Semester I

Department	CIVIL ENGINEERING
Course Code	BS-PH101
Title of Course	Physics-I
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L +1 T
Total Contact Hours	44
Course Out Come	Basic concepts of mechanics, optics and its applications, electricity, magnetism and qualitativeunderstanding of concepts of quantum physics and statistical mechanics.

Department	CIVIL ENGINEERING
Course Code	BS-M102
Title of Course	Mathematics –IB
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L + 1T
Total Contact Hours	42
Course Out Come	After completing the course the student will be able to Apply the concept and techniques of differential and integral calculus to determine curvature andevaluation of different types of improper integrals. Understand the domain of applications of mean value theorems to engineering problems. Learn the tools of power series and Fourier series to analyze engineering problems and apply theconcept of convergence of infinite series in many approximation techniques in engineeringdisciplines. Apply the knowledge for addressing the real life problems which comprises of several variables orattributes and identify extremum points of different surfaces of higher dimensions. Understand different types of matrices, their eigen values, eigen vectors, rank and also theirorthogonal transformations which are essential for understanding physical and engineering problems.

Department	CIVIL ENGINEERING
Course Code	ES-EE101
Title of Course	Basic Electrical Engineering
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L + 1T
Total Contact Hours	42
Course Out Come	To understand and analyze basic electric and magnetic circuits To study the working principles of electrical machines and power converters. To introduce the components of low voltage electrical installations

Department	CIVIL ENGINEERING
Course Code	BS-PH191
Title of Course	Physics-I Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3P
Total Contact Hours	30
Course Out Come	After completing the course the student will be able to 1: Ability to understand the general property of matters like viscosity, Young's Modulus and Modulus of Rigidity. 2: Ability to know optical property. 3: Ability to learn electrical property. 4: Ability to understand Quantum Physics with the help of experiments like Energy band gap of semiconductor, Planck constant and Characteristics of Solar Photovoltaic cell. 5: Ability to learn Electricity and Magnetism with the help of experiments like Hall Effect of semiconductors, Specific charge of electron

Department	CIVIL ENGINEERING
Course Code	ES-EE191
Title of Course	Basic Electrical Engineering Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	24
Course Out Come	After completing the course the student will be able to 1: To learn about the operation, calibration and application of different electrical elements, instruments respectively and observe the constructional details of different electrical machines. 2: To learn about the RLC circuit behaviour under AC and DC excitation. 3: To learn about the characteristics features of a single-phase transformer 4: To learn about three phase circuitanalysis. 5: To learn about the characteristic behaviours of different rotating electrical machines. 6: To learn about the operation of different converters and LT switchgear.

Department	CIVIL ENGINEERING
Course Code	ES-ME192
Title of Course	Workshop/Manufacturing Practices(Gr-A)
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	1T+4P
Total Contact Hours	65
Course Out Come	The student will learn: □ Introduction to engineering design and its place in society □ Exposure to the visual aspects of engineering design □ Exposure to engineering graphics standards □ Exposure to solid modelling

Semester II

Department	CIVIL ENGINEERING
Course Code	BS-CH201
Title of Course	Chemistry-1
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L3 + T1
Total Contact Hours	42
Course Out Come	The concepts developed in this course will aid in quantification of several concepts in chemistry that havebeen introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic,atomic and molecular level modifications. Quantum theory is more than 100 years old and to understandphenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels. The course will enable the student to: □ Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces. □ Rationalise bulk properties and processes using thermodynamic considerations. □ Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energylevels in various spectroscopic techniques □ Rationalise periodic properties such as ionization potential, electronegativity, oxidation states andelectronegativity. □ List major chemical reactions that are used in the synthesis of molecules.

Department	CIVIL ENGINEERING
Course Code	BS-M202
Title of Course	Mathematics –IIB
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L +1T
Total Contact Hours	40
Course Out Come	The students will be able to: Learn the methods for evaluating multiple integrals and their applications to different physicalproblems. Understand different techniques to solve first and second order ordinary differential equations with itsformulation to address the modelling of systems and problems of engineering sciences. Learn different tools of differentiation and integration of functions of a complex variable that are usedwith various other techniques for solving engineering problems. Apply different types of transformations between two 2-dimensional planes for analysis of physicalor engineering problems.

Department	CIVIL ENGINEERING
Course Code	ES-CS201
Title of Course	Programming forProblem Solving
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L +0T
Total Contact Hours	40
Course Out Come	The student will learn To formulate simple algorithms for arithmetic and logical problems. To translate the algorithms to programs (in C language). To test and execute the programs and correct syntax and logical errors. To implement conditional branching, iteration and recursion. To decompose a problem into functions and synthesize a complete program usingdivide and conquer approach. To use arrays, pointers and structures to formulate algorithms and programs. To apply programming to solve matrix addition and multiplication problems andsearching and sorting problems. To apply programming to solve simple numerical method problems, namely rotfinding of function, differentiation of function and simple integration.

Department	CIVIL ENGINEERING
Course Code	HM- HU201
Title of Course	English
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L + 0T
Total Contact Hours	25
Course Out Come	The student will acquire basic proficiency in English including reading and listening comprehension, writingand speaking skills.

Department	CIVIL ENGINEERING
Course Code	BS-CH291
Title of Course	Chemistry-1 Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3P
Total Contact Hours	30
Course Out Come	After completing the course the student will be able to 1: Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces. 2: Rationalise bulk properties and processes using thermodynamic considerations. 3: Distinguish the range of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques. 4: Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity. 5: List major chemical reactions that are used in the synthesis of molecules.

Department	CIVIL ENGINEERING
Course Code	ES-CS291
Title of Course	Programming forProblem Solving
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	4L +0T
Total Contact Hours	40
Course Out Come	□ To formulate the algorithms for simple problems □ To translate given algorithms to a working and correct program □ To be able to correct syntax errors as reported by the compilers □ To be able to identify and correct logical errors encountered at run time □ To be able to write iterative as well as recursive programs □ To be able to represent data in arrays, strings and structures and manipulate them through a program □ To be able to declare pointers of different types and use them in defining self-referential structures. □ To be able to create, read and write to and from simple text files.

Department	CIVIL ENGINEERING
Course Code	ES-ME291
Title of Course	Workshop/Manufacturing Practices
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	1T+4P
Total Contact Hours	52
Course Out Come	□ Upon completion of this laboratory course, students will be able to fabricate components with theirown hands. □ They will also get practical knowledge of the dimensional accuracies and dimensional tolerancespossible with different manufacturing processes. □ By assembling different components, they will be able to produce small devices of their interest.

