First Year – First Semester

THEORY

Department	Basic Science & Humanities
Course Code	HU 101
Title of Course	English Language and Technical Communication
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L + 0T
Total Contact Hours	25
Course Out Come	CO1: Ability to Communicate technical matters CO2: Ability to Communicate fluently and confidently on all spheres of everyday matters.

Department	Basic Science & Humanities
Course Code	PH 101
Title of Course	Physics-I
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L + 1T
Total Contact Hours	42
Course Out Come	**CO1:** Ability to understand the general property of matters and the Oscillation property. **CO2:** Ability to know optics property. **CO3:** Ability to learn basics of Quantum Physics **CO4:** Ability to understand Crystallography and get the idea of crystal structure and understand the property and behaviour of X-Ray.

Department	Basic Science & Humanities
Course Code	M-101
Title of Course	Mathematics-I
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L + 1T
Total Contact Hours	40
Course Out Come	**CO1:**Ability to explain the Knowledge of Matrix, Eigen value problems. **CO2:** Ability to determine the solutions for differential equations which are useful in the Study of Circuit theory and oscillatory systems. **CO3:** Ability to understand Calculus of Functions of Several Variables Partial derivatives, Total differential equations for Electro- magnetic theory, Transmission lines and Vibrating membranes. **CO4:** Ability to use the convergence and Divergence of infinite series in the study ofcommunication systems. **CO5:** Ability to understand Vector Algebra and Vector Calculus.

Department	EE
Course Code	**ES101**
Title of Course	**Basic Electrical & Electronic Engineering –1**
Nature of Course	Compulsory
Type of Course	Theory
Contact Hours	3L+1T
Total Contact Hours	41
Course Out Come	**CO1:** Ability to explain the fundamentals of Physics. **CO2:** Ability to explain the basic knowledge of Electrical and Electronics Engineering. **CO3:** Ability to apply DC network theorem and Kirchhoff's law on different electrical circuits. **CO4:** Ability to determine AC fundamentals like generation of ac voltages, waveforms, average and RMS values, peak factor, form factor, series and parallel resonance circuits. **CO5:** Ability to explain principles of electromagnetism and associated laws. **CO6:** Ability to identify various semiconductors and ability to design and analyse different electrical circuits using different semiconductors.

Department	CIVIL ENGINEERING
Course Code	ME 101
Title of Course	Engineering Mechanics
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L + 1T
Total Contact Hours	42
Course Out Come	CO1: To **Understand** Particle and Rigid Body; types of forces, moment and Vector algebra. CO2: **Construct** free bodies diagrams and calculate the reactions necessary to ensure static equilibrium. CO3:**Apply** and Analyze problems associated with frictional forces. Centre of gravity and moment of inertia and their applications. CO4:**To know**the basic concept of stress strain behavior of material and its applications. CO5:**Analyze** D'Alembert's principle for dynamic equilibrium. And application of work energy principle.

PRACTICAL

Department	Basic Science & Humanities
Course Code	PH-191
Title of Course	Physics Practical-I
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3P
Total Contact Hours	30
Course Out Come	**CO1:** Ability to understand the general property of matters like viscosity, Young's Modulus and Modulus of Rigidity **CO2:** Ability to know optical property. **CO3:** Ability to learn electrical property. **CO4:** Ability to understand thermal conductivity

Department	EE
Course Code	**ES191**
Title of Course	**Basic Electrical &Electronic Engineering– 1(Lab)**
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3P
Total Contact Hours	36

Course Out Come	**CO1:** Ability to perform different experiments of Basic Electrical and Electronics Engineering. **CO2:** Ability to perform different experiments to verify network theorems.
Department	Basic Science & Humanities
Course Code	ME 192
Title of Course	Workshop Practice
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3P+1L
Total Contact Hours	48
Course Out Come	CO1: **Concept** of Engineering materials and its physical, chemical and mechanical properties & applications. CO2: **Understand** different conventional manufacturing processes mainly covering basic principles, different methods and general applications. CO3: **Basic Concept** of forming/shapingand casting. CO4: **Understanding** various aspects of welding processes and its applications. CO5: **Practices** of elementary machining operations- Facing, Centering, Turning, Threading, Drilling, Boring, Shaping and Milling.

SESSIONAL

Department	Basic Science & Humanities
Course Code	HU 181
Title of Course	Language Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	19
Course Out Come	CO1: Ability to develop skills of technical communication in English through Language Lab practice sessions. CO2: Ability to Communicate confidently and competently in English in all spheres.

Department	CIVIL ENGINEERING
Course Code	XC 181
Title of Course	Extracurricular activities (NSS/NCC)
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	16
Course Outcomes	**CO1.**Awareness of social issues. **CO2.**Participate in mass education programs. **CO3**. Enable slum development **CO4.** Inculcate Environmental awareness **CO5.** Participate in relief and rehabilitation training/work.

First Year – Second Semester

THEORY:

Department	Basic Science & Humanities
Course Code	CS 201
Title of Course	Basic Computation & Principles of Computer Programming
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L3 + T1
Total Contact Hours	42
Course Out Come	**CO1:** a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Programming for Problem Solving **CO2:** a) Directly apply the fundamental concepts of Programming to solve (implement) the most elementary/simplest model problems, and thereafter b) Directly combine the fundamental concepts to solve (design and implement) elementary model problems on the idealistic components of real-world systems using Programming for Problem Solving. CO3: a) Analyze (identify parts, their interconnections and flow of information) the design and implementation of idealistic components of real world systems, and thereafter b) Compute the output of given model subsystems (and also identify errors in the design and implementation of given model subsystems using the concept of Programming for Problem Solving CO4: a) Compare and contrast in details between the fundamental concepts of Algorithm and Programming and thereafter b) describe an overview level interconnected map of concepts/terminologies of Programming for Problem Solving. CO5: a) Identify and thematically explain where and how the terminologies are utilized in large scale real world systems, and thereafter b) Design the schematics for typical components of large scale known real world systems using the concept of Programming for Problem Solving. CO6: a) Identify unsolved but necessary real world problems and thereafter b) generate pragmatic detailed ideas for creation/synthesis of innovative socially necessary products and services to solve such problems in Programming.

Department	Basic Science & Humanities
Course Code	CH-201
Title of Course	Chemistry-1
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L3 + T1
Total Contact Hours	42
Course Out Come	**CO1**: Ability to apply concept of Chemical Thermodynamic system with associated laws. **CO2**: Ability to understand Reaction Dynamics & Solid state Chemistry for detection of defects in metals and role of semiconductor. **CO3**: Ability to understand Electrochemistry, Structure and reactivity of Organic molecule **CO4**: Ability to understand the Industrial Chemistry and its applicability. CO5: List major chemical reactions that are used in the synthesis of molecules.

