

B. Tech Degree
in
CIVIL ENGINEERING

CURRICULUM DETAILS
(For students admitted in 2019 to 2023)



DEPARTMENT OF CIVIL ENGINEERING
DR. B. C. ROY ENGINEERING COLLEGE
JEMUA ROAD, FULJHORE, DURGAPUR – 713206
WEST BENGAL, INDIA

INSTITUTE VISION

To transform the institution into a global centre of learning through synergic application of creativity, innovation and discipline.

INSTITUTE MISSION

1. Create ideal ambience for learning and growth
2. Help students inherit value-systems, be creative and agile thinkers.
3. Establish discipline, Value-added education and Training & Placement as three core values.
4. Building capabilities among students to lead from the front as also be a team player.
5. Develop a symbiotic relationship between the institution, society and the community, for mutual betterment.
6. Expand the Vistas of higher learning in Technology and Management Fields, including Post-Graduate Studies and Research.
7. Encourage global vision and integration with International Best Practices for Local, Regional and National Development.

DEPARTMENT VISION

To excel as a premier global centre for civil engineering education, fostering creativity, innovation, discipline, and producing highly employable, ethically responsible professionals who drive societal progress and field advancements.

DEPARTMENT MISSION

1. To provide a great platform for learning by offering a variety of subject choices covering broad frontier areas of civil engineering.
2. To inculcate in students a commitment to ethical and sustainable engineering practices, social responsibility and foster leadership qualities.
3. To collaborate with industry and academia for achieving excellence in research, consultancy and entrepreneurship developments.
4. To develop and maintain quality education through active collaboration with all stakeholders, including students, teachers, industry, alumni, and renowned academic and research institutions.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

1. Graduates will be able to practice civil engineering in construction industry, public sector undertaking and Government sector or as an entrepreneur for successful professional career.
2. Graduates will be able to pursue higher education for professional development.
3. Graduates will be able to exhibit leadership qualities with demonstrable attributes in lifelong learning to contribute to the societal needs.

PROGRAMME OUTCOMES (POs)

PO 1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.

PO 2: Problem analysis: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3: Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.

PO 4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO 6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO 7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10: Communication: Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 12: Life-long learning: Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: Graduates will have strong fundamental knowledge in core topics of each subject of the University curriculum of Civil Engineering.

PSO2: Graduates will have the ability to describe, analyse, and solve problems using mathematics and systematic problem-solving technique for core subjects of Civil Engineering.

PSO3: Graduates will be able to patronize higher studies and technological practice in Civil Engineering.

PSO4: Graduates will be able to keep pace with the modern construction techniques and management tools of Civil Engineering, either in industry or through entrepreneurship.

COURSE ARTICULATION MATRIX

(I) BASIC SCIENCE

Course Code	Course Title	CO	Course Outcomes
BS-PH101	Physics-I	CO1	Explain the basic concepts of Mechanics and Oscillation.
		CO2	Elaborate the concept of Optics and introduction to the principle of LASER.
		CO3	Understand Electromagnetism AND Dielectric properties of materials.
		CO4	Understand the Magnetic properties of materials.
		CO5	Familiarize with the basic laws of Quantum Mechanics and introduction to Schrodinger wave equation and its applications.
		CO6	Understand the basic concept of Statistical Mechanics.
BS-M102	Mathematics IB	CO1	Apply the concept integral calculus to determine curvature and evaluation of different types of improper integrals.
		CO2	Understand the domain of applications of mean value theorems, limit and maxima-minima to engineering problems.
		CO3	Learn the tools of power series and Fourier series to analyse engineering problems and apply the concept of sequence and convergence of infinite series in many approximation techniques in engineering disciplines.
		CO4	Apply the knowledge for addressing the real life problems which comprises of several variables or attributes and identify extremum points if different surfaces of higher dimensions and concept of vector differentiation.
		CO5	Understand the concept of determinant and learn different types of matrices, their eigen values, eigen vectors, rank and also their orthogonal transformations which are essential for

Course Code	Course Title	CO	Course Outcomes
			understanding physical and engineering problems.
		CO6	Design and implement mathematical investigations and projects, including data collection, analysis, and interpretation, and apply appropriate mathematical communication and presentation skills.
BS-CH191	Physics I Laboratory	CO1	Understand the general property of matters like Viscosity, Young's Modulus and Modulus of Rigidity.
		CO2	Explain the Optical property.
		CO3	Discuss the Electrical property.
		CO4	Understand Quantum Physics with the help of experiments like Energy band gap of semiconductor, Planck constant and Characteristics of Solar Photovoltaic cell.
		CO5	Analyze Electricity and Magnetism with the help of experiments like Hall Effect of Semiconductors.
		CO6	Understand the Specific charge of electron
BS-CH201	Chemistry-I	CO1	Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
		CO2	Rationalise bulk properties and processes using thermodynamic considerations.
		CO3	Distinguish the range of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
		CO4	Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
		CO5	Analyse different organic molecule in stereochemical aspect for various purposes.
		CO6	Synthesise some important drug molecules and its application in various medicinal aspect.
BS-M202	Mathematics IIB	CO1	Learn the methods for evaluating multiple integral and their applications to different physical and engineering problems

Course Code	Course Title	CO	Course Outcomes
		CO2	Learn to formulate Ordinary Differential Equations for real-life problems in engineering and applied sciences and apply the understanding to solve first order differential equations with various techniques.
		CO3	Understand to apply different techniques to solve second order ordinary differential equations to address the modelling of systems and problems of engineering sciences with emphasis on Power series, Bessel's functions and Legendre functions.
		CO4	Understanding the concept of the functions of complex variables with the application of Cauchy-Riemann equations to determine the analyticity of a function and to apply its geometrical and physical interpretation in determining harmonic and conjugate harmonic functions.
		CO5	Learn to integrate in the complex plane along with theory of residues.
		CO6	Design and implement mathematical investigations and projects, including data collection, analysis, and interpretation, and apply appropriate mathematical communication and presentation skills.
BS-CH291	Chemistry-I Laboratory	CO1	Implement Instrumental analytical procedure for the enrichment of modern technical skill.
		CO2	Rationalise inter molecular phenomena using thermodynamic considerations
		CO3	Understand titrimetric methods of water analysis required for environmental context
		CO4	Development of physicochemical laboratory methods for the analysis and characterisation of different materials
		CO5	Evaluate different surface phenomena by adsorption technique.
		CO6	Estimate essential parameter like oxygen in water by titrimetric method.
CE(BS)301	Biology for Engineers	CO1	Describe how biological observations of 18th Century that lead to major discoveries.
		CO2	Find that classification per se is not what biology is all about but highlight the underlying criteria, such as morphological, biochemical and ecological.