Department	CIVIL ENGINEERING
Course Code	HM-HU291
Title of Course	Language Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	19
Course Out Come	□ The student will acquire basic proficiency in English including reading and listening comprehension,writing and speaking skills.

Semester III (Second year)

Theory

Department	CIVIL ENGINEERING
Course Code	CE(BS)301
Title of Course	Biology for Engineers
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L + 1T
Total Contact Hours	33
Course Out Come	After completing the course the student will be able to 1: Describe how biological observations of 18th Century that lead to major discoveries. 2: Convey that classification per section is not what biology is all about but highlight the underlying criteria, such as morphological, biochemical and ecological. 3: Highlight the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring. 4: Convey that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine. 5: Classify enzymes and distinguish between different mechanisms of enzyme action. 6: Identify DNA as a genetic material in the molecular basis of information transfer. **7**: Analyse biological processes at the reductionistic level.

Department	CIVIL ENGINEERING
Course Code	CE(ES)301
Title of Course	ENGINEERING MECHANICS
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L+1T
Total Contact Hours	42
Course Outcomes	After completing the course the student will be able to 1. Illustrate system of forces and its resultant and free body diagram of forces. 2. List the types of friction and the laws of friction. 3. Analysis of truss by method of joints and method of sections. 4. Locate the centroid of simple figures and composite sections. 5. Demonstrate particle dynamics and kinematics of rigid bodies.

Department	CIVIL ENGINEERING
Course Code	CE(ES)302
Title of Course	Energy Science & Engineering
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	1L + 1T
Total Contact Hours	30
Course Outcomes	1.To make understand the ideas of scientific principles, energy systems and various non-renewable and renewable resources for energy. 2.To recognize the relation between energy, environment and economic system. 3. To identify the role of civil engineering in energy sources. 4. To interpret about green building LEED ratings, energy audit of facilities andoptimization of energy consumption.

Department	CIVIL ENGINEERING
Course Code	CE (BS)301
Title of Course	Mathematics – III (Transform & Discrete Mathematics)
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L + 0T
Total Contact Hours	34
Course Out Come	1: Learn the tools of Laplace Transform, Fourier Transform and Z-Transform to analyse engineering problems. 2: Learn the ideas of functions, relation and algebraic structure and their applications in engineering environment. 3: Understand the concept of Logic, partially ordered set and apply the Counting technique in the problems of engineering fields. 4: Learn Basics of Graph Theory which are useful to solve engineering problems.

Department	CIVIL ENGINEERING
Course Code	CE(HS)301
Title of Course	HUMANITIES-I (EFFECTIVE TECHNICAL COMMUNICATION)
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L+0T
Total Contact Hours	36
Course Outcomes	CO1: Acquire basic proficiency in English including reading and listening comprehension, writing and speaking Skills. And understand the basics of Business Ethics and Corporate Communication

Department	CIVIL ENGINEERING
Course Code	CE(HS)302
Title of Course	INTRODUCTION TO CIVIL ENGINEERING
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	1L+1T
Total Contact Hours	33
Course Outcomes	1. Understand the basic of civil engineering. 2. Study History of Civil engineering, National Planning for Construction and Infrastructure Development, Fundamentals of Architecture & Town Planning, Fundamentals of Building Materials. 3. Discuss the Basics of Construction Management & Contracts Management, Environmental Engineering & Sustainability, basics of Geotechnical Engineering. 4. Explain fundamentals of Hydraulics, Hydrology &Water Resources Engineering, Ocean Engineering, Power Plant Structures, surveying techniques, &Geomatics, Traffic &Transportation Engineering, Repairs & Rehabilitation of Structures, Computational Methods, IT, IoT in Civil Engineering. 5. Follow the cases of large civil engineering projects by industry professionals, covering comprehensive planning to commission. 6. Learn Basics of Professionalism.

Practical/ Sessional

Department	CIVIL ENGINEERING
Course Code	CE(ES)391
Title of Course	Basic Electronics
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	1L+2P
Total Contact Hours	42
Course Outcomes	1. Understand the principles of semiconductor devices and their applications. 2. Design an application using Operational Amplifier. 3. Understand the working of timing circuit and oscillators. 4. Understand logic gates, flop flop as a building block of digital systems. 5. Learn the basics of Electronic communication system.

Department	CIVIL ENGINEERING
Course Code	CE(ES)392
Title of Course	Computer-aided Civil Engineering Drawing
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	1L+2P
Total Contact Hours	42
Course Outcomes	1. Discuss the basic concepts of drawing. 2. Sketch the site plan, floor plan, elevation and section drawing of small residential buildings. 3. Illustrate perspective view of building and fundamentals of Building Information Modelling. 4. Describe the types of masonry bonds.

Department	CIVIL ENGINEERING
Course Code	CE(ES)393
Title of Course	Life Science
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	3P
Total Contact Hours	15
Course Out Come	1: Comparison of stomatal index in different plants. 2: Study of mineral crystals in plants; 3: Determination of diversity indices in plant communities;To construct ecological pyramids ofpopulation sizes in an ecosystem; 4:Determination of ImportanceValue Index of a species in a plant community; Seminar (with PPTs) on EIA of a Mega-Project (e.g.,Airport, 5: Preparation and extraction of genomic DNA and determination of yield by UV absorbance;

Semester IV (Second year)

Department	CIVIL ENGINEERING
Course Code	CE(ES)401
Title of Course	Introduction to Fluid Mechanics
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+0T
Total Contact Hours	40
Course Outcomes	On successful completion of this course, student should be able to: 1. define basic terms, values and laws in the areas of fluids properties, statics, kinematics and dynamics of fluids, and hydraulic design of pipe systems; 2. describe methods of implementing fluid mechanics laws and phenomena while analyzing the operational parameters of hydraulic problems; 3. practically apply tables and diagrams, and equations that define the associated laws; 4. calculate and optimize operational parameters of hydraulic problems; 5. explain the correlation between different operational parameters; 6. select engineering approach to problem solving based on the acquired physics and mathematical knowledge.