Department	Basic Science & Humanities
Course Code	M-201
Title of Course	Mathematics-II
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L + 1T
Total Contact Hours	40
Course Out Come	**CO1:** Ability to learn Ordinary differential equations with higher order and first degree. **CO2:** Ability to learn Basics of Graph Theory which are useful in the Study of Circuit theory. **CO3:** Ability to learn Laplace Transform which is useful in the study of communication systems.

Department	EE
Course Code	**ES201**
Title of Course	**Basic Electrical &Electronic Engineering-II**
Nature of Course	Compulsory
Type of Course	Theory
Contact Hours	3L+1T
Total Contact Hours	44
Course Out Come	**CO 1:** Ability to explain electrical properties and simple electrical devices. **CO 2:** Ability to explain construction and mechanism of working of different DC machine, 1-phase transformer and 3-phase induction motor. **CO3:** Ability to understand the basic concepts of 3-phase system and structure of power system. **CO4:** Students must acquire to express binary numbers, convert binary to decimal and vice-versa, draw truth table of various applications, design gates and simple digital circuits using different gates. **CO5:** Ability to distinguish the different gate isolation techniques; explain the V-I characteristics of FETs, OP-AMP etc.

Department	CIVIL ENGINEERING
Course Code	ME 201
Title of Course	Engineering Thermodynamics & Fluid Mechanics
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L + 1T
Total Contact Hours	48
Course Out Come	CO1: **To know** the basic Concepts of Thermodynamics: Applications of Heat and work transferred for various thermodynamic processes. CO2: **Understanding** Properties of Pure Substances. Introduction to steam table, Mollier diagram and its application. CO3: **Analysis** of 1st Law of Thermodynamics and 2nd Law of Thermodynamics and their applications. CO4: **Understanding** Air standard Cycles for IC engines: Otto cycle; Diesel cycle and their applications. CO5:**Study** of fluid mechanics, Fluid Kinematics, dynamics of fluids, Bernoulli's equation & its Applications.

PRACTICAL:

Department	Basic Science & Humanities
Course Code	CS 291
Title of Course	Basic Computation & Principles of Computer Programming Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3P
Total Contact Hours	21
Course Out Come	**CO1:** To operate on DOS, UNIX with preliminary commands. **CO2:** To write and execute C programs for solving basic problems viz. prime number generations, computing GCD or LCM etc. **CO3:** To develop real life applications viz. inventory management system, billing systems etc. through C programming.

Department	Basic Science & Humanities
Course Code	CH-291
Title of Course	Chemistry-1 Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3P
Total Contact Hours	21
Course Out Come	**CO1**: Ability to apply concept of Solvent Extraction Procedure **CO2**: Ability to understand Ph metric and conductometric method of determination for acidity and alkalinity of a solution **CO3**: Ability to understand various parameter for the water analysis **CO4**: Ability to understand the viscometric method for determination of solution.

Department	EE
Course Code	**ES291**
Title of Course	**Basic Electrical & Electronic Engineering – II(Lab)**
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3P
Total Contact Hours	36
Course Out Come	**CO1:** Ability to calibrate ammeter and voltmeter and analyse shot circuit and open circuit properties of 1-phase transformer. **CO2:** Ability to explain the different properties of DC machines and 3-phase circuit.

Department	Basic Science & Humanities
Course Code	ME 292
Title of Course	Engineering Drg. & Comp. Graphics
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3P+1L
Total Contact Hours	48
Course Out Come	CO1:**Understanding** and drawing of lines, lettering, dimensioning, scales and geometrical construction of curves. CO2: **Learn** projection of points, lines and surfaces and solids like cube, pyramid, prism, cylinder and cone. CO3: **Drawing** isometric view from orthogonal/sectional views of simple solid objects. CO4: **Understand** and draw full and half sectional views of solids and develop the cut surfaces of prism, cylinder and cone. CO5: **To learn** Computer Aided Drafting using AUTO-CAD.

Second Year – Third Semester

THEORY:

Department	Basic Science & Humanities
Course Code	HU 301
Title of Course	Value and Ethics in Profession
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L+0T
Total Contact Hours	36
Course Outcome	CO1: Ability to understand effects of Technological Growth with its limitation. CO2: Ability to learn ethics of Profession in Engineering field. CO3: Ability to understand Profession and recognize Human Values

Department	Basic Science & Humanities
Course Code	PH 301
Title of Course	Physics-II
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L + 1T
Total Contact Hours	39
Course Out Come	CO1: To elaborate the concept of vector calculus and its applications in engineering problem solving. CO2: To analyze laws of electricity and their applicability. Ability to know the properties of dielectric and explain different properties of Magnetostatics, Time Varying Field and Electromagnetic theory CO3; To be familiarized with Schrödinger wave equation and its applications. CO4: To be familiarized with the basic concept of Statistical Mechanics and to understand the applicability of M-B, B-E and F-D statistics.

Department	Basic Science & Humanities
Course Code	CH 301
Title of Course	Basic Environmental Engineering and Elementary Biology
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L+0T
Total Contact Hours	40
Course Out Come	CO1: Ability to understand Basic ideas of environment, Ecology. CO2: Ability to learn Air, Water, Land, & Noise pollution and control. CO3: Ability to gain knowledge about the Environmental Management which includesEnvironmental impact assessment, Environmental Audit, laws and protection act of India,Differentinternational environmental treaty/agreement/ protocol.

Department	CIVIL ENGINEERING
Course Code	CE301
Title of Course	Solid Mechanics
Nature of Course	Required
Type of Course	Lecture
Contact Hours	3 L+0T
Total Contact Hours	42
Course Outcomes	Students will be able to: CO1: Define and recognize the basic concepts of stress and strain in deformable elastic bodies under normal and shear force, bending and torsion. CO2: Solve the problems relating to truss, beams, columns and shafts under different kind of loads causing normal / axial and shear force, bending, torsion. CO3: Classify various types of deflections in axial members of equal and varying cross sections, truss, beam and column. CO4: Examine and explain the concepts of bending moment, shear force, direct stress, bending stress, normal stress, shear stress, combination of stresses, hoop stress and torsion to practical problems.