Course Code	Course Title	CO	Course Outcomes
		CO3	Classify the concepts of recessive ness and dominance during the passage of genetic material from parent to offspring.
		CO4	Examine that all forms of life have the same building block sand yet the manifestations are as diverse as one can imagine and biological processes at the reductionistic level.
		CO5	Justify enzymes and distinguish between different mechanisms of enzyme action and Apply thermodynamic principles to biological systems.
		CO6	Identify DNA as a genetic materialin the molecular basis of information transfer and microorganisms.
CE(BS)302	Mathematics-III (Transform & Discrete Mathematics)	CO1	Learn the tools of Laplace Transform, Fourier Transform and Z-Transform to analyse engineering problems.
		CO2	Learn the ideas of functions, relation and partially ordered set and their applications in engineering fields.
		CO3	Understand the concept of Logic, and apply the Counting technique in the problems of engineering fields.
		CO4	Apply the algebraic structure in engineering environment.
		CO5	Learn Basic of Graph Theory to solve engineering problems.
		CO6	Design and implement mathematical investigations and projects, including data collection, analysis, and interpretation, and apply appropriate mathematical communication and presentation skills.

(II) ENGINEERING SCIENCE COURSES

Course Code	Course Title	CO	Course Outcomes
ES-EE101	Basic Electrical Engineering	CO1	Illustrate & describe the characteristics of the electric and magnetic circuits
		CO2	State the working principles of transformer, electrical machines and power converters.

Course Code	Course Title	CO	Course Outcomes
		CO3	Construct the different types of electrical machines and transformers.
		CO4	Solve numerical problems of basic electrical circuits (both dc and ac), transformers and electrical machines.
		CO5	Explain the components of low voltage electrical installations
		CO6	
ES-EE191	Basic Electrical Engineering Laboratory	CO1	understand the basic demonstration and application of electrical instruments and machines
		CO2	analyze the response of R-L-C series circuit
		CO3	determine parameters of transformer equivalent circuit and analyze the operational behaviour of DC machine and three phase induction motor
		CO4	study the working principles of synchronous generators and power converters
		CO5	introduce the components of low voltage electrical installations
		CO6	
ES-ME192	Workshop/Manufacturing Practices (Gr-B)	CO1	Discuss workshop safety rules and manufacturing methods namely, moulding, casting, forming, joining, machining.
		CO2	Acquire skill set of machining on Lathe, milling and shaping as per given dimensions.
		CO3	Build wooden pattern and sand mould using pattern and moulding tools and Demonstrate casting process.
		CO4	Fabricate components of given dimensions using Arc and Gas weldings.
		CO5	Make jobs as per given dimensions in fitting and forging shops.
		CO6	Demonstrate electrical and electronic circuits.
ES-CS201		CO1	Define algorithms for arithmetic and logical problems.

Course Code	Course Title	CO	Course Outcomes
	Programming for Problem Solving	CO2	Translate the algorithms to programs (in C language), correct syntax and logical errors on executing the programs.
		CO3	Implement conditional branching, iteration.
		CO4	Decompose a problem into functions, recursion and synthesize a complete program using divide and conquer approach.
		CO5	Apply the concept of arrays, pointers, structures and their applications with the help of programs.
		CO6	Solve matrix addition, multiplication, searching and sorting problems.
ES-CS291	Programming for Problem Solving (Practical)	CO1	Formulate the algorithms for simple problems.
		CO2	Translate given algorithms to a working and correct program.
		CO3	Be able to correct syntax errors as reported by the compilers and to be able to identify and correct logical errors encountered at run time.
		CO4	Be able to write iterative as well as recursive programs and to be able to represent data in arrays, strings and structures and manipulate them through a program.
		CO5	Be able to declare pointers of different types and use them in defining self-referential structures.
		CO6	Be able to create, read and write to and from simple text files.
ESME291	Engineering Graphics & Design	CO1	UNDERSTAND the basic concept of lines and dimension for engineering drawing.
		CO2	INTERPRET and construct scales (plain, vernier & diagonal) and curves (ellipse, parabola, hyperbola, cycloids, involute, spiral).
		CO3	CONSTRUCT orthographic projections of points, lines, planes, solids and sectional solids.
		CO4	APPLY the concept of isometric projection.
		CO5	UNDERSTAND the basic concept of AutoCAD in engineering drawing.

Course Code	Course Title	CO	Course Outcomes
		CO6	Develop the KNOWLEDGE of 2-D and 3-D engineering models by using CAD software.
CE(ES)301	Engineering Mechanics	CO1	Solve system of forces and its resultant and free body diagram of forces.
		CO2	List the types and laws of friction and analyze truss by method of joints and method of sections.
		CO3	Locate the centroid of simple figures and composite sections.
		CO4	Identify the principles of virtual work and energy method and solve problems.
		CO5	Demonstrate particle dynamics and kinematics of rigid bodies.
		CO6	Recognize mechanical vibration and solve problems related to vibration and pendulum.
CE(ES)302	Energy Science & Engineering	CO1	To discuss the ideas of scientific principles, energy systems and various non-renewable and renewable resources for energy.
		CO2	To describe different energy generation systems and their environmental impacts.
		CO3	To develop the idea about the role of civil engineering in energy sources.
		CO4	To use the concepts about green building LEED ratings, energy audit of facilities and optimization of energy consumption.
		CO5	To relate the global policy initiatives and meet the emerging challenges with sustainable technological solutions in the field of energy and environment.
		CO6	To relate the ideas of energy, environment and economic system.
CE(ES)391	Basic Electronics	CO1	Analyze behaviour of passive electrical components such as resistors, capacitors and inductors and understand carrier transport phenomenon in semiconductors
		CO2	Illustrate the principle of operation of measuring instruments such as volt meters, ammeters power supplies, CRO etc used to measure electrical parameters according to the range selected.