Department	CIVIL ENGINEERING
Course Code	CE(ES)402
Title of Course	Introduction to Solid Mechanics
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+0T
Total Contact Hours	34
Course Outcome	After going through this course, the students will be able to: 1. To identify the equilibrium conditions and elastic properties of axially loaded bars through stress-strain and force-displacement curves. 2. To identify the principal plane and principal stresses through Mohr circle. 3. To calculate the hoop and meridional stresses in thin cylinders and spherical shells. 4. To identify different degrees of freedoms for support conditions like hinge, roller and fixed constraints. 5. To calculate the bending moment, shear force and deflection of beams for uniformly distributed, concentrated, linearly varying and external concentrated moment. 6. To calculate the member forces in a plane truss using Method of Joint and Method of Section. 7. To identify torsional moment and twist on a circular shaft and calculate the shear stress. 8. To know the concepts of strain energy due to axial load, bending and shear. 9. To calculate the buckling load of columns using Euler's theory for different support constraints

Department	CIVIL ENGINEERING
Course Code	CE(PC)401
Title of Course	Soil Mechanics-I
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+1T
Total Contact Hours	41
Course Outcomes	After going through this course, the students will be able to: 1. Classify soil as per grain size distribution curve and understand the index properties of soil. 2. Apply the concept of total stress, effective stress and pore water pressure for solving geotechnical problems. 3. Assess the permeability of different types of soil and solve flow problems. 4. Estimate the seepage loss, factor of safety against piping failure using flow net related to any hydraulic structure. 5. Determine vertical stress on a horizontal plane within a soil mass subjected to different types of loading on the ground surface and also the maximum stressed zone or isobar below a loaded area. 6. Apply the concept of shear strength to analyze different geotechnical problems and determine the shear strength parameters from lab and field tests.

Department	CIVIL ENGINEERING
Course Code	CE(PC)402
Title of Course	Environmental Engineering
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L2+T1
Total Contact Hours	42
Course Outcomes	After going through this course, the students will be able to: 1. Define the basic concepts and terminologies of water supply engineering and solid waste management 2. Describe different surface and groundwater sources; and composition and characteristics of municipal solid waste 3. Apply the methods of quantifying water requirement and MSW generation 4. Solve different mathematical problems regarding different components of water supply systems, distribution networks and MSW management systems 5. Compare between different water samples based on their physical, chemical and biological characteristics 6. Design different unit processes and operations involved in water treatment and MSW management

Department	CIVIL ENGINEERING
Course Code	CE(PC)403
Title of Course	Surveying &Geomatics
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L + 1T
Total Contact Hours	42
Course Outcomes	Upon completing the course, the students will be able to: 1. Define and state the scope of surveying and geomatics in civil engineering 2. Understand the basic principles of surveying and geomatics engineering 3. Apply the different methods of surveying and geomatics to measure the features of interest 4. Analyze the traditional and advanced methods of surveying 5. Evaluate the different techniques of surveying and geomatics in solving real world problems. 6. Design and construct solutions for real world problems related to surveying and geomatics.

Department	CIVIL ENGINEERING
Course Code	CE(PC)404
Title of Course	CONCRETE TECHNOLOGY
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+1T
Total Contact Hours	40
Course Outcomes	On completion of the course, the students will be able to: 1. Test all the required properties of concrete materials as per IS code. 2. Compute the properties of concrete at fresh and hardened state. 3. Design the concrete mix as per latest IS code methods. 4. Ensure quality control while testing/ sampling. 5. Design the special type of concrete for specific application purposes. 6. Use the admixture as per requirement.

Department	CIVIL ENGINEERING
Course Code	CE(HS)401
Title of Course	Civil Engineering - Societal & Global Impact
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+0T
Total Contact Hours	30
Course Out Come	On completion of the course, the students will be able to: 1. The impact which Civil Engineering projects have on the Society at large and on the global arena and using resources efficiently and effectively. 2. The extent of Infrastructure, its requirements for energy and how they are met: past, present and future 3. The Sustainability of the Environment, including its Aesthetics, 4. The potentials of Civil Engineering for Employment creation and its Contribution to the GDP 5. The Built Environment and factors impacting the Quality of Life 6. The precautions to be taken to ensure that the above-mentioned impacts are not adverse but beneficial. 7. Applying professional and responsible judgement and take a leadership role;

Department	CIVIL ENGINEERING
Course Code	CE(MC)401
Title of Course	Management – I (Organizational Behaviour)
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L + 0T
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	CE(ES)491
Title of Course	Fluid Mechanics Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	25
Course Outcomes	On completion of the course, the students will be able to: 1. Calibrate the notch and orifice meter. 2. Evaluate the performance of pump and turbine. 3. Determine the various hydraulic coefficients. 4. Determine the minor losses through pipes. 5. Measure the water surface profile due to formation of hydraulic jump. 6. Measure the water surface profile for flow over Broad crested weir.

Department	CIVIL ENGINEERING
Course Code	CE(ES)492
Title of Course	Solid Mechanics Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	25
Course Outcomes	After going through this course, the students will be able to: 1. Demonstrate the method and findings of tension and compression tests on ductile and brittlematerials. 2. Explain the method of bending tests on mild steel beam and concretebeam. 3. Demonstrate the method and findings of Torsion test on mild steel circular bar and concrete beam. 4. Illustrate the concept of hardness and explain the procedure and findings of Brinnel and Rockwelltests. 5. Demonstrate the concept and procedure of calculation of spring constant and elaborate its use in CivilEngineering. 6. Demonstrate the method and findings of Izod and Charpy impacttests. 7. Understand the concepts of fatiguetest.

Department	Civil Engineering
Course Code	CE(ES)493
Title of Course	Engineering Geology Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	25
Course Outcomes	Upon completion of the course, the students will be able to: 1. Define and state the role of engineering geology in civil engineering 2. Understand origin of rocks and geologic structures 3. Apply different tools to identify rocks and minerals in hand specimen and under microscope 4. Analyze the geological structures through drawing the cross sections from the geological maps 5. Evaluate the results obtained from different geological experiments 6. Investigate the natural hazards/disasters that are caused by the geological reasons

Department	CIVIL ENGINEERING
Course Code	CE(PC)493
Title of Course	Surveying &Geomatics
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	25
Course Outcomes	Upon completion of the course, the students will be able to: 1. State the interdependency and advancement of different surveying methods 2. Comprehend the working principles of different surveying and geomatics instruments and experiments 3. Execute the different methods of surveying and geomatics to measure the features of interest 4. Examine the results obtained from the surveying and geomatics experiments 5. Critically appraise the different techniques of surveying and geomatics in measuring and assessing the features of interest 6. Design and construct solutions for real world problems related to surveying and geomatics.