Department	CIVIL ENGINEERING
Course Code	CE302
Title of Course	Surveying
Nature of Course	Required
Type of Course	Lecture + Tutorial
Contact Hours	3L + 1T
Total Contact Hours	42
Course Outcomes	Students will be able to: CO1:Study the principles and methodologies of various types of field surveys. CO2:Develop knowledge of the basic and conventional surveying instruments, principle behind them and working of the instruments. CO3: Develop understanding regarding plotting of the area from the field measurements and determination of the area. CO4**:** Recognise the range of calculations that can be made with surveying data and identify the linkages between surveying data and engineering design.

Department	CIVIL ENGINEERING
Course Code	CE303
Title of Course	BUILDING MATERIAL AND CONSTRUCTION
Nature of Course	Required
Type of Course	Lecture + Tutorial
Contact Hours	3L + 1T
Total Contact Hours	42
Course Outcomes	Students will be able to: CO1: State the properties of bricks, aggregates, lime, cement, concrete and its constituent materials. CO2: Explain the concepts of mortar, wood and its products, Paints,Gypsum and its products. CO3: Understand the construction practices and techniques of foundation, brick masonry, door and window. CO4: Demonstrate different types of stairs, flooring, plastering and roofs.

PRACTICAL:

Course Code	PH- 391
Title of Course	Physics Practical -II
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3P
Total Contact Hours	36
Course Outcomes	CO1: Ability to understand Lande g factor of electron, specific charge of electron and energy band gap of semiconductor. CO2: Ability to study Hall effect of semiconductors and haracteristics of solar photovoltaic cell.

Course Code:	CE 391
Course Name:	Solid Mechanics Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3P
Total Contact Hours	36
Course Outcomes	CO1: Students will be able to perform various experiments in order to understand the behavior of solid materials, especially their deformation characteristics under the action of different types of forces like axial tension and compression, bending, torsion, impact and fatigue. CO2: Students will be able to understand the validity and limitations of various theories of mechanics of solid by comparing the results from actual experimental data on test specimens.

Department	CIVIL ENGINEERING
Course Code	CE 392
Title of Course	Surveying Practice I
Nature of Course	Required
Type of Course	Practical
Contact Hours	3 L
Total Contact Hours	36
Course Outcomes	Students will be able to: CO1:Develop an understanding of the experiment to examine the fundamental principles of surveying. CO2:Students will be able to perform field surveys through chain, compass, plane table and leveling instruments. CO3: Students will be able to operate various conventional as well as modern survey instruments with proper care. CO4: Develop a critical understanding for examining, analyzing and interpreting the results of the experiments by performing in groups.

Department	CIVIL ENGINEERING
Course Code	CE393
Title of Course	Building Design and Drawing
Nature of Course	compulsory
Type of Course	Practical
Contact Hours	3P
Total Contact Hours	Not provided
Course Outcomes	CO1. To inculcate the imagination and mental visualization capabilities for interpreting the geometrical details of residential, commercial and public buildings. CO2. To interpret conventional sign, symbols and working drawings of various civil engineering structures. CO3. Prepare a detailed drawing for different component of a building. CO4. Use software to prepare detailed drawing of residential and public buildings

Second Year – Fourth Semester

THEORY:

Department	Basic Science & Humanities
Course Code	M(CS)-401
Title of Course	Numerical Methods
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L + 1T

Total Contact Hours	28
Course Out Come	CO1: Ability to analyse error and to understand numerical computation & Interpolation. CO2: Ability to learn Numerical integration & solution of linear equations. CO3: Ability to solve Numerical solution of Algebraic, transcendental equations & ordinary differential equations.

Department	Basic Science & Humanities
Course Code	M-402
Title of Course	Mathematics-III
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L +1 T
Total Contact Hours	42
Course Out Come	CO1: Ability to understand Fourier Series & Fourier Transform. CO2: Ability to learn Calculus of Complex Variable. CO3: Ability to understand Probability. CO4: Ability to solve Partial Differential Equations and Ordinary Differential Equations.

Department	CIVIL ENGINEERING
Course Code	CE401
Title of Course	Fluid Mechanics
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3
Total Contact Hours	42
Course Outcomes	Students will be able to: CO1: Define the basic properties of fluids, mechanics involved in fluid flow and to recognize the fundamental concepts of fluid statics in analyzing the forces on floating and submerged structures for their stability. CO2: Apply fundamental concepts of fluid mechanics in analyzing the fluid flow situations like turbulent flow, steady, uniform and varied flow in pipes and channels as well as measure the rate of flow using weirs, notches. CO3: Solve the problems on dimensional analysis by establishing the relationship between several parameters that influence the flow in fluid mechanics. CO4: Understand the concept of water hammer as well as develop knowledge on working principles and techniques to solve problems of hydraulic turbines and pumps.

Department	CIVIL ENGINEERING
Course Code	CE402
Title of Course	STRUCTURAL ANALYSIS
Nature of Course	Compulsory
Type of Course	3L + 1T
Contact Hours	48
Course Outcomes	Students will be able to: CO1: Understand fundamental concepts of mechanics and statics to correlate the basic equilibrium of statically determinate and indeterminate structures, corresponding support and displacement conditions. CO2: Sketch the influence lines for statically determinate and indeterminate structures. CO3:Analyze statically determinate and indeterminate structures (i.e. beams, frames, cables, trusses, arches etc. by using classical force methods, displacement methods and energy methods. CO4:Use appropriate assumption to perform approximate analysis of structures.

Department	CIVIL ENGINEERING
Course Code	CE403
Title of Course	SOIL MECHANICS
Nature of Course	Compulsory
Type of Course	Lecture + Tutorial
Contact Hours	3L + 1T
Total Contact Hours	42
Course Outcomes	Students will be able to: CO1: Identify standard soil properties and classify the soil samples. CO2: Interpret the necessity of laboratory tests and their relevance for preliminary engineering assessment of different types of soil samples to design the foundations and other earth retaining structures. CO3: Distinguish various load bearing and settlement characteristics of soil and related numerical problems. CO4: Execute and compare complex practical problems related to soil mechanics with theoretical data. CO5: Evaluate strength and settlement properties of soil through investigation and judgment of different test results.

PRACTICAL:

Department	CIVIL ENGINEERING
Course Code	HU481
Title of Course	TECHNICAL REPORT WRITING & LANGUAGE LAB PRACTICE
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3P
Total Contact Hours	36
Course Outcomes	1. Students will understand and know how to follow the stages of the writing process (prewriting/writing/rewriting) and apply them to technical and workplace writing tasks. 2. Students will be able to produce a set of documents related to technology and writing in the workplace and will have improved their ability to write clearly and accurately. 3. Students will understand the basic components of definitions, descriptions, process explanations, and other common forms of technical writing. 4. Students will be familiar with basic technical writing concepts and terms, such as audience analysis, jargon, format, visuals, and presentation. 5. Students will be able to read, understand, and interpret material on technology. They will have an appreciation for some of the ideas, issues, and problems involved in writing about technology and in workplace writing. 6. Students will be familiar with basic sources and methods of research and documentation on topics in technology, including on-line research. They will be able to synthesize and integrate material from primary and secondary sources with their own ideas in research papers.