Course Code	Course Title	CO	Course Outcomes
		CO3	Illustrate the characteristics and working principles of semiconductor diodes and determine their parameters.
		CO4	Bias the transistor such as BJT, JFET and MOSFET in the desired operating region using any of the available biasing techniques.
		CO5	Analyse the characteristics of Integrated circuits and its use in several applications in electronics circuits particularly the IC Op - Amp and 555 timer, IC voltage regulators etc.
		CO6	Design combinational and sequential circuits for a given functions using logic gates.
CE(ES)392	Computer-aided Civil Engineering Drawing	CO1	Discuss the basic concepts of drawing.
		CO2	Differentiate the various signs and symbols used in AUTOCAD.
		CO3	Sketch the site plan, floor plan, elevation and section drawing of small residential buildings.
		CO4	Demonstrate isometric, perspective view of building and fundamentals of Building Information Modelling.
		CO5	Describe the types of masonry bonds.
		CO6	Construct an Industrial building and roof truss.
CE(ES)393	Life Science	CO1	Describe about Ecosystems- Components, types, flow of matter and energy in an ecosystem Biotic & food chain, food web, ecological pyramids;
		CO2	Discuss about Plant Physiology: like Transpiration; Mineral nutrition
		CO3	Examine the Structures of DNA and RNA; Concept of Gene, Gene regulation
		CO4	Explain the Basic concepts: of Tot potency and Cell manipulation; Plant & Animal tissue culture- Methods and uses in agriculture, medicine and health; Recombinant DNA Technology- Techniques and applications
		CO5	Examine the Value Index of a species in a plant community and its importance
		CO6	Compare the stomata index in different plants

Course Code	Course Title	CO	Course Outcomes
CE(ES)401	Introduction to Fluid Mechanics	CO1	Describe basic terms, values and laws in the areas of fluids properties.
		CO2	Use the basic equations of fluid statics to solve problems on submerged planes and manometers.
		CO3	Implement the fundamental principles of fluid kinematics and dynamics to solve practical problems related to fluid flow characteristics, energy relationships, and flow measurement techniques.
		CO4	Organise dimensional analysis principles for problems in fluid mechanics.
		CO5	Use fundamental theories of fluid flow for the analysis of flow through pipes and the pipeline systems.
		CO6	Examine the fundamental principles of hydraulic machines and the role of specific speed in selecting appropriate pumps and turbines for various applications.
CE(ES)402	Introduction to Solid Mechanics	CO1	To identify different degrees of freedoms for support conditions, equilibrium conditions and elastic properties of axially loaded bars through stress-strain and force-displacement curves.
		CO2	To calculate the bending moment diagram, shear force diagram, bending and shear stresses and deflection of beams for uniformly distributed, concentrated, linearly varying and external concentrated moment.
		CO3	To identify strain energy due to bending moment, axial force, shear force and the concepts of principal stresses, principal planes, and Mohr's circle.
		CO4	To calculate the member forces in plane trusses; hoop and meridional stresses in thin cylinders and spherical shells.
		CO5	To identify torsional moment and twist on a circular shaft and calculate the shear stress.
		CO6	To calculate the buckling load of columns using Euler's theory for different support constraints.
CE(ES)491	Fluid Mechanics Laboratory	CO1	Describe the ability to perform calibration procedures for both the notch and orifice meter.

Course Code	Course Title	CO	Course Outcomes
		CO2	Examine the performance of pump and turbine.
		CO3	Examine the various hydraulic coefficients.
		CO4	Examine the minor losses through pipes.
		CO5	Differentiate the various water surface profiles due to formation of hydraulic jump.
		CO6	Differentiate the various water surface profiles for flow over Broad crested weir.
CE(ES)492	Solid Mechanics Laboratory	CO1	Operate experimental techniques to conduct tension, compression, and bending tests on various structural materials (mild steel, HYSD bars, timber, bricks, and concrete cubes) and examine the obtained test data to determine key mechanical properties (e.g., yield strength, ultimate tensile strength, modulus of elasticity).
		CO2	Execute the principles of torsion testing on mild steel circular bar and determine the key mechanical properties (shear modulus) using the test data.
		CO3	Implement the principles and procedures of Brinell and Rockwell hardness tests to find the hardness of ferrous and non-ferrous metals.
		CO4	Demonstrate experimental techniques to conduct tests on closely coiled helical springs and examine the obtained data to determine key spring and spring material characteristics (spring stiffness, modulus of rigidity).
		CO5	Interpret the principles and procedures of Izod and Charpy impact tests to get the impact strength of various materials.
		CO6	Explain the concepts of fatigue test.
CE(ES)493	Engineering Geology Laboratory	CO1	Relate the observed physical properties of minerals to their classification and identify them using a standard reference.
		CO2	Implement the knowledge of texture, color, and mineral composition to identify different types of rocks.
		CO3	Explain the relationship between crystal structure and external form using models and diagrams, identifying unit cells and crystal systems.

Course Code	Course Title	CO	Course Outcomes
		CO4	Interpret provided models to visualize and interpret various geologic structures (folds, faults, unconformities), demonstrating an understanding of their formation processes.
		CO5	Relate the geological structures through drawing the cross sections from the geological maps
		CO6	Examine thin sections of rocks and minerals under a microscope, identifying individual mineral constituents based on their optical properties.