Department	CIVIL ENGINEERING
Course Code	CE(PC)494
Title of Course	Concrete Technology Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	25
Course Outcomes	On completion of the course, the students will be able to: 1. Demonstrate the method and findings of tension and compression tests on concrete. 2. Understand the concepts of different test on hardened concrete. 3. Calculate the specific gravity of concrete ingredients. 4. Find out the mix proportion of high grade of concrete. 5. Measure the workability of concrete mix. 6. Know about the quality of concrete. 7. Understand the different properties of cement.

Semester V

Department	CIVIL ENGINEERING
Course Code	CE(PC)501
Title of Course	Design of RC Structures
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+1T
Total Contact Hours	40
Course Outcomes	After going through this course, the students will be able to: 1. Understand material properties and design methodologies for reinforced concretestructures. 2. Assess different type of loads and prepare layout for reinforced concretestructures. 3. Identify and apply the applicable industrial design codes relevant to the design of reinforced concretemembers. 4. Analyse and design various structural elements of reinforced concrete building like beam, slab, column, footing, andstaircase. 5. Assessment of serviceability criteria for reinforced concrete beam andslab. 6. Prepare structural drawings and detailing and produce design calculations and drawing in appropriate professionalformat.

Department	CIVIL ENGINEERING
Course Code	CE(PC)502
Title of Course	Engineering Hydrology
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L+0T
Total Contact Hours	40
Course Outcomes	On completion of the course, the students will be able to: 1. study the source, occurrence, movement and distribution of water which is a prime resource for development of anation. 2. learn about the functioning of reservoirs and estimation of storagecapacities. 3. learn about flood hazards, estimation of design floods for various structures and methods of estimating effects of passage of floods through rivers andreservoirs. 4. know the basic principles of measurement of flow inrivers.

Department	CIVIL ENGINEERING
Course Code	CE(PC)503
Title of Course	STRUCTURAL ANALYSIS-I
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	30
Course Outcomes	After going through this course, the students will be able to: 1. Distinguish between stable and unstable and statically determinate and indeterminate structures. 2. Apply equations of equilibrium to structures and compute the reactions. 3. Calculate the internal forces in cable and arch type structures. 4. Evaluate and draw the influence lines for reactions, shears and bending moments in beams due to moving loads. 5. Use approximate methods for analysis of statically indeterminate structures. 6. Calculate the deflections of truss structures and beams.

Department	CIVIL ENGINEERING
Course Code	CE(PC)504
Title of Course	Soil Mechanics – II
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	41
Course Outcomes	After going through this course, the students will be able to: 1. Assess the compaction and consolidation characteristics of soil for solving geotechnical problems. 2. Calculate earth pressure on rigid retaining walls on the basis of classical earth pressure theories. 3. Analyze and design rigid retaining walls (cantilever types) from geotechnical engineering consideration. 4. Evaluate the bearing capacity of shallow foundation by applying established theory. 5. Estimate settlement in soils by different methods. 6. Compute safety of dams and embankments on the basis of various methods of slope stability analysis.

Department	CIVIL ENGINEERING
Course Code	CE(PC)505
Title of Course	Environmental Engineering – II
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	42
Course Outcomes	After going through this course, the students will be able to: 1. Define the basic concepts and terminologies of waste water engineering and hazardous waste management 2. Describe different home plumbing systems for water supply and wastewater disposal 3. Apply the methods of quantifying sanitary sewage and storm sewage 4. Solve different mathematical problems regarding different components of sewerage system 5. Compare between different wastewater samples based on their physical, chemical and biological characteristics 6. Design different unit processes and operations involved in wastewater treatment

Department	CIVIL ENGINEERING
Course Code	CE(PC)506
Title of Course	Transportation Engineering
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	42
Course Outcomes	After going through this course, the students will be able to: 1. Understand the knowledge of planning, design and the fundamental properties of highway materials in highway engineering. 2. Apply the knowledge of geometric design and draw appropriate conclusion. 3. Interpret the concept of different methods in design, construction of the pavement. 4. Interpret traffic parameters by applying the knowledge in traffic planning and intersection design.

Department	CIVIL ENGINEERING
Course Code	CE(PC)591
Title of Course	RC Design Sessional
Nature of Course	Compulsory
Type of Course	Sessional
Contact Hours	2P
Total Contact Hours	24
Course Outcomes	After going through this course, the students will be able to: 1. Understand material properties and design methodologies for reinforced concrete structures. 2. Assess different type of loads and prepare layout for reinforced concrete structures. 3. Identify and apply the applicable industrial design codes relevant to the design of reinforced concrete members. 4. Analyse and design various structural elements of reinforced concrete building like beam, slab, column, footing, and staircase. 5. Assessment of serviceability criteria for reinforced concrete beam and slab. 6. Prepare structural drawings and detailing and produce design calculations and drawing in appropriate professional format.

Department	CIVIL ENGINEERING
Course Code	CE(PC)594
Title of Course	Soil Mechanics Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	24
Course Outcomes	After going through this course, the students will be able to: 1. Identify different types of soil by visual inspection. 2. Determine natural moisture content and specific gravity of various types of soil. 3. Estimate in-situ density by core cutter method and sand replacement method. 4. Analyze grain size distribution and Atterberg limits for soil. 5. Perform laboratory tests to determine permeability and compaction characteristics of soil. 6. Determine shear strength parameters of soil by unconfined compression test and vane shear test. 7. Determine shear strength parameters of soil by direct shear test. 8. Perform triaxial test to determine shear strength parameters of soil. 9. Determine California Bearing Ratio (CBR) of soil. 10. Prepare technical laboratory report

Department	CIVIL ENGINEERING
Course Code	CE(PC)595
Title of Course	Environmental Engineering Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	24
Course Outcomes	On completion of the course the students will be able to: 1. Experiment various physical characteristics for a given sample of water and wastewater 2. Determine various chemical characteristics for a given sample of water and wastewater 3. Examine the bacteriological characteristics for a given sample of water and wastewater 4. Examine the suitability of a few treatment options for a given sample of water and wastewater 5. Compare the determined quality parameters with standards to decide on the suitability of use for the tested water and disposal of tested wastewater

Department	CIVIL ENGINEERING
Course Code	CE(PC)596
Title of Course	Transportation Engineering Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	24
Course Outcomes	On completion of the course the students will be able to: 1. Identify and perform various experiments on soil, aggregate and bituminous materials in a group. 2. Interpret and apply the results of various experiments to design and solve various engineering problems related to bituminous overlay, sub base design and bituminous mix design.