Department	Basic Science & Humanities
Course Code	M(CS)-491
Title of Course	Numerical Methods Lab
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2P
Total Contact Hours	24
Course Out Come	CO1: Ability to understand numerical computation & Interpolation. CO2: Ability to learn Numerical integration & solution of linear equations. CO3: Ability to solve Numerical solution of Algebraic, transcendental equations & ordinary differential equations.

Department	CIVIL ENGINEERING
Course Code	CE 491
Title of Course	Fluid Mechanics Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3 L
Total Contact Hours	36
Course Outcomes	Students will be able to: CO1: Develop an understanding of the experiment to examine the fundamental principles of fluid mechanics. CO2: Investigate and analyze engineering design principles for pipe networks, open channel systems, ram, turbines and pumps to obtain valid outcomes. CO3: Develop practical knowledge in calibration of Venturimeter, Orifice meter and notches. CO4: Develop a critical understanding for examining, analyzing and interpreting the results of the experiments by performing in groups.

Department	CIVIL ENGINEERING
Course Code	CE492
Title of Course	Surveying Practice II
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3
Total Contact Hours	36
Course Outcomes	Students will be able to: CO1: Work in a group to perform different types of traversing using theodolite and prepare Gales Table. CO2: Operate modern engineering equipment at the field and generate different type of topographical survey drawings. CO3: Classify different types of terrain and develop suitable contour maps and vertical land profile. CO4: Identify horizontal land profile and develop simple curve profile as per requirement.

Department	CIVIL ENGINEERING
Course Code	CE493
Title of Course	Soil Mechanics Lab.
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3 P
Total Contact Hours	36
Course Outcomes	Students will be able to: CO1: Determine various index properties, flow and compaction parameters of soil. CO2: Interpret various experimental results. CO3: Correlate different experimental outcomes with the standardized code and prescribed values. CO4: Work in a group to perform different tests.

Third Year – Fifth Semester

THEORY:

Department	Basic Science & Humanities
Course Code	HU 501
Title of Course	Economics for Engineers
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	36
Course Outcome	CO1: Ability to understand Economic Decisions Making and considering that students willlearn to find out Engineering Costs & Estimation. CO2: Ability to learn Cash Flow and also able to calculate Rate of Return Analysis. CO3: Ability to know Inflation and Price Change, Present Worth Analysis. CO4: Ability to learn depreciation and able to analysis the requirement of replacement.

Department	CIVIL ENGINEERING
Course Code	CE501
Title of Course	FOUNDATION ENGINEERING
Nature of Course	Compulsory
Type of Course	Lecture + Tutorial
Contact Hours	3L + 1T
Total Contact Hours	42
Course Outcomes	Students will be able to CO1: Define the lateral earth pressure due to soil mass behind the earth retaining structure and select the proper design of the retaining wall and different sheet piles. CO2: Apply basic soil mechanics knowledge to the analysis of earthen slopes by the employing different methods. CO3: Execute and implement different field tests for site investigation and soil exploration. CO4: Measure the bearing capacities of different types soil andanalyse the settlement of shallow foundations. CO5: Classify different types of deep foundations and based on the soil properties, estimate load carrying capacity of piles.

Department	CIVIL ENGINEERING
Course Code	CE502
Title of Course	DESIGN OF RCC STRUCTURES
Nature of Course	Compulsory
Type of Course	Lecture + Tutorial
Contact Hours	3 L +1T
Total Contact Hours	36
Course Outcomes	Student will be able to: CO1: Recognize and interpret the principles of reinforced concrete design of different type of structural components using working stress and limit state method. CO2:Develop a thorough understanding of Indian Standard Code for RCC design. CO3:Design different type of structural components using working stress and limit state method.

Department	CIVIL ENGINEERING
Course Code	CE 503
Title of Course	Concrete Technology
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3 L
Total Contact Hours	36
Course Outcomes	Students will be able to: CO1:Define reaction between water and cement, properties of the product of reaction, various tests on cement and different types of cement. CO2: Recognize various types of aggregates, their reaction with alkalis and various tests to evaluate their properties. CO3:Identify different properties of the constituent materials of concrete, properties of fresh concrete, hardened concrete and their strength and durability aspects. To study about the concrete design mix and the effect of different types of admixture. CO4:Evaluate the effect of the environment on service life performance, properties and failure modes of structural concrete and demonstrate techniques of measuring the Non Destructive Testing of concrete structure.

Department	CIVIL ENGINEERING
Course Code	CE504
Title of Course	Engineering Geology
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3
Total Contact Hours	36
Course Outcomes	Students will be able to: **CO1:** Understand the importance of the subject in civil engineering within the framework toidentify and classify rock and minerals using basic geological classification systems. **CO2:**Explainthe weathering effects on rocks, geological work of rivers and landslides. **CO3:** Classify the structural geology, engineering properties of rocks and the importance of geological structures and rocks as construction materials. **CO4:**Recognize of the causes, impacts and resistance methods of seismic hazards and understand the methods of geophysical investigation along with the importance of surface, subsurface geological and geophysical surveys for construction projects.

PRACTICAL:

Department	CIVIL ENGINEERING
Course Code	CE591
Title of Course	Soil Mechanics Lab-II.
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3 P
Total Contact Hours	36
Course Outcomes	Students will be able to CO1: Analyze settlement characteristics of soils in lab using modernized equipment's. CO2: Perform different tests to determine shear strength parameters of different type of soils in lab by using modernized equipments. CO3: Set up and organize tests of soils in field by using field equipment's in groups.

Department	CIVIL ENGINEERING
Course Code	CE 592
Title of Course	CONCRETE LABORATORY
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3 L
Total Contact Hours	36
Course Outcomes	Students will be able to: CO1: Develop an understanding of the experiment to examine the fundamental principles of concrete technology. CO2: Perform tests in a group to determine various properties of the constituent materials of concrete and the principal properties of fresh and hardened concrete. CO3: Design concrete mixes and apply statistical quality control techniques to concrete quality by performing in a group. CO4: Develop a critical understanding for examining, analyzing and interpreting the results of the experiments by performing in groups.