(III) HUMANITIES & SOCIAL SCIENCE

HM-HU201	English	CO1	Acquire basic proficiency in English, including reading, listening comprehension, writing, and speaking skills, and demonstrate a basic understanding of English grammar, vocabulary, and syntax.
		CO2	Communicate confidently in English, using appropriate grammar, vocabulary, and syntax, and demonstrate effective speaking and presentation skills in different contexts.
		CO3	Communicate appropriately in professional and social situations, using appropriate language and tone, and demonstrate effective communication skills in group activities like group discussions, case studies, role play, etc.
		CO4	Improve teamwork, leadership skills, and problem-solving skills through group activities like group discussions, case studies, role play, etc.
		CO5	Organize and write business correspondence properly and correctly, using appropriate formats, grammar, vocabulary, and syntax, and demonstrate effective writing and editing skills.
		CO6	Develop active listening skills, including effective listening strategies, note-taking, and summarizing, and apply these skills to different listening contexts.
HM-HU291	Language Laboratory	CO1	Demonstrate improvement in listening and speaking skills in English language through regular practice and feedback in language laboratory sessions.
		CO2	Develop confidence in communication in English language through various exercises and activities.

		CO3	Enhance professional and social communication skills by participating in group activities like group discussions, case studies and role plays.
		CO4	Develop problem-solving skills, teamwork and leadership skills through various group activities and exercises.
		CO5	Demonstrate ability to write business correspondence properly and correctly by practicing different types of business writing and receiving feedback.
		CO6	Use various language learning resources available in the language laboratory effectively, such as language software, audio and video resources, and online tools, to enhance their language proficiency.
CE(HS)301	Humanities-I (Effective Technical Communication)	CO1	Understand the dynamics of Verbal and Non Verbal aspects of technical communication
		CO2	Practice multi-step writing process to plan, draft, and revise reports, correspondence, and presentations
		CO3	Illustrate and examine the knowledge of ethical aspects of engineering
		CO4	Demonstrate and explain social and professional etiquettes
		CO5	Plan self-development and practice self-assessment to function on multi-disciplinary teams
		CO6	Organize and write business correspondence properly and correctly, using appropriate formats, grammar, vocabulary, and syntax, and demonstrate effective writing and editing skills.
CE(HS)302	Introduction to Civil Engineering	CO1	Describe the basic of civil engineering.
		CO2	Summarize the History of Civil engineering, National Planning for Construction and Infrastructure Development, Fundamentals of Architecture & Town Planning, Fundamentals of Building Materials.
		CO3	Discuss the Basics of Construction Management & Contracts Management, Environmental Engineering & Sustainability, basics of Geotechnical Engineering.
		CO4	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.

		CO5	Analyze the cases of large civil engineering projects by industry professionals, covering comprehensive planning to commission.
		CO6	Summarize Basics of Professionalism.
CE(HS)401	Civil Engineering-Societal & Global Impact	CO1	Discuss the change in trends of civil engineering from the past to present and future in Indian as well as global scenario.
		CO2	The impact, which Civil Engineering projects have on the Society and identifying the ancient and modern marvels of civil engineering to plan for a better world.
		CO2	Recognise the different infrastructural requirements of civil engineering related to megacities, smart cities, energy generation and communication
		CO4	Classification of environmental engineering including waste managements, flood control, pollution control to build a sustainable society.
		CO5	Identify the built environment and factors influencing the quality of life ensuring sustainability.
		CO6	Understand the EIA procedures and apply advanced engineering techniques to contribute to GDP and generate employment.
CE(HS)801	Professional Practice, law & Ethics	CO1	Recognize the importance of Values and Ethics in their Personal lives and professional careers.
		CO2	Distinguish the nuances of contract formation and legal principles, evaluating their implications for different types of construction projects.
		CO3	Appraise the suitability of different contract management practices (joint ventures, subcontracts, tendering, etc.), considering project context, risks, and ethical considerations.
		CO4	Critique the process of dispute resolution within construction contracts, evaluating the strengths and weaknesses of arbitration, conciliation, ADR, and other mechanisms.
		CO5	Identify the role of labour in civil engineering and methods of engaging labour.
		CO6	Relate the role of intellectual property protection in fostering innovation and safeguarding the interests of stakeholders within the construction sector.

(IV) PROFESSIONAL CORE SUBJECTS

CE(PC)401	Soil Mechanics - I	CO1	Classify soil as per grain size distribution curve and understand the index properties of soil.
		CO2	Implement the concept of total stress, effective stress and pore water pressure for solving geotechnical problems.
		CO3	Compare and contrast the permeability of different types of soil by analysing experimental data, and use the insights to solve flow problems.
		CO4	Examine the seepage loss, factor of safety against piping failure using flow net related to any hydraulic structure.
		CO5	Appraise and discriminate the vertical stress on a horizontal plane within a soil mass subjected to different Explain Comprehension types of loading on the ground surface and also the maximum stressed zone or isobar below a loaded area.
		CO6	Develop and formulate new geotechnical problems using the concept of shear strength analysis and determine the shear strength parameters from lab and field tests.
CE(PC)402	Environmental Engineering-I	CO1	Define the basic concepts and terminologies of water supply engineering and solid waste management.
		CO2	Describe different surface and ground water sources; and composition and characteristics of municipal solid waste.
		CO3	Implement the methods of quantifying water requirement and MSW generation.
		CO4	Solve different mathematical problems regarding different components of water supply systems, distribution networks and MSW management systems.
		CO5	Compare between different water samples based on their physical, chemical and biological characteristics.
		CO6	Design different unit processes and operations involved in wastewater treatment.
CE(PC)403	Surveying & Geomatics	CO1	To explain and state the scope of surveying and geomatics in civil engineering
		CO2	To demonstrate the basic principles of surveying and geomatics engineering
		CO2	To solve the problems using different methods of surveying and geomatics to measure the features of interest
		CO4	To examine the traditional and advanced methods of surveying
		CO5	To relate the different techniques of surveying and geomatics in solving real world problems.

