GLOBAL INSTITUTE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)
COURSE CATALOGUE
REGULATIONS B.TECH – GR - 24
CIVIL ENGINEERING
II YEAR II SEMESTER

Course Code	Course Name	Subject Area	Category	Periods Per Week			Credits	Scheme of Examination Max Marks		
				L	T	P		CIA	SEE	Total
THEORY										
CE401PC	Basic Electrical and Electronics Engineering	PCC	CORE	3	0	0	3	40	60	100
CE402PC	Concrete Technology	PCC	CORE	3	0	0	3	40	60	100
CE403PC	Strength of Materials–II	PCC	CORE	3	0	0	3	40	60	100
CE404PC	Hydraulics and Hydraulics Machinery	PCC	CORE	3	0	0	3	40	60	100
CE405PC	Structural Analysis-I	PCC	CORE	3	0	0	3	40	60	100
PRACTICAL										
CE406PC	Fluid Mechanics and Hydraulics Machinery Laboratory	PCC	CORE	0	0	2	1	40	60	100
CE407PC	Basic Electrical and Electronics Engineering Laboratory	PCC	CORE	0	0	2	1	40	60	100
CE408PC	Concrete Technology Laboratory	PCC	CORE	0	0	2	1	40	60	100
CE409PC	Real-time Research Project/Field-Based Project	PROJ	PROJECT	0	0	4	2	40	60	100
MANDATORY COURSE										
*MC410	Intellectual Property Rights	MC-IV	MC	3	0	0	0			
			Total Credits	**18**	**0**	**10**	**20**			

COURSE CONTENT

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING								
II Year - II Semester: CE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
CE401PC	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**-**	**-**	**3**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				**Total Classes: 48**		
Prerequisite: Nil								

1. COURSE OVERVIEW

This course enables knowledge on electrical quantities such as current, voltage, and power, energy to know the impact of technology in global and societal context. It provides the knowledge on basic DC and AC circuits used in electrical and electronic devices, highlights the importance of electrical machines and basics of semiconductor devices like diodes and transistors.

2. COURSE OBJECTIVE

The students will try to Learn:

1) The fundamentals of electrical circuits and analysis of circuits with DC and AC excitation using circuit laws.
2) The construction and operation of Electrical machines.
3) The operational characteristics of semiconductor devices with their applications.

3. COURSE OUTCOMES

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

CO 1	Make use of basic electrical laws for solving DC and AC circuits.
CO 2	Apply network theorems for analysis of simple electrical circuits.
CO 3	Demonstrate the fundamentals of electromagnetism for the operation of DC and AC machines.
CO 4	Utilize the characteristics of semiconductor devices for the application of rectifiers and regulators.
CO 5	Interpret the transistor configurations for BJT & FET.

4. COURSE CONTENT

UNIT-I:

D.C. Circuits: Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation.

A.C. Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits, Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-II:

Electrical Installations: Components of LT Switch-gear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB,

Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

UNIT-III:

Electrical Machines: Working principle of Single-phase transformer, equivalent circuit, losses in transformers, efficiency, Three-phase transformer connections. Construction and working principle of DC generators, EMF equation, working principle of DC motors, Torque equations and Speed control of DC motors, Construction and working principle of Three-phase Induction motor, Torques equations and Speed control of Three-phase induction motor. Construction and working principle of synchronous generators.

UNIT-IV:

P-N Junction and Zener Diode: Principle of Operation Diode equation, Volt-Ampere characteristics, Temperature dependence, Ideal versus practical, Static and dynamic resistances, Equivalent circuit, Zener diode characteristics and applications.

Rectifiers and Filters: P-N junction as a rectifier - Half Wave Rectifier, Ripple Factor - Full Wave Rectifier, Bridge Rectifier, Harmonic components in Rectifier Circuits, Filters – Inductor Filters, Capacitor Filters, L-section Filters, π- section Filters.

UNIT-V:

Bipolar Junction Transistor (BJT): Construction, Principle of Operation, Amplifying Action, Common Emitter, Common Base and Common Collector configurations, Comparison of CE, CB and CC configurations.

Field Effect Transistor (FET): Construction, Principle of Operation, Comparison of BJT and FET, Biasing FET.