Department	CIVIL ENGINEERING
Course Code	CE 593
Title of Course	Quantity Surveying, Specification and Valuation
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3P
Total Contact Hours	36
Course Outcomes	Students will be able to: CO1: Classify and describe specification of different materials, types of estimates, items of work, unit of measurement, unit rate of payment and specification of different works. CO2: Measure and prepare quantity estimate of a single storied building, Bar bending schedule. Estimate of quantities of road, Underground reservoir, Surface drain, Septic tank. CO3: Calculate cost of different quantities using schedule of rate and prepare detailed estimates. CO4: Evaluate the different parameters of market using the technique of valuation.

Department	CIVIL ENGINEERING
Course Code	CE 594
Title of Course	Engineering Geology Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3 P
Total Contact Hours	36
Course Outcomes	Students will be able to: CO1: Develop an understanding on identification based technical skills of the various geological structures by performing in groups in addition to preparation of lab reports for effective study. CO2: Classify crystal system and identify various crystal models of crystal system. CO3: Identify the physical and mechanical characteristics of various types of minerals and rocks using hand specimen and microscope. CO4:Understand and interpret geological maps and to have an idea of ground surface features, geological structures and analysis of thickness problems and bore-hole problems with emphasis on practical application in civil engineering.

Third Year – Sixth Semester

THEORY:

Department	Basic Science & Humanities
Course Code	HU 601
Title of Course	Principles of Management
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L
Total Contact Hours	24
Course Outcome	CO1: Ability to know the basic concepts of management, function of management includingPlanning, Society and People Management. CO2: Ability to know the Leadership quality; Decision making, Economic, Financial &Quantitative Analysis. CO3: Ability to understand Customer Management, Operations & Technology Management

Department	CIVIL ENGINEERING
Course Code	CE 601
Title of Course	Highway & Transportation Engineering
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2 L
Total Contact Hours	24
Course Outcomes	Students will be able to: CO1: Understand the scope of highway engineering, road development plans and recognize the basics of highway economics as well as the necessities and scopes of highway financing. CO2: Describe the criteria, standards and engineering procedures used to design principal elements of the highway alignment and highway cross sectional components. CO3: Identify design factors for pavement thickness and apply different approaches to analyze and design flexible and rigid pavement along with subsequent characterization of pavement construction techniques. CO4: Develop the understanding of traffic characteristics, highway capacity, various methods of collecting traffic data and intersection design in addition to implementation of traffic controlling devices.

Department	CIVIL ENGINEERING
Course Code	CE602
Title of Course	Design of Steel structure
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3 L
Total Contact Hours	36
Course Outcomes	Students will be able to: CO1: Identify and recognize the materials used for steel structure design as per latest revised Indian standards. CO2: Recognize and solve different types of connections and use their knowledge for design of connections as per latest revised Indian Standards. CO3: Analyze and employ different techniques for the design of tension and compression members as per latest revised Indian standards. CO4: Differentiate and solve the problems on the design of beams, plate-girder and gantry-girder as per latest revised Indian Standards.

Department	CIVIL ENGINEERING
Course Code	CE603
Title of Course	Construction Planning &Management
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3 L
Total Contact Hours	36
Course Outcomes	Students will be able to: CO1: Apply the basics of planning, regulation, bye laws and fire protection. CO2: Recognize the use of different construction equipments and techniques. They will also be able to present the knowledge in a way that is understandable to others. CO3: Demonstrate standard management tools to define different phases of construction industry, with knowledge to quality control monitoring in the project and project safety management. CO4: Classify the roles and responsibilities of participants in the construction processes, administration and preparation of documents.

Professional Elective – I

Department	CIVIL ENGINEERING
Course Code	CE604A
Title of Course	Bridge Engineering
Nature of Course	Professional Elective
Type of Course	Lecture
Contact Hours	3
Total Contact Hours	36
Course Outcomes	Students will be able to: CO1:*Recognize* and *appreciate* basic concepts in proportioning and design of bridges in terms of aesthetics, geographical location, functionality and classification of loads as per relevant IRC code. CO2:*Identify* the conceptual design of reinforced concrete solid slab bridge, box culvert, beam and slab bridges. CO3:*Analyze* and design different types of reinforced concrete and steel bridges, namely balanced cantilever bridge, plate girder bridge composite bridge and cable stayed bridge.

Department	CIVIL ENGINEERING
Course Code	CE604B
Title of Course	Pre-stressed Concrete
Nature of Course	Professional Elective
Type of Course	Lecture
Contact Hours	3
Total Contact Hours	36
Course Outcomes	Students will be able to: CO1: *Describe* prestressing system and *explain* prestress and bending stress, losses in prestress, short term and long term deflection, partial pre-stressing and non-pre-stressed reinforcement and composite construction of prestressed and in-situ concrete. CO2: *Use* limit state criteria in design of prestressed beams, design of reinforcement for shear, torsion and bending and anchorage zone. CO3: *Apply* the method of analysis of secondary moment for continuous members. CO4: *Analyze* and design of prestress concrete section for compression and bending**.**

Department	CIVIL ENGINEERING
Course Code	CE604C
Title of Course	Structural Dynamics & Earthquake Engineering
Nature of Course	Professional Elective
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	36
Course Outcomes	Students will be able to: CO1:*Recognize*the free and forced vibration response of single-degree and multi-degree of freedom, basic principles and importance of structural dynamics and earthquake effects on structures. CO2:*Assess* seismic response analysis of a structure subjected to transient loading. CO3:*Identify* the origin of earthquakes and estimate seismic hazard. CO4:*Apply* the concepts of earthquake resistant design for the design of multistoried building and fundamentals of response spectrum method, ductile detailing as per Indian Standard.

Free Elective – I

Department	CIVIL ENGINEERING
Course Code	CE 605A
Title of Course	Operations Research
Nature of Course	Free Elective
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	36
Course Out Come	**CO1**: Solve different linear programming problems (LPP). **CO2:** Discuss on the Network Analysis and Inventory control. **CO3**: Familiarize the Game Theory and Queuing Theory.

Department	CIVIL ENGINEERING
Course Code	CE605B
Title of Course	Human Resource Management (HSS)
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	3L + 0T
Total Contact Hours	36
Course Outcomes	Students will be able to: CO1. Identify and understand the roles of HR. CO2.Develop a knowledge of Human resource management CO3.Assess the need of training, technique of training employees,, appraise the performance of employee CO4.Develop concept about performance management system.