		CO6	To develop and construct solutions for real-world problems related to surveying and geomatics.
CE(PC)404	Concrete Technology	CO1	Explain the composition, manufacturing process, chemical compounds and types of cement, along with influence of aggregate and water in concrete making.
		CO2	Identify appropriate aggregate types and conduct tests to evaluate their suitability for concrete construction.
		CO3	Relate the factors affecting fresh concrete properties and perform tests to measure workability.
		CO4	Explain the properties of hardened concrete and the factors influencing its strength.
		CO5	Design concrete mixes using the IS 10262-2019 method and understand the role of admixtures.
		CO6	Classify concrete quality using non-destructive testing methods and explain special concrete types.
CE(PC)493	Surveying & Geomatics	CO1	Explain the interdependency and advancement of different surveying methods.
		CO2	Explain the working principles of different surveying and geomatics instruments and experiments.
		CO3	Execute the different methods of surveying and geomatics to measure the feature of interest.
		CO4	Examine the results obtained from the surveying and geomatics experiments
		CO5	Appraise the different techniques of surveying and geomatics in measuring and assessing the features of interest.
		CO6	Design and construct solutions for real world problems related to surveying and geomatics.
CE(PC)494	Concrete Technology Laboratory	CO1	Demonstrate the method and findings of tension and compression tests on concrete.
		CO2	Describe the concepts of different test on hardened concrete and different properties of cement.
		CO3	Examine the specific gravity of concrete ingredients.
		CO4	Test the mix proportion of high grade of concrete.
		CO5	Design the workability of concrete mix.

		CO6	Investigate the quality of concrete.
CE(PC)501	Design of RC Structures	CO1	State the basic principles of design for reinforced concrete members, including the working stress method and limit state method as per IS code provisions (IS:456 2000)
		CO2	Discuss the significance of bond stress, development length, and the use of design aids for reinforced concrete structures.
		CO3	Implement the principles of limit state method to analyze, design, and detail singly reinforced rectangular, T, L, doubly reinforced beam sections and one-way or two-way slab panels, as well as continuous beams and slabs.
		CO4	Examine the behavior of reinforced concrete elements under different loading conditions, including bending moment, shear forces, and axial loads with moments.
		CO5	Select adequate reinforcement details and structural configurations in meeting the specified design criteria and performance objectives of RC structures.
		CO6	Formulate design solutions for reinforced concrete column and foundations adhering to IS code provisions and employing the limit state method.
CE(PC)502	Engineering Hydrology	CO1	Explain the catchment area, hydrologic cycle and source, occurrence, movement, distribution of water which is a prime resource for development of a nation.
		CO2	Interpret the process of precipitation measurement and processing of the rainfall data.
		CO3	Examine the Various types of losses from precipitation.
		CO4	Judge the measurement of flow in rivers, runoff from rainfall.
		CO5	Develop unit hydrograph and storm hydrograph.
		CO6	Design the flood volume and carry out flood routing.
CE(PC)503	Structural Analysis - I	CO1	Distinguish between stable and unstable and statically determinate and indeterminate structures.
		CO2	Solve equations of equilibrium to structures and compute the reactions.
		CO3	Interpret the internal forces in cable and arch type structures.
		CO4	Develop and draw the influence lines for reactions, shears and bending moments in beams due to moving loads.
		CO5	Use approximate methods to solve statically indeterminate Structures.

		CO6	Sketch the deflections of truss structures and beams.
CE(PC)504	Soil Mechanics - II	CO1	Identify the compaction and consolidation characteristic of soil for solving geotechnical problems.
		CO2	Use classical earth pressure theories to calculate the earth pressure on rigid retaining walls.
		CO3	Execute and implement the design of rigid retaining walls (cantilever type) from a geotechnical engineering perspective.
		CO4	Examine the bearing capacity of shallow foundations by applying established theory.
		CO5	Examine soil settlement using different methods.
		CO6	Design safety of dams and embankments on the basis of Design Synthesis various methods of slope stability analysis.
CE(PC)505	Environmental Engineering - II	CO1	Recognize the basic concepts and terminologies of waste water engineering and hazardous waste management.
		CO2	Describe different home plumbing systems for water supply and waste water disposal.
		CO3	Implement the methods of quantifying sanitary sewage and storm sewage.
		CO4	Solve different mathematical problems regarding different components of sewerage system.
		CO5	Compare between different waste water samples based on their physical, chemical and biological characteristics.
		CO6	Design different unit processes and operations involved in wastewater treatment.
CE(PC)506	Transportation Engineering	CO1	Classify different road categories based on their function and explain the scope of highway engineering and its importance in infrastructure development.
		CO2	Identify factors controlling highway alignment and their impact on design.
		CO3	Design the geometric elements of highways by ensuring compliance with design parameters.
		CO4	Interpret traffic flow characteristics and their interrelationships to assess the suitability of different traffic signs and signal designs.
		CO5	Investigate the impact of flexible and rigid pavements design parameters on pavement stresses and potential pavement distresses.

		CO6	Identify the scope of adoption of sustainable construction techniques by using recyclable hazardous materials.
CE(PC)591	RC Design Sessional	CO1	Identify material properties and design methodologies for reinforced concrete structures.
		CO2	Examine different type of loads and organise layout for reinforced concrete structures.
		CO3	Identify and use the applicable industrial design codes relevant to the design of reinforced concrete members.
		CO4	Design various structural elements of reinforced concrete building like beam, slab, column, footing, and staircase.
		CO5	Examine serviceability criteria for reinforced concrete beam and slab.
		CO6	Develop structural drawings and detailing in appropriate professional format.
CE(PC)594	Soil Mechanics Laboratory	CO1	Classify the types of soil and determine its natural moisture content alongwith specific gravity.
		CO2	Estimate in-situ density of soil by core cutter and sand replacement method.
		CO3	Develope grain size distribution curve and Atterberg limits for soil.
		CO4	Demonstrate laboratory tests to determine permeability and compaction characteristics of soil.
		CO5	Calculate the shear strength parameters of soil by using UCS, Vane Shear, Direct Shear & Triaxial Test.
		CO6	Calculate the California Bearing Ratio (CBR) of soil.
CE(PC)595	Environmental Engineering Laboratory	CO1	Experiment various physical characteristics for a given sample of water and waste water.
		CO2	Describe various chemical characteristics for a given sample of water and waste water.
		CO3	Test the bacteriological characteristics for a given sample of water and waste water.
		CO4	Examine the suitability of a few treatment options for a given sample of water and waste water
		CO5	Compare the determined quality parameters with standards to decide on the suitability of use for the tested water and disposal of tested wastewater.
		CO6	Appraise the most appropriate technique to purify and control water contamination.