5. TEXT BOOKS

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.

6. REFERENCE BOOKS

1) Electronic Devices and Circuits – R. L. Boylestad and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2) Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabrata Jit, TMH, 2/e, 1998.
3) Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th edition.
4) Linear circuit analysis (time domain phasor and Laplace transform approaches) - 2nd edition by Raymond A. De Carlo and Pen-Min-Lin, Oxford University Press-2004.
5) Network Theory by N. C. Jagan& C. Lakshminarayana, B.S. Publications.
6) Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
7) L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
8) E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
9) V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989

7. ELECTRONIC RESOURCES

- https://www.kuet.ac.bd/webportal/ppmv2/uploads/1364120248DC%20Machines
- https://www.eleccompengineering.files.wordpress.com/2014/08/a-textbook-of-electrical-technologyvolume-ii-ac-and-dc-machines-b-l-thferaja.pdf
- https://www.geosci.uchicago.edu/~moyer/GEOS24705/Readings/Klempner_Ch1.pdf
- https://www.ibiblio.org/kuphaldt/electricCircuits/DC/DC.pdf
- https://www.users.ece.cmu.edu/~dwg/personal/sample.pdf.

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**2**										**2**	**3**	**2**
CO 2	**2**	**3**										**2**	**2**	**3**
CO 3	**2**	**3**											**2**	**3**
CO 4	**3**	**-**	**1**		**2**								**3**	**-**
CO 5	**3**	**3**			**1**							**2**	**3**	**3**

COURSE CONTENT

CONCRETE TECHNOLOGY								
II Year - II Semester: CE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
CE402PC	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**-**	**-**	**3**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				**Total Classes: 48**		
Prerequisite:								

1. COURSE OVERVIEW

The Concrete Technology course provides in-depth knowledge of the properties, composition, and behavior of concrete. It covers the selection and testing of materials like cement, aggregates, and water, as well as mix design methods. Students learn about fresh and hardened concrete properties, durability, and various admixtures. The course also addresses quality control, special concretes, and construction techniques. It equips students with the skills to design, produce, and assess concrete for diverse civil engineering applications.

2. COURSE OBJECTIVE

The students will try to Learn:

1) Know different types of cement as per their properties for different field applications.
2) Understand Design economic concrete mix proportion for different exposure conditions and intended purposes
3) Understand the building bye-laws
4) Know field and laboratory tests on concrete in plastic and hardened stage.

3. COURSE OUTCOMES

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

CO 1	**Determine** the properties of concrete ingredients i.e., cement, sand, coarse aggregate by conducting different tests. Recognize the effects of the rheology and early age properties of concrete on its long-term behavior.	Understand
CO 2	**Understand** the properties of fresh concrete.	Understand
CO 3	**Understand** the laboratory techniques to characterize hardened concrete	Understand
CO 4	**Understand** the concepts of elasticity, creep and shrinkage in Concrete	Understand
CO 5	**Design** concrete mix and understand the properties of special concretes.	Understand

4. COURSE CONTENT

UNIT - I

Aggregate: Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine, Manufactured sand and coarse Aggregates – Gap graded aggregate – Maximum aggregate size- Properties 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 reverberation 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.

UNIT – IV

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 – V

Admixtures: Types of admixtures – mineral and chemical admixtures.

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.

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, Nano silica and Nano Alumina concrete

5. TEXT BOOKS

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.

6. REFERENCE BOOKS

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, Mc Graw Hill Publishers.

IS Codes: IS 383 : 2016 IS 516 : 2018 (Part -1 - 4) IS 10262 - 2019

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**											**2**	**2**	**2**
CO 2	**2**	**2**		**2**								**2**	**2**	**2**
CO 3	**2**	**2**		**2**								**2**	**2**	**2**
CO 4	**2**	**2**		**1**		**1**						**2**	**2**	**2**
CO 5	**2**	**2**	**2**	**2**		**2**						**2**	**2**	**2**

COURSE CONTENT

STRENGTH OF MATERIALS - II								
II Year - II Semester: CE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
CE403PC	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**-**	**-**	**3**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				**Total Classes: 48**		
Prerequisite:								

1. COURSE OVERVIEW

The course builds upon basic mechanics to analyze advanced stress-strain relationships in structural members. It covers topics such as torsion of circular shafts, columns and struts, and theories of failure. Students study bending and shear stresses in curved beams and unsymmetrical bending. The course also includes energy methods like strain energy and Castigliano's theorems. It enhances students' ability to evaluate structural safety and performance under complex loading conditions.