Department	CIVIL ENGINEERING
Course Code	CE(PC)597
Title of Course	Computer Applications in Civil Engineering
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	25
Course Outcomes	On successful completion of this course, student should be able to: 1. Use the computer as a problem-solvingtool. 2. Identify and formulate Civil Engineering problems solvable bycomputers. 3. Perform linear algebra and matrix operations and their application to solve Civil Engineeringproblems 4. Solve sets of linear equations and determine roots and nonlinearequations 5. Construct, interpret and solve simple optimizationproblems 6. Develop programs for Civil Engineering analysis and designproblems. 7. Use various software used in industries for analysis anddesign.

Semester VI

Department	CIVIL ENGINEERING
Course Code	CE(PC)601
Title of Course	Construction engineering & Management
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+0T
Total Contact Hours	30
Course Outcomes	On completion of the course, the students will have: 1. An idea of how structures are built and projects are developed on thefield 2. An understanding of modern constructionpractices 3. A good idea of basic construction dynamics- various stakeholders, project objectives, processes, resources required and projecteconomics 4. A basic ability to plan, control and monitor construction projects with respect to time andcost 5. An idea of how to optimise construction projects based oncosts 6. An idea how construction projects are administered with respect to contract structures and issues. 7. An ability to put forward ideas and understandings to others with effective communication processes

Department	CIVIL ENGINEERING
Course Code	CE(PC)602
Title of Course	Engineering Economics, Estimation & Costing
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	29
Course Outcomes	On completion of the course, the students will: 1. Have an idea of Economics in general, Economics of India particularly for public sector agencies and private sector businesses 2. Be able to perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives. 3. Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives. 4. Be able to understand the technical specifications for various works to be performed for a project and how they impact the cost of a structure. 5. Be able to quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure. 6. Be able to understand how competitive bidding works and how to submit a competitive bid proposal.

Department	CIVIL ENGINEERING
Course Code	CE(PC)603
Title of Course	Water Resources Engineering
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	31
Course Outcomes	On successful completion of this course, student should be able to: 1. Understand the fundamentals of flow in open channels. 2. Understand the concepts of irrigation. 3. Estimate the quantity of water required by different crops in different seasons, and accordingly the irrigation water requirement. 4. Design channels and other irrigation structures required for irrigation, drainage, soil conservation, flood control and other water-management projects. 5. Learn about groundwater resources, aquifers and wells.

Department	CIVIL ENGINEERING
Course Code	CE(PC)604
Title of Course	Design of Steel Structures
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	28
Course Outcomes	After going through this course, the students will be able to: 1. Identify the material properties of structural steel. Moreover, the students will identify different bolted and welded connections, analyse and design them for axial and eccentric loads. 2. Design different steel sections subjected to axial compression and tension following Indian codes of practices. 3. Comprehend the differences between laterally supported and unsupported flexure members. Designing of the flexure members using Indian codes of practice. 4. Analyse and design rolled and built up compression members along with base connection subjected to axial compression, bending and tension. 5. Calculate shear force and bending moment on rolled and built up girders, dimension the section and finally design it following Indian standard design guidelines. 6. Identify different components of gantry system, calculate lateral and vertical loads acting on the system, dimension the components and design them. 7. Design different components of an industrial building.

Department	CIVIL ENGINEERING
Course Code	CE(PE)601A
Title of Course	Stability of Slopes
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	28
Course Outcomes	On successful completion of this course, student should be able to: 1. Understand the fundamental theories and knowledge in the stability analysis of soil slopes. 2. Measure the finite and infinite slope stability. 3. Develop the analytical and numerical skills in treating a complicated practical slope problem. 4. Evaluate the safety and design proper slope protection measures. 5. Analyse the strength parameters in slope stability.

Department	CIVIL ENGINEERING
Course Code	CE(PE)601B
Title of Course	Foundation Engineering
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	30
Course Outcomes	On successful completion of this course, student should be able to: 1. Determine the load carrying capacity of pile foundation. 2. Compute the efficiency and settlement of pile group. 3. Understand different subsoil exploration methods and interpret field and laboratory test data to obtain design parameters for geotechnical analysis. 4. Correlate bearing capacity of shallow foundation from field test data. 5. Analyze and design sheet pile structure on the basis of earth pressure theories. 6. Understand and apply various types of ground improvement methods for solving complex geotechnical problems.

Department	CIVIL ENGINEERING
Course Code	CE(PE)601C
Title of Course	Ground Improvement Technique
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	30
Course Outcomes	On successful completion of this course, student should be able to: 1. gain competence in properly devising alternative solutions to difficult and earth construction 2. evaluate their effectiveness before, during and after construction. 3. understand different approaches to the ground modification. 4. Understand the soil stabilisation for reinforced earth construction.

Department	CIVIL ENGINEERING
Course Code	CE(PE)602A
Title of Course	Building Construction Practice
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+0T
Total Contact Hours	30
Course Outcomes	1. Identify the factors to be considered in construction of buildings and develop the construction practices and techniques for basic construction work related to specifications, site clearance, marketing, earthwork, masonary work, slip form, scaffoldings, de-shuttering forms etc. 2. Understand the sub structure construction techniques of basic structures: jacking, tunneling, piling, sheet pile, shoring, dewatering and stand by plant equipment for underground open excavation. 3. Understand the super structure construction techniques for launching girders, bridge decks, off shore platforms etc.

Department	CIVIL ENGINEERING
Course Code	CE(PE)602B
Title of Course	Structural Analysis – II
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	30
Course Outcomes	After going through this course, the students will be able to: 1. Apply the Slope Deflection and Moment Distribution Method to analyze indeterminate structures. 2. Develop and analyze the concept of suspension bridge and stiffness girders 3. Apply and analyze the concepts of curved beam analysis in hooks, rings and Bow girders. 4. Develop the concept bending in unsymmetrical beams. 5. Develop the fundamental concepts of plastic analysis using kinematic method and apply them in frames and continuous beam analysis. 6. Develop and analyze the portal frames using Portal and Cantilever method. Develop and analyze the indeterminate structures (continuous beams and frames) using flexibility and stiffness matrix method.

Department	CIVIL ENGINEERING
Course Code	CE(PE)602C
Title of Course	Industrial Structure
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	30
Course Outcomes	After going through this course, the students will be able to: 1. To perform the analysis and design of reinforced concrete members and their connections. 2. To identify and apply the industrial design codes relevant to the design of Reinforced concrete members. 3. To be familiar with the professional and contemporary design issues and fabrication of Reinforced concrete members.