CE(PC)596	Transportation Engineering Laboratory	CO1	Classify and examine of aggregates through different tests.
		CO2	Demonstrate the Specific Gravity test, Penetration test, and Static or Kinematic viscosity test on Bitumen.
		CO3	Demonstrate Softening point test, Flash and Fire Point test and Ductility test on Bitumen.
		CO4	Investigate the CBR value of sub-grade (Soaked and Unsoaked).
		CO5	Design the bituminous mix with Marshall stability test.
		CO6	Experiment the striping value, Loss on heating, Benkelman beam and Bump integrator test.
CE(PC)597	Computer Application in CE	CO1	Use the computer as a problem-solving tool.
		CO2	Identify and formulate Civil Engineering problems solvable by computers.
		CO3	Solve Civil Engineering problems by illustrating linear algebra and matrix operations and their applications.
		CO4	Solve sets of linear equations and determine roots and nonlinear equations.
		CO5	Construct, interpret and solve simple optimization problems.
		CO6	Develop programs for Civil Engineering analysis and design problems and with the help of various software, analysis and design are done for industries.
CE(PC)601	Construction Engineering & Management	CO1	Execute well planned building which balances all aspects of building such as space conditioning, ventilation, privacy etc. maintain building bye-laws regulations with respect to building side spaces and fire protections.
		CO2	Appraise the project planning and control activities in the construction projects by using the techniques of PERT and CPM.
		CO3	Explain the concept of wall panels, slabs, columns during erection of prefabricated buildings evaluate, appropriate shoring and scaffolding techniques for construction projects, construction sequence of silos, chimneys and sky scrapers.
		CO4	Use construction equipments for earthwork, material handling and miscellaneous purposes.
		CO5	Describe the elements and types of contracts, Contract formation, Potential contractual problems,

		CO6	Comparison of actions and laws, Powers and duties of arbitrator and types of laws, justify the legal requirements to solve contractual problems for managing construction contracts, achieve awareness on arbitrations, powers and duty of an arbitrator.
CE(PC)602	Engineering Economics, Estimation & Costing	CO1	Define Economics in general, Economics of India particularly for public sector agencies and private sector businesses.
		CO2	Differentiate present worth, future worth and annual worth analyses on one of more economic alternatives.
		CO3	Sketch benefit/cost, life cycle and breakeven analyses on one or more economic alternatives.
		CO4	Explain the technical specifications for various works to be performed for a project and how they impact the cost of a structure.
		CO5	Weigh the worth of a structure by calculating quantities of constituents, their cost rates and the overall cost of the structure.
		CO6	Explain competitive bid proposal and workmanship.
CE(PC)603	Water Resources Engineering	CO1	Explain the fundamentals of flow in open channels.
		CO2	Describe the concepts of irrigation
		CO3	Estimate the quantity of water required by different crops in different seasons, and accordingly the irrigation water requirement.
		CO4	Design canals and other irrigation structures required for irrigation and other water-management projects.
		CO5	Design drains required for land drainage, soil conservation, flood control.
		CO6	Define about groundwater resources, aquifers and wells.
CE(PC)604	Design of Steel Structures	CO1	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.
		CO2	Design different steel sections subjected to axial compression and tension following Indian codes of practices.
		CO3	Differentiate between laterally supported and unsupported flexure members. Designing of the flexure members using Indian codes of practice.

		CO4	Design rolled and built-up compression members along with base connection subjected to axial compression, bending and tension.
		CO5	Formulate shear force and bending moment on rolled and built-up girders, dimension the section and finally design it following Indian standard design guidelines.
		CO6	Identify different components of gantry system, calculate lateral and vertical loads acting on the system, dimension the components and design them and design different components of an industrial building.
CE(PC)693	Water Resource Engineering Laboratory	CO1	Develop a diagram of the catchment area for any water body from given information.
		CO2	Calculate the average rainfall over a catchment.
		CO3	Measure the rainfall data using different types of rain-gauges.
		CO4	Measure the rate of infiltration of water through the soil.
		CO5	Measure the evaporation using evaporimeter.
		CO6	Measure the sunshine hours in a particular day.
CE(PC)694	Steel Structure Design Sessional	CO1	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.
		CO2	Design different steel sections subjected to axial compression and tension following Indian codes of practices.
		CO3	Discuss the differences between laterally supported and unsupported flexure members. Designing of the flexure members using Indian codes of practice.
		CO4	Compare and design the rolled and built up compression members along with base connection subjected to axial compression, bending and tension.
		CO5	Explain shear force and bending moment on rolled and built up girders, dimension the section and finally design it following Indian standard design guidelines.
		CO6	Identify different components of gantry system, calculate lateral and vertical loads acting on the system, dimension the components and design them. Design different components of an industrial building.
CE(PC)695	Quantity Survey Estimation and Valuation Sessional	CO1	Explain about Quantity Surveying, different types of estimates, items of work and their units.
		CO2	Implement the schedule of rates

		CO3	Recognize the specification of materials & works.
		CO4	Prepare bar bending schedule for RCC structure
		CO5	Interpret the fundamental concept of valuation
		CO6	Execute the detailed estimation of material consumption and abstracts for constructions for single storied building, road, Underground reservoir, Surface drain, Septic tank