2. COURSE OBJECTIVE

The students will try to Learn:

1) To understand the nature of stresses developed in simple geometries shafts, springs, columns & 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.

3. COURSE OUTCOMES

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

CO 1	**Calculate** the strength of structures and mechanical components in particular to torsion and direct compression.	Apply
CO 2	Calculate the crushing load in columns and struts under various end conditions	Apply
CO 3	**Analyze** strength and stability of structural members subjected to Direct, and Direct and Bending stresses	Apply
CO 4	**Calculate** the stresses and strains in thin and thick cylinders	Apply
CO 5	**Calculate** the Stresses in beams subjected to unsymmetrical bending Locate the shear center.	Apply

4. COURSE CONTENT

UNIT - I

Torsion of 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.

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

UNIT - II

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.

Beam Columns: Laterally loaded struts – subjected to uniformly distributed and concentrated loads.

UNIT - III

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 - IV

Thin 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 – Thin spherical shells.

Thick Cylinders: Introduction - Lame's theory for thick cylinders – Derivation of Lame'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: 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.

Shear Centre: Introduction - Shear center for symmetrical and unsymmetrical (channel, I, T and L) sections.

5. 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.

6. 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

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**2**	**3**	**2**		**2**						**2**	**2**	**2**
CO 2	**3**	**2**	**3**	**2**		**2**						**2**	**2**	**2**
CO 3	**3**	**2**	**3**	**1**								**2**	**2**	**2**
CO 4	**3**	**2**	**3**	**1**								**2**	**2**	**2**
CO 5	**3**	**1**	**2**	**1**								**2**	**2**	**2**

COURSE CONTENT

HYDRAULICS AND HYDRAULIC MACHINERY								
II Year - II Semester: CE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
CE404PC	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**-**	**-**	**3**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				**Total Classes: 48**		
Prerequisite:								

1. COURSE OVERVIEW

The Hydraulics and Hydraulic Machinery course explores the principles of fluid flow in open channels and the working of hydraulic machines. It covers uniform and non-uniform flow, hydraulic jumps, and energy concepts in open channel flow. Students learn about turbines, pumps, and other hydraulic devices, including their design and performance analysis. The course integrates theory with practical applications in water resource and irrigation engineering. It equips students with the knowledge to analyze and design hydraulic systems in civil engineering projects.

2. COURSE OBJECTIVE

The students will try to Learn:

1) To Define the fundamental principles of water conveyance in open channels.
2) To Discuss and analyze the open channels in uniform and Non-uniform flow conditions.
3) To Study the characteristics of hydroelectric power plant and its components.
4) To analyze and design of hydraulic machinery and its modeling.

3. COURSE OUTCOMES

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

CO 1	**Compute** the parameters of flow and critical flow in open channels	Apply
CO 2	**Compute** water surface profiles by numerical and analytical methods and analyze the rapidly varied flows in open channel in steady state conditions.	Apply
CO 3	**Apply** dimensional analysis and to differentiate the model, prototype and similitude conditions for practical problems.	Apply
CO 4	**Calculate** the performance characteristics of hydraulic machines	Apply
CO 5	**Calculate** workdone and efficiency of pumps	Apply

4. COURSE CONTENT

UNIT - I

Open Channel Flow – I: 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-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 – Computation of water surface profiles by Numerical and Analytical approaches. Direct step method.
Rapidly varied flow: Elements and characteristics (Length and Height) of Hydraulic jump in rectangular channel– Types, applications and location of hydraulic jump, Energy dissipation and other uses – Positive and Negative Surges (Theory only).