Department	CIVIL ENGINEERING
Course Code	CE605C
Title of Course	Materials Handling
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	3L+0T
Total Contact Hours	36
Course Outcomes	Students will be able to: CO1: **Analyze** the benefit of an efficient material handling system CO2: Study of effective process layout **design** on the material handling system CO3: **Describe** the importance of proper material handling and storage techniques CO4: **Recommend** improvements to existing plant layouts from the standpoint of material handling CO5: **Integrate** concepts and techniques learned through this course in order to **design** efficient material handling equipment

PRACTICAL:

Department	CIVIL ENGINEERING
Course Code	CE 691
Title of Course	Highway & Transportation Engineering Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3 P
Total Contact Hours	36
Course Outcomes	Students will be able to: CO1: Understand and perform various experiments on soil, aggregate and bituminous materials. CO2: Analyze and interpret the results of various experiments by developing the understanding on BIS and IRC standards to relate with the real life construction requirements. CO3:Evaluate structural condition of pavement by performing pavement deflection test and able to design bituminous mixes by developing job mix design and performing deformation test under maximum load. CO4: Develop an understanding of experiment based technical skills on the impact of the safe and professional engineering solutions by performing in groups.

Department	CIVIL ENGINEERING
Course Code	CE692
Title of Course	Detailing of RCC & steel structures
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3P
Total Contact Hours	36
Course Outcomes	Students will be able to: CO1: Memorize the knowledge of structural analysis, design of RC and steel structure and also identify the complex numerical problems. CO2: Design and define different details of steel beams with lateral restraint, steel columns without eccentricities, member of the roof truss with joints, bracings, column with bracings and foundation. CO3: Design singly and doubly reinforced concrete beams, one-way and two-way reinforced concrete slabs, staircase, isolated and combined footings with an understanding of codes of practice and specifications. CO4: Prepare working drawings for RCC and steel structures including reinforcement schedules and bill of materials for common RCC and steel structures. CO5: Communicate effectively on structural design problems with site engineers and also make effective design documentation and presentation.

Department	CIVIL ENGINEERING
Course Code	CE693
Title of Course	CAD Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3P
Total Contact Hours	36
Course Outcomes	Students will be able to: CO1: Identify important features of commercially available design software package for analysis and design of structures. CO2: Analyze frames and multi-storeyed buildings or components of a building for dead load, live load, wind load and seismic load. CO3: Design of multi-storeyed buildings or components of a building such as RCC slab, beam, column, footing using commercially available design software package. CO4: Prepare plans, elevations of engineering structures along with ductility detailing for earthquake resistant structures from the analysis results of commercially available design software package.

Department	CIVIL ENGINEERING
Course Code	CE681
Title of Course	Seminar
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3 P
Total Contact Hours	36
Course Outcomes	Students will be able to: CO1: Recognize the greater dimensions of civil engineering and necessity of engineering practices in general to cope up with the economic, social and environmental aspects of the modern world. CO2: Develop and enhance leadership and communicative skills. CO3: Prepare seminar report related to the chosen topic. CO4:Present and communicate the topic in a proper manner in front of an audience in a group in the form of oral presentations.

Fourth Year – Seventh Semester

THEORY:

Department	CIVIL ENGINEERING
Course Code	CE 701
Title of Course	Environmental Engineering
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3 L
Total Contact Hours	36
Course Outcomes	Student will be able to: CO1:Identify the requirement for demand and supply of water for present and future, sources of water and water quality and water treatment. CO2:Apply the knowledge in the design and distribution of storage and water supply network . CO3:Define the various characteristics of sewage and drainage water. CO4:Describe the treatment of sewage and apply the knowledge in the design and disposal of sewerage systems.

Department	CIVIL ENGINEERING
Course Code	CE 702
Title of Course	Water Resources Engineering
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3 L
Total Contact Hours	36
Course Outcomes	Students will be able to CO1:Recognize the concepts related to hydrologic cycle, catchment area, rainfall and its measurement, losses in rainfall and runoff. CO2:Understand the theory of hydrograph, flood routing and measure the stream flow using direct and indirect methods. CO3:Apply the concepts of effective utilization of rain water in irrigation, design of structures used for irrigation and flood control measures. CO4:Combine the concepts of effective utilization of ground water with the use of wells.

Professional Elective – II

Department	CIVIL ENGINEERING
Course Code	CE 703A
Title of Course	ADVANCED FOUNDATION ENGINEERING
Nature of Course	Professional Elective
Type of Course	Lecture
Contact Hours	3L+0T
Total Contact Hours	36
Course Outcomes	CO1: Identify a suitable foundation system for a structure. CO2: Evaluate the importance of raft foundation and principles of design for buildings and tower structures. CO3: Analyse and design pile foundations. CO4: Examine and discuss various machine foundations. CO5: Analyse and design Sheet piles and cofferdams.

Department	CIVIL ENGINEERING
Course Code	CE703B
Title of Course	Soil Stabilization and Ground Improvement Techniques
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	3L+0T
Total Contact Hours	36
Course Outcomes	1. Understand the different methods of soil stabilization and their techniques with different items. 2. Study the concept of Densification of granular soil and Densification of Cohesive Soils. 3. Execute the design of Sand drains and Stone columns. 4. Understand the different methods of grouting and judge geotextile as separator. 5. Investigate the different techniques of soil stability.

Department	CIVIL ENGINEERING
Course Code	CE 703C
Title of Course	Advanced Highway & Transportation Engineering
Nature of Course	Professional Elective II
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	36
Course Outcomes	Students will be able to: CO1: Remember the concepts of traffic engineering, traffic flow characteristics, traffic survey/studies and identify the importance of traffic controlling devices as well as the scope of traffic management system. CO2: Understand the concept of urban transportation planning and the need for transportation project/system planning as well as transport demand analysis followed by preparation of project report. CO3: Explain the fundamental concepts of railway engineering, components of railway track, different railway gauges, interlocking and modern signal system, track maintenance and geometric design of railway track. CO4: Develop the understanding of different functional areas and classification of airports, role of wind rose diagram and design of basic airport facilities such as runways, taxiways and terminal building.

Professional Elective – III

Department	CIVIL ENGINEERING
Course Code	CE 704A
Title of Course	Advanced Structural Analysis
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	36
Course Outcomes	1. Recognize the analytical methods for indeterminate structures. 2. Classify the different force methods and displacement methods for statically indeterminate structures 3. Define the systems for Matrix concept and solve problems on matrix analysis of structures. 4. Analyze space trusses, beams, grid and frames using stiffness and flexibility methods 5. Examine problems based on three dimensional stress and strain analysis, stress-strain transformation, stress invariants; equilibrium and compatibility equations, boundary conditions. 6. To develop solutions for two dimensional problems, bending of beams, thick cylinder under pressure, complex variable, harmonic and bi-harmonic functions 7. Investigate problems on torsion of rectangular bars and hollow sections and demonstrate Energy principles, variational methods and numerical methods.