(V) PROFESSIONAL ELECTIVE SUBJECTS

Course Code	Course Title	CO	Course Outcomes
CE(PE)601A	Stability of Slopes	CO1	Describe types, causes, and mechanisms of slope failures.
		CO2	Classify different types of landslides and evaluate their safety factors.
		CO3	Analyse the stability of finite and infinite slopes under different soil conditions.
		CO4	Apply analytical and graphical methods (e.g., Taylor's chart, Friction circle) for slope stability analysis.
		CO5	Implement method of slices (Fellenius and Bishop's methods) to calculate slope safety.
		CO6	Design slope protection measures and select appropriate soil strength parameters for stability analysis.
CE(PE)601B	Foundation Engineering	CO1	Implement bearing capacity formulas to determine the Load carrying capacity of pile foundation.
		CO2	Implement the concept of load carrying capacity of pile to compute the efficiency and settlement of pile group.
		CO3	Interpret Different subsoil exploration methods and in-situ test data to obtain design parameters for geotechnical analysis.
		CO4	Correlate bearing capacity of shallow foundation with field test data.
		CO5	Design sheet pile structure on the basis of earth pressure theories.

Course Code	Course Title	CO	Course Outcomes
		CO6	Describe different types of ground improvement methods for solving geotechnical problems.
CE(PE)601C	Ground Improvement Technique	CO1	Understand the principles and necessity of ground improvement methods.
		CO2	Classify and compare different methods of densification and reinforcement of soil.
		CO3	Analyse ground improvement techniques such as vibro-replacement, stone columns, and preloading methods.
		CO4	Apply geosynthetics, grouting techniques, and dewatering systems to real-world ground improvement problems.
		CO5	Design suitable ground improvement systems based on soil conditions and project requirements.
		CO6	Evaluate the effectiveness and performance of different ground modification techniques after construction.
CE(PE)602A	Building Construction Practice	CO1	Define the sequence of construction
		CO2	Describe various techniques and practices on masonry construction, flooring, and roofing, centering shuttering, slip forms etc.
		CO3	Identify various techniques involved in sub structure construction like box jacking, pipe jacking, tunneling, Piling.
		CO4	Execute under water construction process like well caisson, cofferdam, diaphragm wall, sheet pile, shoring.
		CO5	Use advanced construction techniques for launching girders, bridge decks, offshore platforms, special forms for shells, and heavy decks, in situ pre-stressing in high rise structures.
		CO6	Implement material handling techniques and quality assurance measures effectively in construction projects involving erecting lightweight components on tall structures, support structures for heavy equipment and conveyors, and the erection of articulated structures, braced domes, and space decks.
CE(PE)602B	Structural Analysis-II	CO1	Apply the Slope Deflection and Moment Distribution Method to analyse indeterminate structures.

Course Code	Course Title	CO	Course Outcomes
		CO2	Develop and analyse the concept of suspension bridge and stiffness girders.
		CO3	Apply and analyse the concepts of curved beam analysis in hooks, rings and Bow girders.
		CO4	Develop the concept bending in unsymmetrical beams.
		CO5	Development the fundamental concepts of plastic analysis using kinematic method and apply them in frames and continuous analysis.
		CO6	Development and analyse the portal frames using Portal and Cantilever method. Develop and analyse the indeterminate structures (continuous beams and frames) using flexibility and stiffness matrix.
CE(PE)602C	Industrial Structures	CO1	To Discuss the planning and functional requirements of Industrial structures
		CO2	To Identify the need to learn about the design concepts and constructional aspects of Industrial structures
		CO3	To Demonstrate the importance of bunkers and silos
		CO4	To Execute the Design of foundations and folded plates in industrial buildings.
		CO5	To Examine structural elements used in construction including slabs and beams of different types.
		CO6	To Implement the industrial design codes relevant to the design of Reinforced concrete members.
CE(PE)701A	Computational Hydraulics	CO1	Identify the complexities involved in fluid flow problems.
		CO2	Formulate the governing equations, initial and boundary conditions, and appropriate solution schemes for fluid flow problems.
		CO3	Develop finite difference formulations for solving ordinary and partial differential equations of flow problems.
		CO4	Investigate the finite volume formulation of ordinary and partial differential equations of flow problems.
		CO5	Implement numerical solution techniques like finite difference and finite volume methods to solve real-world fluid flow problems.
		CO6	Explain the applications of numerical methods, such as finite difference and finite volume, in solving fluid flow problems.
CE(PE)701B		CO1	To Use Disaster Concepts to Management

Course Code	Course Title	CO	Course Outcomes
	Disaster Preparedness and Planning	CO2	To Identify the Responsibilities of the Society for Disaster Management
		CO3	To Relate the Connection between Development and Disasters
		CO4	To Classify the Categories of Disasters
		CO5	To Identify the Impacts of Disasters Key Skills
		CO6	To Implement the Concepts of Disaster to Management
CE(PE)701C	Hydraulic Structure	CO1	Identify the characteristics of various types of dams and their selection procedure.
		CO2	Operate the reconnaissance survey and, geophysical investigations necessary for selection of suitable dam site.
		CO3	Examine forces acting on gravity dams and develop stability analysis.
		CO4	Examine the seepage loss through embankment dams and construct necessary remedial measures.
		CO5	Describe various diversion head works and their components, including creep in foundation.
		CO6	Examine the discharge through the overflow section and design the appropriate energy dissipation structures.
CE(PE)702A	Prestressed Concrete	CO1	Learn the introduction of prestressed concrete member and its deflection properties.
		CO2	Develop the design criteria of prestressed concrete section for flexure and shear properties.
		CO3	Design the anchorage zone stress for post-tensioned members.
		CO4	Use the methods for Analysis of Statically Indeterminate Structures.
		CO5	Explain the composite construction of Prestress and In- situ concrete.
		CO6	Design the Prestressed concrete poles and sleepers and introduction of partial prestressing.
CE(PE)702B	Repair & Rehabilitation of Structures	CO1	Learn the various distress and damages to concrete and masonry structures
		CO2	Identify the physical and chemical deterioration of concrete structures, Identification and measurement of cracks.
		CO3	Assessment and evaluation of damage in existing structures by performing destructive, semi-destructive and nondestructive test