UNIT - III

Dimensional Analysis and Hydraulic Similitude: Dimensional homogeneity – Rayleigh's method and Buckingham's π methods – Dimensionless groups. Similitude, Model studies, Types of models. Application of dimensional analysis and model studies to fluid flow problems. Distorted models.
Basics of Turbo Machinery: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, Jet striking centrally and at tip, Velocity triangles at inlet and outlet, expressions for work done and efficiency – Angular.

UNIT – IV

Hydraulic Turbines – I: Elements of a typical Hydropower installation – Heads and efficiencies – Classification of turbines – Pelton wheel – Francis turbine – Kaplan turbine – working, working proportions, velocity diagram, work done and efficiency, hydraulic design. Draft tube – Classification, functions and efficiency.
Hydraulic Turbines – II: Governing of turbines – Surge tanks – Unit and specific turbines – Unit speed – Unit quantity – Unit power – Specific speed – Performance characteristics – Geometric similarity – Cavitation. Selection of turbines.

UNIT – V

Centrifugal Pumps: Pump installation details – classification – work done – Manometric head – minimum starting speed – losses and efficiencies – specific speed. Multistage pumps – pumps in parallel – performance of pumps – characteristic curves – NPSH – Cavitation. Reciprocating pumps – Working, discharge, slip indicator diagrams.

5. TEXT BOOKS

1) Fluid Mechanics by Modi and Seth, Standard Book House.
2) Fluid Mechanics and Hydraulic machines by Manish Kumar Goyal, PHI learning Private Limited, 2015
3) Open channel flow by V.T. Chow (McGraw Hill Book Company).

6. REFERENCE BOOKS

1) Fluid Mechanics by R. C. Hibbeler, Pearson India Education Services Pvt. Ltd
2) Fluid Mechanic & Fluid Power Engineering by D. S. Kumar (Kataria & Sons Publications Pvt. Ltd.).
3) Introduction to Fluid Mechanics and Fluid Machines by SK Som, Gautam Biswas, Suman Chakraborthy, Mc Graw Hill Education (India) Private Limited
4) Hydraulic Machines by Banga& Sharma (Khanna Publishers).

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**2**	**3**	**2**					**2**			**2**	**2**	**2**
CO 2	**3**	**2**	**3**	**2**					**2**			**2**	**2**	**2**
CO 3	**3**	**2**	**3**	**1**					**2**			**2**	**2**	**2**
CO 4	**3**	**2**	**3**	**1**					**3**			**2**	**2**	**2**
CO 5	**3**	**1**	**2**	**1**					**2**			**2**	**2**	**2**

COURSE CONTENT

STRUCTURAL ANALYSIS – I								
II Year - II Semester: CE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
CE405PC	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**-**	**-**	**3**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				**Total Classes: 48**		
Prerequisite:								

1. COURSE OVERVIEW

The Structural Analysis-I course focuses on the fundamentals of analyzing static structures. It covers the analysis of determinate and indeterminate beams, frames, and trusses. Topics include equilibrium equations, static and kinematic indeterminacy, and methods such as the force method and displacement method. The course also emphasizes shear force and bending moment diagrams for various structural loads. Students gain a strong foundation in both analytical techniques and practical applications for civil engineering design.

2. COURSE OBJECTIVE

The students will try to Learn:

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 bars, 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

3. COURSE OUTCOMES

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

CO 1	**Analyse** Perfect frames under various loading conditions	Apply
CO 2	**Calculate** strain Energy, Deflections of statically determinate beams and analyze 2,3 hinge arches under different loading conditions	Apply
CO 3	**Analyze** propped cantilevers and fixed beams subjected to different combinations of loads	Apply
CO 4	**Calculate** the stiffness parameters in beams and pin jointed trusses.	Apply
CO 5	**Analyze** the maximum SF &BM at a given section under various moving load conditions, construct and interpret influence lines	Apply

4. COURSE CONTENT

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 uniformly distributed load - point loads - 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.

5. 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 T. S Thandavamoorthy, Oxford university Press

6. REFERENCE BOOKS

1) Structural Analysis by R. C. Hibbeler, Pearson Education
2) Basic Structural Analysis by K.U. Muthu et al., I.K. International Publishing House Pvt. Ltd
3) Mechanics of Structures Vol – I and II by H.J. Shah and S.B. Junnarkar, Charotar Publishing House Pvt. Ltd.
4) Basic Structural Analysis by C. S. Reddy, Tata McGraw Hill Education Pvt. Ltd.
5) Fundamentals of Structural Analysis by M.L. Gamhir, PHI Learning Pvt. Ltd.

