and analyze the open channels in uniform and Non-uniform flow conditions.
3. Study the characteristics of hydroelectric power plant and its components.
4. Study of models and Analyze the impact of jet on vanes and their applications
5. Analyze and design of hydraulic machinery and its modeling

Course Outcomes:

At the end of the course the student will able to

1. **Apply** fundamentals in design of open channels for uniform flow
2. **Solve** problems in Non-uniform flow conditions in open channels.
3. **Analyze** the fundamentals of dimensional analysis and the basics of turbo machinery.
4. **Evaluate** the working proportions and performance of turbines.
5. **Predict** characteristics and performance of centrifugal pumps and **interpret** the study of hydro electric power plants.

UNIT-I**Open Channel Flow – I:**

Uniform Flow: Introduction to Open channel flow-Comparison between open channel flow and pipe flow - Classification of open channel flows - Velocity distribution - Uniform flow- Characteristics of uniform flow - Chezy's, Manning's and Bazin formulae for uniform flow – Factors affecting Manning's Roughness Coefficient - Most economical sections - Computation of Uniform flow - Normal depth.

Critical Flow: Specific energy – critical depth - computation of critical depth – critical, sub critical and Super critical flows - Applications of specific energy to channel transitions.

UNIT-II**Open Channel Flow – II:**

Non-uniform flow – Gradually Varied Flow: Dynamic equation for G.V.F - Classification of channel bottom slopes – Classification and characteristics of Surface profiles - various methods of integration of varied flow equation - computation of water surface profiles using Direct step method.

Rapidly varied flow: Elements and characteristics i.e Length and Height of Hydraulic jump in rectangular Channel – Types of jump - applications and location of hydraulic jump - Energy dissipation.

UNIT-III

Dimensional Analysis and Hydraulic Similitude: Introduction to Dimensional analysis - dimensional homogeneity-Rayleigh's method and Buckingham π - methods - Model studies –

Similitude - dimension less numbers- types of models - Application of model studies to fluid flow problems - Distorted models concept.

Basics of Turbo Machinery: Hydro dynamic force of jets on stationary and moving flat , inclined and curved vanes / plates - Jet striking centrally and at tip - Velocity triangles at inlet and outlet - expressions for work done and efficiency - angular momentum principle and its applications.

UNIT-IV

Hydraulic Turbines: Elements of a typical Hydropower installation – Heads and efficiencies – Classification of turbines – working of Pelton wheel, Francis turbine, Kaplan turbine - working proportions - velocity triangles diagrams - work done and efficiency - hydraulic design - Draft tube – Classification, functions and efficiency.

Unit quantities such as Unit speed, Unit discharge and Unit power - Specific speed - Selection of turbines - Performance characteristics - geometric similarity – cavitation - governing of turbines - surge tanks and its types.

UNIT-V

Centrifugal Pumps: Centrifugal pump definition and classification – components - work done - manometric head - various losses and efficiencies - minimum starting speed - specific speed - Multistage pumps - pumps in series and parallel - geometric similarity - performance of pumps - characteristic curves - NPSH - cavitation.

Hydropower Engineering: Definition of hydro power - comparison between hydro power and thermal power - estimation of hydropower potential – storage and pondage - Classification of Hydropower plant under various considerations - definition of terms- firm power - secondary power - load factor - utilization factor - capacity factor - various components of hydro power development.

TEXTBOOKS:

1. Hydraulics and Fluid Mechanics including Hydraulic Machines by Modi P.N. and Seth S.M., , Standard Book House, 2009.
2. Fluid Mechanics and Hydraulic machines by Rajput R.K., S.Chand & Company, 2010.
3. Fluid Mechanics including Hydraulic Machines by Jain A. K., , Khanna Publishers (rs), 2004.

REFERENCEBOOKS:

1. Fluid Mechanics and Hydraulic Machines by Bansal R. K. , Laxmi Publication Pvt. Ltd, 2010
2. Fluid Mechanics and Hydraulic Machines problems and solutions by Subramanya K, McGraw Hill Education Pvt.Ltd,2014
3. Fluid Mechanics & Fluid Power Engineering by D.S.Kumar, , Kataria & Sons Publications Pvt. Ltd.

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**B.Tech in Civil Engineering
IV Semester Syllabus**

CE451PC: Fluid Mechanics and Hydraulic Machinery Laboratory

Course Objectives:

1. To **identify** the behavior of analytical models introduced to the actual behavior of real fluid flows.
2. To **explain** the standard measurement techniques of fluid mechanics and their applications.
3. To **illustrate** the students with the components and working principles of the various flow related experiments
4. To **illustrate** the students with the components and working principles of the hydraulic machines such as different types of turbines and pumps.
5. To **analyze** the laboratory measurements and to document the results in an appropriate format

Course Outcomes:

1. **Analyze** the coefficient of discharge measurements and **Illustrate** the Bernoulli's equation and Water hammer phenomenon.
2. **Identify** various losses for real fluid and **interpret** the various coefficients
3. **Test** the performance characteristics of various hydraulic machines.