Department	CIVIL ENGINEERING
Course Code	CE 704B
Title of Course	Hydraulic Structure
Nature of Course	Professional Elective III
Type of Course	Lecture
Contact Hours	3 L
Total Contact Hours	36
Course Outcomes	Students will be able to: CO1: Recognize the concepts of diversion head works, different seepage theories, weirs and barrages. CO2: Apply the knowledge of various types of canal fall and cross-drainage work. CO3: Develop the concept for the planning and design of dams (earthen and gravity dams). CO4: Explain different types and components of spillway.

Free Elective – II

Department	CIVIL ENGINEERING
Course Code	CE 705A
Title of Course	Engineering Materials
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	36
Course Outcomes	CO1: Discuss the fundamental concepts and its importance in engineering. CO2: List the Imperfections in Metals. CO3: Interpret phase diagrams and explain the basic concepts. CO4: Explain the mechanical properties of metals and heat treatment. CO5: Define ceramic materials and composite materials. CO6: Select material based on required properties, availability and cost of material, environmental issues.

Department	CIVIL ENGINEERING
Course Code	CE 705B(EE402)
Title of Course	Electrical & Electronic measurement
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	3L
Total Contact Hours	41
Course Out Come	**CO1:** Ability to appraise about methods of measurement and working of analog meter. **CO2:** Ability to appraise advantages and disadvantages of different instrument transformer. **CO3:** Ability to explain operating principle of power, energy and resistance measurement devices. **CO4:** Ability to explain and analyse different types of potentiometer in AC bridges. **CO5:** Ability to use CRO for measurement of voltage, current, frequency etc. **CO6:** Ability to use different electronic instruments and sensor and transducers and explain their working principle.

PRACTICAL

Department	CIVIL ENGINEERING
Course Code	HU 781
Title of Course	Group Discussion
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3P
Total Contact Hours	36
Course Outcomes	Students should be able to CO1: Improve subject knowledge, interpersonal and oral communication skills. CO2: Understand the other persons' point of view while making their point. CO3: Develop team playing skills, leadership skills and team management. CO4: Learn that their team as a whole reaches a solution or agreement that is both feasible and accepted by all team members.

Department	CIVIL ENGINEERING
Course Code	CE 791
Title of Course	Environmental Engineering Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3 L
Total Contact Hours	36
Course Outcomes	Students will be able to: CO1: Develop an understanding of the experiment to examine the fundamental characteristics of water and wastewater. CO2: Perform different physical and chemical tests to determine the quality of water and prepare report for the test results. CO3: Analyse using different bacteriological laboratory tests to determine the quality of sewage and prepare report for the test results. CO4: Develop a critical understanding for examining, analyzing and interpreting the results of the experiments by performing in groups.

Department	CIVIL ENGINEERING
Course Code	CE792
Title of Course	CIVIL ENGINEERING PRACTICE SESSIONAL
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3P
Total Contact Hours	36
Course Outcomes	1. Apply fundamental concept of water resources engineering to estimate different parameters related to hydrology and irrigation. 2. Analyze and design of water distribution network, hydraulic design of sewer and population forecasting. 3. Design the pavement design and traffic signal design of highway along with different geometric parameters of highway. 4. Understand the preparation of soil test report from bore log data and estimate of bearing capacity and settlement behavior of foundation.

Department	CIVIL ENGINEERING
Course Code	CE 793A
Title of Course	MATERIAL TESTING LAB
Nature of Course	Elective
Type of Course	Practical
Contact Hours	3P
Total Contact Hours	36
Course Outcomes	**CO1.** Identify right non destructive test to examine the defects for the samples given **CO2.** Ability to conduct destructive testing experiments on Tensile, compression, Hardness, Bending, Torsion, Impact tests to analyze and interpret mechanical properties of the samples. **CO3.** Ability to prepare standard metallographic samples for engineering materials to examine microstructure. **CO4.** Recognize the methods of fatigue design and finite life design.

Department	CIVIL ENGINEERING
Course Code	CE 793B(EE492)
Title of Course	Electrical & Electronic measurement Laboratory
Nature of Course	Elective
Type of Course	Practical
Contact Hours	3P
Total Contact Hours	36
Course Out Come	**CO1:** Ability to explain constructions and working principles of PMMC, Dynamometer, Electro-thermal etc. **CO2:** Ability to calibrate moving iron, electrodynamometer and AC energy meter type ammeter/voltmeter by potentiometer. **CO3:** Ability to measure resistance, inductance, power, frequency and capacitance.

Department	CIVIL ENGINEERING
Course Code	CE782
Title of Course	INDUSTRIAL TRAINING
Nature of Course	Compulsory
Type of Course	Sessional
Contact Hours	4 weeks
Total Contact Hours	36
Course Outcomes	Ability to acquire and apply fundamental principles of engineering. Become master in one's specialized technology Become updated with all the latest changes in technological world. Ability to communicate efficiently. Ability to identify, formulate and model problems and find engineering solution based on a systems approach. Capability and enthusiasm for self-improvement through continuous professional development and life-long learning

Department	Civil Engineering
Course Code	CE783
Title of Course	Project Part 1
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours per week	6
Total Contact Hours	
Course Outcomes	Students will be able to: **CO1.**Demonstrate a sound technical knowledge of their selected project topic. **CO2.** Undertake problem identification, formulation and solution. **CO3.** Design engineering solutions to complex problems utilising a systematic approach. **CO4.** Conduct an engineering project. **CO5.**Communicate with engineers and the community at large in written and oral forms. **CO6.**Demonstrate the knowledge, skills and attitudes of a professional engineer.

Fourth Year – Eighth Semester

THEORY:

Department	CIVIL ENGINEERING
Course Code	HU 801A
Title of Course	Organizational Behaviour
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L
Total Contact Hours	24L
Course Outcomes	CO1: Identify the importance and intricacies of organizational behavior. CO2: Describe personality, attitudes and perception to motivate employees and improve one's perception CO3: Monitor human resources through effective leadership CO4: Resolve organizational conflicts and politics through negotiations.

Department	CIVIL ENGINEERING
Course Code	HU 801B
Title of Course	Project Management
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L
Total Contact Hours	24L
Course Outcomes	CO1: Identify the scope, cost, timing, and quality of the project. CO2: Implement project management knowledge, processes, lifecycle andconcepts, tools and techniques in order to achieve project success. CO3: Analyse the learning and understand techniques for Project planning, scheduling and Execution Control.