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**3**	**2**	**1**					**1**			**2**	**2**	**2**
CO 2	**3**	**2**	**2**	**1**					**1**			**2**	**2**	**2**
CO 3	**3**	**3**	**2**	**2**					**1**			**2**	**2**	**2**
CO 4	**3**	**3**	**1**	**2**					**2**			**2**	**2**	**2**
CO 5	**3**	**2**	**3**	**1**					**2**			**2**	**2**	**2**

COURSE CONTENT

HYDRAULICS AND HYDRAULIC MACHINERY LABORATORY								
II Year - II Semester: CE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
CE406PC	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	**-**	**2**	**1**	**40**	**60**	**100**
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 32				**Total Classes: 32**		
Prerequisite:								

1. COURSE OVERVIEW

The Hydraulics and Hydraulic Machinery Laboratory course provides practical exposure to the behavior of fluids and the performance of hydraulic machines. Students conduct experiments on flow measurement in open channels, pipes, and the operation of turbines and pumps. The lab reinforces theoretical concepts like flow dynamics, energy losses, and efficiency calculations. Emphasis is placed on data collection, analysis, and interpretation of results. This course enhances students' understanding of fluid mechanics and machinery through hands-on experimentation.

2. COURSE OBJECTIVE

The students will try to Learn:

1) To identify the behavior of analytical models introduced in lecture 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 Hydraulic machines- different types of Turbines, Pumps, and other miscellaneous hydraulics machines.
4) To analyze the laboratory measurements and to document the results in an appropriate format.

3. COURSE OUTCOMES

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

CO 1	**Describe** the basic measurement techniques of fluid mechanics and its appropriate application.	Understand
CO 2	**Interpret t**he results obtained in the laboratory for various experiments.	Apply
CO 3	**Discover** the practical working of Hydraulic machines- different types of Turbines, Pumps, and other miscellaneous hydraulics machines	Apply
CO 4	**Compare** the results of analytical models introduced in lecture to the actual behavior of real fluid flows and draw correct and sustainable conclusions.	Apply
CO 5	**Write** a technical laboratory report	Apply

4. COURSE CONTENT

List of Experiments

1) Verification of Bernoulli's equation
2) Determination of Coefficient of discharge for a small orifice by a constant head method
3) Calibration of Venturimeter / Orifice Meter
4) Calibration of Triangular / Rectangular/Trapezoidal Notch
5) Determination of Minor losses in pipe flow

6) Determination of Friction factor of a pipe line
7) Determination of Energy loss in Hydraulic jump
8) Determination of Manning's and Chezy's constants for Open channel flow.
9) Impact of jet on vanes
10) Performance Characteristics of Pelton wheel turbine
11) Performance Characteristics of Francis turbine
12) Performance characteristics of Keplan Turbine
13) Performance Characteristics of a single stage / multi stage Centrifugal Pump

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**2**	**3**	**2**					**2**			**2**	**2**	**2**
CO 2	**3**	**2**	**3**	**2**					**2**			**2**	**2**	**2**
CO 3	**3**	**2**	**3**	**1**					**2**			**2**	**2**	**2**
CO 4	**3**	**2**	**3**	**1**					**3**			**2**	**2**	**2**
CO 5	**3**	**1**	**2**	**1**					**2**			**2**	**2**	**2**

COURSE CONTENT

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY								
II Year - II Semester: CE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
CE407PC	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	**-**	**2**	**1**	**40**	**60**	**100**
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 32				**Total Classes: 32**		
Prerequisite:								

1. COURSE OVERVIEW

This lab course provides hands-on experience in **basic electrical experiments**, including verification of Ohm's law, Kirchhoff's laws, and circuit theorems. It includes practical exposure to **AC and DC machines**, transformers, and measurements using electrical instruments. On the **electronics side,** students explore characteristics of **P-N junction and Zener diodes**, and analyze their behavior in circuits. Experiments on **rectifiers and filters** help understand AC to DC conversion and signal smoothing. The lab builds foundational skills in circuit construction, testing, and analysis for both electrical and electronics domains.