List of Experiments

1. Verification of Bernoulli's equation
2. Determination of Coefficient of discharge for a small orifice by constant head method
3. Calibration of Venturi meter / Orifice Meter
4. Calibration of Triangular/Rectangular/Trapezoidal Notch
5. Calibration of Water hammer Apparatus
6. Determination of Minor losses in pipe flow- Contraction loss
7. Determination of Friction factor of a pipeline
8. Determination of Energy loss in Hydraulic jump
9. Determination of Manning's and Chezy's constants for Open channel flow.
10. Impact of jet on vanes
11. Performance Characteristics of Pelton wheel turbine
12. Performance Characteristics of Francis turbine
13. Performance characteristics of Kaplan Turbine
14. Performance Characteristics of a single stage Centrifugal Pump
15. Performance Characteristics of a multistage Centrifugal Pump

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**B.Tech in Civil Engineering
IV Semester Syllabus**

CE452PC: Computer Aided Drafting Laboratory

Course Objectives:

1. To be able to plan buildings as per NBC.
2. To understand various types of conventional signs and brick bonds.
3. To draw the plan section and elevation for doors, trusses and staircases.
4. To use AutoCAD tools to draw building plans, sections and elevations from a given line diagram and specifications.
5. To develop working drawings of residential buildings.

Course Outcomes:

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

1. **Use** various commands of the chosen software to draw plan, section, and elevations of Brick bonds and staircases.
2. **Draw** plan, section, and elevations of Residential and Public buildings in accordance with building by-laws and the National Building Code.
3. **Draw** building Electrical and Plumbing layouts.

List of Experiments:

1. Planning Aspects of Building systems as per National Building Code (NBC).
2. Brick bonds: English bond & Flemish bond – Odd and Even courses.
3. Developing plan and section of dog-legged staircase.
4. Developing plan of single storied residential building.
5. Developing section and elevation of single storied residential building.
6. Developing plan of single /two storied Residential building as per Building by-laws.
7. Developing plan of public building as per building by-laws.
8. Developing section and elevation of public building.
9. Development of working drawing of building –Electrical Layout.
10. Development of working drawing of building – Plumbing Layout.

TEXT BOOKS:

1. Computer Aided Design Laboratory by M. N. Sessa Praksh & Dr. G. S. Servesh – Laxmi Publications.
2. Engineering Graphics by P. J. Sha – S. Chand & Co.
3. Civil Engineering Drawing-I by N. Sreenivasulu, S. Rama Rao – Radiant Publishing House.
4. Civil Engineering Drawing-II by N. Sreenivasulu – Radiant Publishing House.

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B.Tech in Civil Engineering
IV Semester Syllabus
***MC451HS: Gender Sensitization Laboratory**
(CE, ME, ECE, MCT & MME)

Course Objectives:

This course aims:

1. To develop students' sensibility with regard to issues of gender in contemporary India.
2. To provide a critical perspective on the socialization of men and women.
3. To introduce students to information about some key biological aspects of genders.
4. To expose the students to debates on the politics and economics of work.
5. To help students reflect critically on gender violence.
6. To expose students to more egalitarian interactions between men and women.

Course Outcomes:

1. Students will have developed a better understanding of important issues related to gender in contemporary India.
2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
3. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
4. Students will acquire insight into the gendered division of labour and its relation to politics and economics.
5. Men and women students and professionals will be better equipped to work and live together as equals.
6. Students will develop a sense of appreciation of women in all walks of life.
7. Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

Course Description

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality. This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

Unit-I: Understanding Gender

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender- Construction of Gender-Socialization: Making Women, Making Men - Preparing for Womanhood. Growing up Male.

Unit-II: Gender Roles and Relations

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles-Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences-Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary

Unit-III: Gender and Labour

Division and Valuation of Labour-Housework: The Invisible Labor- “My Mother doesn’t Work.” “Share the Load.”- Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work. -Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming

Unit-IV: Gender - Based Violence

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: “Chupulu”.

Domestic Violence: Speaking Out -Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-“I Fought for my Life....”

Unit – V: Gender and Culture

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks-The Brave Heart.

Note: Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of **English Literature** or Sociology or Political Science or **any other qualified faculty who has expertise in this field from engineering departments.**

- Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on “Gender”.

Suggested Readings:

- The Textbook, “Towards a World of Equals: A Bilingual Text Book on Gender” written by A. Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu published by Telugu Akademi, Telangana Government in 2015.

Assessment and Grading:

- Discussion & Classroom Participation: 20%
- Project/Assignment: 30%
- End Term Exam: 50%.