Professional Elective – IV

Department	CIVIL ENGINEERING
Course Code	CE 801A
Title of Course	Environmental Pollution and Control
Nature of Course	Professional Elective IV
Type of Course	Lecture
Contact Hours	3 L
Total Contact Hours	36
Course Outcomes	Students will be able to: CO1: Understand the essence of environment, identify the various forms of air pollution, analyse and design various control techniques to control air pollution. CO2: Develop knowledge in details about noise pollution, different approaches to measure it, analyse its effects and examine various control measures for it. CO3:Assess the various forms of industrial pollution and relate to the control techniques. CO4:Recognise the importance of various global environmental issues. CO5: Develop the concepts of environmental impact assessment; predict environmental clearance process for various industries and the related administrative controls and laws.

Department	CIVIL ENGINEERING
Course Code	CE801B
Title of Course	Water Resources Management & Planning
Nature of Course	Professional Elective IV
Type of Course	Lecture
Contact Hours	3 L
Total Contact Hours	36
Course Outcomes	Students will be able to CO1: Recognize the principles, system of analysis, methods of analysis and policy planning of water resource system. CO2: Evaluate single and multi reservoir operation using computer programming. CO3: Plan single and multi reservoir operation under uncertainty by statistical methods. CO4: Analyse river basin planning problem and water quality management by using statistical modelling.

Department	CIVIL ENGINEERING
Course Code	CE 801C
Title of Course	Remote Sensing and GIS
Nature of Course	Professional Elective IV
Type of Course	Lecture
Contact Hours	3 L
Total Contact Hours	36
Course Outcomes	Students will be able to: CO1: Identify the types of remote sensing, tacheometry, triangulation, trilateration, geodetics and error analysis by EDM and Total station. CO2: Investigate the photogrammetry, satellite by application of camera system for mapping with the help of ground photograph and aerial photograph. CO3:Analyze the satellite survey by satellite sensing, application of microwave imaging, field astronomy of 3D computation and correlate global positioning system with the help of astronomy. CO4: Demonstrate planning and database management of GIS concept.

Professional Elective – V

Department	CIVIL ENGINEERING
Course Code	CE 802A
Title of Course	Finite Element Method
Nature of Course	Professional Elective V
Type of Course	Lecture
Contact Hours	3 L
Total Contact Hours	36
Course Outcomes	Students will be able to: CO1: Recognize basic Concepts of Finite Element Analysis, Elasticity and different formulation techniques of finite element analysis. CO2: Ascertain the concepts of formulation techniques including formation of stiffness matrices for analysis of truss, continuous beam and simple plane frame. CO3: Execute the different element properties and develop numerical integration for dimensional analysis of elements. CO4: Apply finite element methods for two dimensional analysis including plates and recognize standard finite element software in civil engineering.

Department	CIVIL ENGINEERING
Course Code	CE802B
Title of Course	Dynamics of Soils and Foundations
Nature of Course	Professional Elective V
Type of Course	Lecture
Contact Hours	3 L
Total Contact Hours	36
Course Outcomes	CO1:Students will be able to analyse and design block type machine foundations under dynamic load. CO2:Students will be able to examine the fundamentals of vibration for damped and undamped systems. CO3: Students will be able to differentiate dynamic properties of soil, laboratory and field evaluation of soil properties as per IS codes including liquefaction of soils. CO4: Student will be able to understand mechanism of wave propagation and classify different types of waves.

Department	CIVIL ENGINEERING
Course Code	CE802C
Title of Course	Design of Tall Buildings
Nature of Course	Professional Elective V
Type of Course	Lecture
Contact Hours	3 L
Total Contact Hours	36
Course Outcomes	Students will be able to: CO1: Recognise the design philosophy for tall buildings and identify the various loads acting on them. CO2: Execute the different structural forms and floor systems. CO3: Examine the buckling of frames and judge the stability of high-rise buildings. CO4: Identify the requirements and modelling for tall buildings under static and dynamic loading conditions.

Department	CIVIL ENGINEERING
Course Code	CE 802D
Title of Course	Pavement Design
Nature of Course	Professional Elective V
Type of Course	Lecture
Contact Hours	3 L
Total Contact Hours	36
Course Outcomes	Students will be able to: **CO1:** Remember the concept of different types of pavement, pavement design approaches and characterization of pavement materials by different types of field and laboratory experimental methods. **CO2:** Understand the classification of vehicle types, axle configurations, contact shapes and analyze contact stress distribution as well as axle load surveys for the estimation of design traffic. **CO3:** Analyze and design flexible and rigid pavement using linear elastic theories, IRC guidelines. **CO4:** Evaluate structural and functional failure/distress of pavement, identify the need of pavement management system for analyzing pavement performance using overlay design concept as per IRC guidelines.

PRACTICAL

Department	CIVIL ENGINEERING
Course Code	CE 891
Title of Course	Structural Engineering Design Practice
Nature of Course	Sessional
Type of Course	Practical
Contact Hours	6 P
Total Contact Hours	72
Course Outcomes	Students will be able to: CO1: Comprehend different types of water tank and identify the complex numerical problems. CO2: Apply the knowledge of planning and design of reinforced concrete structures in solving the practical civil engineering problems related to water tanks reinforced concrete pipes, bunkers, silos, chimneys, aqueducts, box culverts, concrete bridges. CO3:Differentiate and solve the problems on the design of beams, plate-girder and gantry-girder as per latest revised Indian Standards. CO4:Recognize and solve different types of connections and use their knowledge for design of Industrialroof trusses as per latest revised Indian Standards.

Department	CIVIL ENGINEERING
Course Code	CE881
Title of Course	Project Part II
Nature of Course	Required
Type of Course	Practical
Contact Hours	12
Total Contact Hours	144
Course Outcomes	Students will be able to: CO1: recognize the scope of problem and conduct Literature review CO2: use existing/new methods to apply the fundamental aspects of civil engineering and their relevance with respect to the societal benefit CO3: set up experimentation / design / development of models to analyze and compare the results CO4: to develop the ability of working in the groups and to develop skills related to comprehensive report writing.

Department	CIVIL ENGINEERING
Course Code	CE 882
Title of Course	Grand Viva
Nature of Course	Required
Type of Course	Practical
Contact Hours	-
Total Contact Hours	-
Course Outcomes	Students will be able to: **CO1:**Memorize the basic and advanced knowledge in civil engineering. **CO2:**Develop an idea about the environment of job market and their preparedness to defend the interview after graduation. **CO3:** Implement their knowledge in civil engineering acquired in the last four years and its usefulness to the society and assess the impact of civil engineering on the environment.