2. COURSE OBJECTIVE

The students will try to Learn:

1) To introduce the concepts of electrical circuits and its components
2) To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
3) To study and understand the different types of DC/AC machines and Transformers.
4) To import the knowledge of various electrical installations.
5) To introduce the concept of power, power factor and its improvement.
6) To introduce the concepts of diodes & transistors, and
7) To impart the knowledge of various configurations, characteristics and applications.

3. COURSE OUTCOMES

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

CO 1	**To analyze** and solve electrical circuits using network laws and theorems	Apply
CO 2	**Understand** and analyze basic Electric and Magnetic circuits	Apply
CO 3	**Study** the working principles of Electrical Machines	Apply
CO 4	**To introduce** components of Low Voltage Electrical Installations	Apply
CO 5	**To identify** and characterize diodes and various types of transistors.	Apply

4. LIST OF EXPERIMENTS / DEMONSTRATIONS:

PART- A: ELECTRICAL

1) Verification of KVL and KCL
2) (i) Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
   (ii) Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star) in a Three Phase Transformer
3) Measurement of Active and Reactive Power in a balanced Three-phase circuit

4) Performance Characteristics of a Separately Excited 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-meters (ii) Function Generator (iii) Regulated Power Supplies (iv) CRO.
2. PN Junction diode characteristics
3. Zener diode characteristics and Zener as voltage Regulator
4. Input & Output characteristics of Transistor in CB / CE configuration
5. Full Wave Rectifier with & without filters
6. Input and Output characteristics of FET in CS configuration

5. TEXT BOOKS:

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.

6. REFERENCE BOOKS:

1) Electronic Devices and Circuits – R. L. Boylestead and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2) Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabrata Jit, TMH, 2/e, 1998.
3) Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th edition.
4) Linear circuit analysis (time domain phasor and Laplace transform approaches) - 2nd edition by Raymond A. De Carlo and Pen-Min-Lin, Oxford University Press-2004.
5) Network Theory by N. C. Jagan& C. Lakshminarayana, B.S. Publications.
6) Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
7) L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
8) E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
9) V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

7. ELECTRONICS RESOURCES:

https://www.nptel.ac.in/Courses/117106108
https://www.gnindia.dronacharya.info/EEEDept/labmanuals.html
https://www.textofvideo.nptel.iitm.ac.in
https://www.textofvideo.nptel.iitm.ac.in/

8. MATERIALS ONLINE:

Course template
Lab manual

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**3**	**1**	**1**	**0**	**2**	**1**	**1**	**0**	**0**	**1**	**1**	**2**	**2**
CO 2	**3**	**3**	**1**	**2**	**0**	**2**	**1**	**1**	**0**	**0**	**2**	**3**	**2**	**2**
CO 3	**3**	**2**	**1**	**2**	**0**	**2**	**1**	**1**	**0**	**0**	**3**	**2**	**2**	**2**
CO 4	**3**	**2**	**1**	**2**	**0**	**2**	**1**	**1**	**0**	**0**	**3**	**2**	**2**	**2**
CO 5	**3**	**2**	**1**	**2**	**0**	**2**	**1**	**1**	**0**	**0**	**3**	**2**	**2**	**2**

COURSE CONTENT

CONCRETE TECHNOLOGY LABORATORY								
II Year - II Semester: CE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
CE408PC	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	**-**	**2**	**1**	**40**	**60**	**100**
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 32				**Total Classes: 32**		
Prerequisite:								

1. COURSE OVERVIEW

The Concrete Technology Laboratory course offers hands-on experience in testing the properties of concrete and its ingredients. Students perform experiments to assess workability, strength, durability, and mix design of concrete. The lab includes tests on cement, aggregates, and fresh and hardened concrete. Emphasis is placed on quality control, standard procedures, and interpretation of test results. This course strengthens practical understanding of concrete behavior and its application in construction.