Department	CIVIL ENGINEERING
Course Code	CE(OE)601A
Title of Course	Soft Skills and Interpersonal Communication – I
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	30
Course Outcomes	1. Analyse the dynamics of business communication and communicateaccordingly. 2. Write business letters andreports 3. Learn to articulate opinions and views withclarity 4. Appreciate the use of language to create beautifulexpressions 5. Analyse and appreciate literature. 6. Communicate in an official and formalenvironment.

Department	Civil Engineering
Course Code	CE(OE)601B
Title of Course	Introduction to Philosophical Thoughts
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L
Total Contact Hours	28
Course Outcomes	Students will be able to: **CO1.**Describe and distinguish key philosophical concepts on Indian philosophy, charvaka philosophy and samkhya philosophy. **CO2.**Read and comprehend key texts of yoga philosophy, naya philosophyand mimansa philosophy. **CO3.**Explain key philosophical concepts on vaisesika, Buddhist and jain philosophy.

Practical/ Sessional

Department	CIVIL ENGINEERING
Course Code	CE(PC)693
Title of Course	Water Resource Engineering Laboratory
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	2P
Total Contact Hours	24
Course Outcomes	1. Determine Catchment area delineation (Manually and using DEM). 2. Compute average rainfall over a catchment area with arithmetic mean method, Thiessen polygon method and Isohyetal Method. 3. Use of different type of Rain gauges. 4. Measure infiltration rate using double ring infiltrometer. 5. Measure evaporation using evaporimeter. 6. Record bright sunshine hours using sunshine recorder.

Department	CIVIL ENGINEERING
Course Code	CE(PC)694
Title of Course	Steel Structure Design Sessional
Nature of Course	Compulsory
Type of Course	Practical/ Sessional
Contact Hours	2P
Total Contact Hours	24
Course Outcomes	1. Identify the material properties of structural steel. Moreover, the students will identify different bolted and welded connections, analyse and design them for axial and eccentric loads. 2. Design different steel sections subjected to axial compression and tension following Indian codes of practices. 3. Comprehend the differences between laterally supported and unsupported flexure members. Designing of the flexure members using Indian codes of practice. 4. Analyse and design rolled and built up compression members along with base connection subjected to axial compression, bending and tension. 5. Calculate shear force and bending moment on rolled and built up girders, dimension the section and finally design it following Indian standard design guidelines. 6. Identify different components of gantry system, calculate lateral and vertical loads acting on the system, dimension the components and design them. 7. Design different components of an industrial building.

Department	CIVIL ENGINEERING
Course Code	CE(PC)695
Title of Course	Quantity Survey Estimation And Valuation Sessional
Nature of Course	Compulsory
Type of Course	Practical/Sessional
Contact Hours	1T+2P
Total Contact Hours	36
Course Outcomes	The subject aims to provide the student with: 1.An introduction to quantity surveying. 2.The capability to know analysis and schedule of rates 3.The ability to know specification of materials 4.An understanding about specification of works 5.The introduction to valuation.

Semester VII (Fourth year]

Theory

Department	CIVIL ENGINEERING
Course Code	CE(OE) 701A
Title of Course	METRO SYSTEM AND ENGINEERING
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+0T
Total Contact Hours	31
Course Outcomes	1. To acquire & understand fundamental principals of metro system and it's need, routing studies; basic planning and financing. 2. To acquire the knowledge of various construction methods for: stations, bridges, tunnenls, basics of construction planning and management, etc. 3. To apply the knowledge to design & adopt the system for Electronics and Communication Engineering such as signaling, automatic fare collection, operation control centre etc. 4. Understand the need for Mechanical work such as rolling stock, vehicle dynamics and structures. 5. To acquire & comprehend various Electrical systems in Metro systems such as OHE, Traction power, substations, standby and backup systems, green building, carbon credits and clear air mechanics.

Department	CIVIL ENGINEERING
Course Code	CE(OE)701B
Title of Course	ICT for Development
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L
Total Contact Hours	31
Course Outcomes	1. Define ICT and list different types of ICT and use of it. 2. Discuss Digital Revolution and Digital Communication. 3. Extrapolate Technology and Development on the basis of ICT. 4. List different types of CMC and cite important theoretical framework of CMC.

Department	CIVIL ENGINEERING
Course Code	CE(OE)701C
Title of Course	CYBER LAW & ETHICS
Nature of Course	Open elective courses
Type of Course	Lecture
Contact Hours	2L+0T
Total Contact Hours	30
Course Outcomes	1. Understand the basics of different Cyber laws of different countries & IT act of India. 2. Discuss computer ethics, professional ethics, computer privacy issues, digital evidence controls, basics of Indian evidence act, legislative background. 3. Explain intellectual property right issues, software piracy, authorship, document forgery. 4. Illustrate Indian IT act and standards 5. Interpret international laws governing cyber space and role of INTERPOL on it.

Department	CIVIL ENGINEERING
Course Code	CE(PE)701A
Title of Course	Computational Hydraulics
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	40
Course Outcomes	On successful completion of this course, student should be able to: 1. Identify the complexities involved in fluid flow problems. 2. Model the specific flow problem in terms of defining the governing equations, initial and boundary conditions and appropriate solution schemes to use. 3. Develop finite difference formulation of ordinary and partial differential equations of flow problems. 4. Develop finite volume formulation of ordinary and partial differential equations of flow problems.

Department	CIVIL ENGINEERING
Course Code	CE(PE)701B
Title of Course	Disaster Preparedness and Planning
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	42
Course Outcomes	On completion of the course the students will be able to: 1. Define the basic concepts and terminologies disaster management 2. Understand and describe the categories of disaster 3. Realize the roles and responsibilities of a civil engineer towards society in time of a disaster 4. Analyze relationship between development and disasters 5. Apply different concepts of disaster management

Department	CIVIL ENGINEERING
Course Code	CE(PE)701C
Title of Course	Hydraulic Structures
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	42
Course Outcomes	On successful completion of this course, student should be able to: 1. Identify the characteristics of various types of dams and their selection procedure. 2. Perform the reconnaissance survey and, geophysical investigations necessary for selection of suitable dam site 3. Estimate forces acting on a gravity dams and perform stability analysis. 4. Estimate the seepage loss through embankment dams and suggest necessary remedial measures. 5. Calculate the discharge through the overflow section and design the appropriate energy dissipation structures.

Department	CIVIL ENGINEERING
Course Code	CE(PE)702A
Title of Course	Prestressed Concrete
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	42
Course Outcomes	After going through this course, the students will be able to: 1. Learn the introduction of prestressed concrete member and its deflection properties 2. Develop the design criteria of prestressed concrete section for flexure and shear properties 3. Analyze the anchorage zone stress for post-tensioned members 4. Impart knowledge regarding the methods of Analysis of Statically Indeterminate Structures. 5. Impart knowledge regarding the composite construction of Prestress and In-situ concrete. 6. Impart knowledge regarding Design of Prestressed concrete poles and sleepers and introduction of partial prestressing.

Department	CIVIL ENGINEERING
Course Code	CE(PE)702B
Title of Course	Repair & Rehabilitation of Structures
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	42
Course Outcomes	By the end of this course students will have the capability/knowledge of 1. Various distress and damages to concrete and masonry structures 2. The importance of maintenance of structures, types and properties of repair materials etc 3. Assessing damage to structures and various repair techniques

Department	CIVIL ENGINEERING
Course Code	CE(PE)702C
Title of Course	Finite Element Method
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	40
Course Outcomes	After going through this course, the students will be able to: 1. Define the basic concepts and terminologies regarding air pollution and noise pollution 2. Describe the physics of air pollution and noise pollution 3. Apply the methods of air pollution and noise pollution measurements 4. Analyze different concepts of air and noise pollution solving mathematical problems 5. Compare air and noise quality with allowable standards and limits 6. Choose and design proper techniques for air pollution control and noise pollution control

Department	CIVIL ENGINEERING
Course Code	CE(PE)703A
Title of Course	Air and Noise Pollution and Control
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	40
Course Outcomes	After going through this course, the students will be able to: 1. Obtain an understanding of the fundamental theory of the FEA method. 2. Develop the ability to generate the governing FE equations for systems governed by partial differential equations. 3. Understand the use of the basic finite elements for structural applications using truss, beam, frame, and plane elements and

Department	CIVIL ENGINEERING
Course Code	CE(PE)703B
Title of Course	Physico-Chemical Processes for Water and Wastewater Treatment
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	42
Course Outcomes	On completion of the course the students will be able to: 1. Define the basic concepts and terminologies regarding physico-chemical treatment of water and wastewater 2. Describe the physics, chemistry and hydraulics of different unit operations and processes for water and wastewater treatment 3. Analyze different physico-chemical water and wastewater treatment options solving mathematical problems 4. Design different physico-chemical treatment processes to treat water and wastewater

Department	CIVIL ENGINEERING
Course Code	CE(PE)703C
Title of Course	Water and Air Quality Modelling
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	42
Course Outcomes	On completion of the course the students will be able to: 1. Define the basic concepts and terminologies regarding water and air quality modelling 2. Describe the background mechanisms in modeling water and air quality 3. Analyze different water and air quality models solving mathematical problems 4. Apply the concepts of air and water quality modeling in air and water pollution control and management

Department	CIVIL ENGINEERING
Course Code	CE(PE)704A
Title of Course	Structural Dynamics
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	42
Course Outcomes	At the conclusion of this course, the students will have an understanding of: 1. Fundamental theory of dynamic equation of motion 2. Fundamental analysis methods for dynamic systems 3. Dynamic properties and behaviour of civil structures 4. Modelling approach of dynamic response in civil engineering applications

Department	CIVIL ENGINEERING
Course Code	CE(PE)704B
Title of Course	Advanced Structural Analysis
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	40
Course Outcomes	After going through this course, the students will be able to: 1. Basic Knowledge of the student will increase. 2. Student will be able to apply stiffness and flexibility method using system approach. 3. Student will understand the yield conditions from their knowledge of stress-strain relations. 4. Student will be able to solve simple plate and shell problems

Department	CIVIL ENGINEERING
Course Code	CE(PE)704C
Title of Course	Coastal Hydraulics and Sediment Transport
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	42
Course Outcomes	On successful completion of this course, student should be able to: 1. Explain and quantify coastal wave processes including wave generation, propagation, refraction, shoaling, diffraction, and breaking. 2. Explain and quantify coastal wave properties important to coastal engineering, including wave heights, speeds, induced water velocities, pressures, making appropriate approximations for deep and shallow waters. 3. Characterize and quantify basic coastal sediment transport processes and rates 4. Analyse coastal sites to determine design waves by utilizing historical and bathymetric data. Estimate hydrodynamic forces on coastal structures

Department	CIVIL ENGINEERING
Course Code	CE(PE)705A
Title of Course	Railway and Airport Engineering
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	30
Course Outcomes	Students will be able to 1. Explain the basics in planning functional components of Railway and Airport. 2. Illustrate the engineering concepts of construction, operation and maintenance of Railway and Airport components. 3. Interpret the geometric design parameters of Railway 4. Decide the runway orientation of proposed runway on the basis of previous wind data analysis 5. Assess the basic runway length parameters.

Department	CIVIL ENGINEERING
Course Code	CE(PE)705B
Title of Course	Pavement Design
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 1T
Total Contact Hours	30
Course Outcomes	At the end of the course, the student will be able to: 1. Differentiate between different types of pavements, both structurally and functionally. 2. Conduct Axle Load Survey and Estimate Design Traffic. 3. Analyze and design bituminous and cement concrete pavement using. 4. Understand the principles of Pavement Maintenance and identify various pavement distresses.

Department	CIVIL ENGINEERING
Course Code	CE(PE)705C
Title of Course	Transportation System Planning
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	30
Course Outcomes	At the end of the course, the student will be able to: 1. To learn the fundamentals of transportation planning. 2. To understand the classical methods of urban transportation planning. 3. To be acquainted with the transportation landuse interaction.

PRACTICAL/SESSIONAL:

Department	CIVIL ENGINEERING
Course Code	CE(IN)791
Title of Course	Industrial Internship
Nature of Course	Compulsory
Type of Course	Practical/Sessional
Contact Hours	1
Total Contact Hours	12
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	CE(PROJ)792
Title of Course	Project Part 1
Nature of Course	Practical/Sessional
Type of Course	Lecture
Contact Hours per week	10P
Total Contact Hours	120
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.

Semester VIII (Fourth year]

Theory:

Department	CIVIL ENGINEERING
Course Code	CE(HS)801
Title of Course	Professional Practice, law & Ethics
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L
Total Contact Hours	30L
Course Outcomes	1. Cite Respective roles of various stakeholders 2. Define Ethics, Professional Ethics, Business Ethics, Corporate Ethics, Engineering Ethics, Personal Ethics, Code of Ethics. 3. Discuss General Principles of Contracts Management. 4. Explain Arbitration, Conciliation and ADR (Alternative Dispute Resolution) system. 5. Discuss intellectual property, main forms of IP, Copyright, Trademarks, Patents and Designs, Secrets.