2. COURSE OBJECTIVE

The students will try to Learn:

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

3. COURSE OUTCOMES

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

CO 1	**Perform** various tests required to assess the characteristics of cement	Apply
CO 2	**Evaluate** the properties of fine and coarse aggregates and determine its suitability for construction	Apply
CO 3	**Evaluate** the fresh properties of concrete	Apply
CO 4	**Evaluate** the hardened properties of concrete	Apply
CO 5	**Design** the concrete mix for required strength and test its performance characteristics	Apply

4. COURSE CONTENT

List of Experiments

1) **Tests on Cement:**
   a) Soundness.
   b) Compressive strength.
2) **Tests on Aggregates:**
   a) Specific gravity of fine aggregate.
   b) Specific gravity of coarse aggregate.
   c) Bulking of fine aggregate.
   d) Grading of fine aggregate
3) IS method of mix design of normal concrete as per IS: 10262

4) **Tests on Fresh Concrete**:
   a) Slump cone test.
   b) Compacting factor test.
   c) Vee-Bee consistometer test.
5) **Tests on Hardened Concrete:**
   a) Compressive & Tensile strength tests.
   b) Modulus of elasticity of concrete.
   c) Non-destructive testing of concrete.

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**1**		**1**	**1**				**2**	**1**		**2**	**2**	**2**
CO 2	**3**	**1**		**1**	**1**				**2**	**1**		**2**	**2**	**2**
CO 3	**3**	**1**		**1**	**1**				**2**	**1**		**2**	**2**	**2**
CO 4	**3**	**1**		**1**	**1**				**2**	**1**		**2**	**2**	**2**
CO 5	**3**	**1**		**1**	**1**				**2**	**1**		**2**	**2**	**2**

COURSE CONTENT

INTELLECTUAL PROPERTY RIGHTS								
II Year - II Semester: CE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
***MC410**	**Mandatory**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**-**	**-**	**-**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				**Total Classes: 48**		
Prerequisite:								

1. COURSE OVERVIEW

The Intellectual Property Rights (IPR) course is designed to provide students with a comprehensive understanding of the legal frameworks that protect creative and innovative works. It covers the principles, laws, and practices surrounding the protection of intellectual property such as: Patents, Trademarks, Copyrights, Designs and Trade Secrets.

2. COURSE OBJECTIVE

The students will try to Learn:

1) Significance of intellectual property and its protection.
2) Introduce various forms of intellectual property.

3. COURSE OUTCOMES

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

CO 1	Distinguish and Explain various forms of IPRs.
CO 2	Identify criteria to fit one's own intellectual work in particular form of IPRs.
CO 3	Apply statutory provisions to protect particular form of IPRs.
CO 4	Appraise new developments in IPR laws at national and international level
CO 5	Understand the new development of intellectual property.

4. COURSE CONTENT

UNIT – I **(10L)**

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II **(10L)**

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting, and evaluating trade mark, trade mark registration processes.

UNIT – III **(10L)**

Law of copyrights: Fundamental of copyright law, originality of material, rights of reproduction, rights to perform the work publicly, copyright ownership issues, copyright registration, notice of copyright, international copyright law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV **(9L)**

Trade Secrets: Trade secret law, determination of trade secret status, liability for misappropriations of trade secrets, protection for submission, trade secret litigation.

Unfair competition: Misappropriation right of publicity, false advertising.

UNIT – V **(9L)**

New development of intellectual property: new developments in trade mark law; copyright law, patent law, intellectual property audits.

International overview on intellectual property, international – trade mark law, copyright law, international patent law, and international development in trade secrets law.

5. TEXT BOOKS

1) Intellectual property right, Deborah. E. Bouchoux, Cengage learning.

6. REFERENCE BOOKS

1) Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata McGraw Hill Publishing company ltd.

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**2**	**2**		**2**					**2**	**2**	**2**		
CO 2	**3**	**3**	**2**		**2**					**2**	**2**	**2**		
CO 3	**3**	**2**	**3**	**2**	**2**					**2**	**2**	**2**		
CO 4	**3**	**2**	**3**	**2**	**2**					**2**	**2**	**2**		
CO 5	**3**	**2**	**2**	**3**	**3**					**2**	**2**	**2**		