Department	CIVIL ENGINEERING
Course Code	CE(PE)801A
Title of Course	GIS & Remote Sensing
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	32
Course Outcomes	Upon completing the course, the students will be able to: 1. Define and state the scope GIS & remote sensing in civil engineering 2. Understand the basic principles of remote sensing and GIS 3. Apply the various methods of remote sensing and GIS to different geospatial datasets 4. Analyze the different results obtained from different remote sensing data sources 5. Evaluate the different results in solving real world problems. 6. Design and construct optimum solutions for real world problems that can be resolved by GIS & remote sensing

Department	CIVIL ENGINEERING
Course Code	CE(PE)801B
Title of Course	Rock Mechanics
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+0T
Total Contact Hours	30
Course Outcomes	Upon completing the course, the students will be able to: 1. To understand the fundamentals of composition and classifications of rocks. 2. To apply the rock mechanics principle in design and analysis practical problems related to rock excavations. 3. To estimate stress-strain characteristics, failure characteristics. 4. To evaluate strength and structural features of rocks.

Department	CIVIL ENGINEERING
Course Code	CE(PE)801C
Title of Course	Environmental Laws and Policy
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	28
Course Outcomes	Upon completing the course, the students will be able to: 1. To apply the relevant measures to mitigate pollution from different sources. 2. To understand the effects of the various pollutants on the environment as a whole according to the formulated guidelines 3. To be able to give recommendations for alternatives to reduce pollution 4. To formulate standards of the various parameters corresponding to their impact on the environment with changing time

Department	CIVIL ENGINEERING
Course Code	CE(PE)801D
Title of Course	PAVEMENT MATERIALS
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+0T
Total Contact Hours	29
Course Outcomes	Upon completing the course, the students will be able to: 1. Identify the engineering properties and characteristics of the different materials that concern the pavement engineer. 2. Understanding and evaluation of modern testing techniques of soil, granular, and bituminous materials for pavement analysis and design. 3. Describe different Superpave aggregate tests and requirements. 4. Analysis of design mix for rigid pavements.

Department	Civil Engineering
Course Code	CE(OE)801A
Title of Course	Human Resource Development and Organizational Behaviour
Nature of Course	Open elective courses
Type of Course	Lecture
Contact Hours per week	2L
Total Contact Hours	24
Course Outcomes	Students will be able to: **CO1.** Understand the HR Management and system at various levels in general and in certain specific industries or organizations **CO2.** Create a congenial and cohesive ambience within the framework of organizational structure in achieving the organisational goals. **CO3.** Focus on and analyse the issues and strategies required to select and develop manpower resources **CO4.** Develop relevant skills necessary for application in HR related issues **CO5.**Integrate the understanding of various HR concepts along with the domain concept in order to take correct business decisions **CO6.**Identify the importance and intricacies of organizational behaviour.

Department	CIVIL ENGINEERING
Course Code	CE(OE)801B
Title of Course	Bridge Engineering
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	32
Course Outcomes	After going through this course, the students will be able to: 1. Discuss basic definitions, types, and components of bridges. 2. Discuss sub-surface investigations required for bridge construction. 3. Understand standard specification and loads for bride design. 4. Perform design of different types bearings and joints for bridges. 5. Perform design of various reinforced concrete and steel bridges.

Department	CIVIL ENGINEERING
Course Code	CE(OE)801C
Title of Course	Deep Foundations
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	28
Course Outcomes	On successful completion of this course, student should be able to: 1. Explain the concept of bearing capacity for deep foundation. 2. Estimate the safe bearing capacity including settlement consideration for deep foundations. 3. Select a suitable deep foundation system for various site conditions and also analysis of that. 4. Explain in what circumstances pile is needed and how to estimate pile and pile group capacity under various soil conditions Characterize.

Department	CIVIL ENGINEERING
Course Code	CE(OE)801D
Title of Course	Groundwater Contamination
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	28
Course Outcomes	On successful completion of this course, student should be able to: 1. To be able to understand the principles and theories regarding groundwater contamination with 2. To be able to formulate the various remedial measures for groundwater contamination

Department	CIVIL ENGINEERING
Course Code	CE(OE)802A
Title of Course	Soft Skills and Personality Development
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L+0T
Total Contact Hours	25
Course Outcomes	1. Discuss about the Self growth theory of soft skill. 2. Study the concept of Competitive Spirit and Responsibility Factor to operate Professional Communication. 3. Develop the leadership quality and team playing strategies

Department	CIVIL ENGINEERING
Course Code	CE(OE)802B
Title of Course	Earthquake Engineering
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	34
Course Outcomes	After going through this course, the students will be able to: 1. To provide a coherent development to the students for the courses in sector of earthquake engineering. 2. To present the foundations of many basic engineering concepts related earthquake Engineering 3. To give an experience in the implementation of engineering concepts which are applied in field of earthquake engineering 4. To involve the application of scientific and technological principles of planning, analysis, design of buildings according to earthquake design philosophy.

Department	CIVIL ENGINEERING
Course Code	CE(OE)802C
Title of Course	Urban Transport Planning
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	30
Course Outcomes	After going through this course, the students will be able to: 1. Understanding the issues & challenges in the Transportation Sector 2. To develop skills required for Transport planning & formulation. 3. Understand optimization techniques for Transport Planning & Pricing.

Department	CIVIL ENGINEERING
Course Code	CE(OE)802D
Title of Course	Environmental Impact Assessment and Life Cycle Analyses
Nature of Course	Elective
Type of Course	Lecture
Contact Hours	2L+ 0T
Total Contact Hours	27
Course Outcomes	After going through this course, the students will be able to: 1. To understand and evaluate the impact of any activity (large or small scale) on the surrounding environment 2. To be able to formulate mitigation strategies to protect the environment leading to sustainability 3. To be able to understand the intricacies of Life Cycle Analysis and apply basic knowledge for coherent existence

PRACTICAL/SESSIONAL:

Department	CIVIL ENGINEERING
Course Code	CE(CV)891
Title of Course	Comprehensive Viva Voce
Nature of Course	compulsory
Type of Course	Practical/Sessional
Contact Hours	1
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.

Department	CIVIL ENGINEERING
Course Code	CE (PROJ)892
Title of Course	Project
Nature of Course	compulsory
Type of Course	Practical/Sessional
Contact Hours	10P
Total Contact Hours	120
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.