Course Code	Course Title	CO	Course Outcomes
		CO4	Identify and apply the criteria for repair and rehabilitation of concrete and structures.
		CO5	Develop solutions for Retrofitting and Strengthening of structures including the design for seismic retrofit.
		CO6	To idealize the importance of protection and maintenance of structures and applicability of structural health monitoring for long term maintenance of structures
CE(PE)702C	Finite Element Method	CO1	List the basic concepts of finite element analysis and its importance in structural analysis and design.
		CO2	Explain the principles behind the variational principles used in finite element formulation, such as the Ritz method and Galerkin approach.
		CO3	Use the formulation process of Euler-Bernoulli beam elements and Timoshenko beam elements, including the imposition of boundary conditions.
		CO4	Test the concepts of interpolation functions and numerical integration to formulate one-dimensional and two-dimensional finite elements (e.g., bar elements, beam elements, plate elements).
		CO5	Judge the effectiveness of different numerical methods and element formulations in accurately simulating structural behavior.
		CO6	Develop finite element models for structural components, including beams, plates, and trusses, using appropriate element types and meshing techniques using software such as SAP2000.
CE(PE)703A	Air and Noise Pollution and Control	CO1	Explain the basic concepts and terminologies regarding air pollution and noise pollution.
		CO2	Demonstrate the physics of air pollution and noise pollution.
		CO3	Use the methods to solve the air pollution and noise pollution measurements.
		CO4	Examine different concepts of air and noise pollution for solving mathematical Problems.
		CO5	Examine air and noise quality with allowable standards and limits
		CO6	Select and design proper techniques for air pollution, noise pollution, and control.
CE(PE)703B	Physico-Chemical Processes for Water and Wastewater Treatment	CO1	Define the basic concepts and terminologies regarding physico-chemical treatment of water and wastewater
		CO2	Describe the physics, chemistry and hydraulics of different unit operations and processes for water and wastewater treatment

Course Code	Course Title	CO	Course Outcomes
		CO3	Examine different physico-chemical water and wastewater treatment options solving mathematical problems
		CO4	Use design principles for sedimentation tanks, coagulation and flocculation systems, and filtration units, including slow and rapid sand filters and precoat filters.
		CO5	Appraise the effectiveness of aeration, precipitation, ion exchange, and membrane processes in water and wastewater treatment
		CO6	Design integrated water and wastewater treatment systems that utilize a combination of physico-chemical processes to meet specific water quality standards and regulatory requirements.
CE(PE)703C	Water and Air Quality Modelling	CO1	Relate the fundamental principles of water and air quality modeling in the context of environmental systems.
		CO2	Use various modeling techniques to assess the quality of water and air under diverse environmental conditions.
		CO3	Appraise the impacts of pollutants on water and air quality using appropriate simulation tools.
		CO4	Develop predictive models for pollutant transport and transformation in natural water and air systems.
		CO5	Examine sustainability principles and modern tools for effective water and air quality management.
		CO6	Interpret findings effectively through reports and presentations, highlighting critical insights from the modeling results.
CE(PE)704A	Structural Dynamics	CO1	Memorize the equations governing the dynamic equilibrium of structures and the generation of stiffness matrices.
		CO2	Discuss the principles of free vibration of single-degree-of-freedom (SDOF) systems, including undamped and damped free vibration, natural period/frequency, and types of damping.
		CO3	Use numerical methods, such as time-stepping methods, central difference method, and Newmark's method, to solve dynamic response problems of structures.

Course Code	Course Title	CO	Course Outcomes
		CO4	Examine the response of structures to arbitrary motions, including unit impulse, arbitrary force, step and ramp forces, and half sinusoidal waves, using Duhamel's integral and other analytical methods.
		CO5	Judge the earthquake response of MDOF systems through time history analysis and response spectrum analysis, considering the dynamic characteristics of the structures and ground motion inputs.
		CO6	Develop strategies for analyzing and mitigating the dynamic response of continuous systems, including the consideration of shear behavior, bending behavior, and the use of generalized SDOF models.
CE(PE)704B	Advanced Structural Analysis	CO1	Use matrix methods of structural analysis for plane trusses, beams, and continuous frames.
		CO2	Solve simple problems by the finite difference method.
		CO3	Identify various relaxation techniques used in structural analysis.
		CO4	Demonstrate three-dimensional stress and strain analysis, stress invariants, equilibrium and compatibility equations.
		CO5	Identify plane stress, plane strain problems.
		CO6	Solve simple plate and shell problems.
CE(PE)704C	Coastal Hydraulics and Sediment Transport	CO1	Explain and quantify wave generation, propagation, refraction, shoaling, diffraction, and breaking in coastal zones.
		CO2	Analyse tidal phenomena and nearshore current behaviour for engineering applications.
		CO3	Apply linear and nonlinear wave theories for coastal and harbour design.
		CO4	Evaluate sediment transport processes, including bed-load and suspended load dynamics.
		CO5	Design and assess littoral drift and shoreline changes due to sediment transport.
		CO6	Assess the impact of coastal structures on beach morphology and recommend stabilization strategies.
CE(PE)705A	Railway and Airport Engineering	CO1	Explain the zonal classification system, and discuss different railway track gauges and classification based on speed criteria.

Course Code	Course Title	CO	Course Outcomes
		CO2	Identify factors influencing railway track alignment selection and assess the impact of different track gauges on operational efficiency.
		CO3	Design railway geometric elements ensuring they meet the required standards and criteria.
		CO4	Design railway points and crossings, and develop effective layouts for stations and yards.
		CO5	Explain the functions of different airport components.
		CO6	Design runways and taxiways with appropriate orientation using wind rose diagrams to maximize operational safety and efficiency.
CE(PE)705B	Pavement Design	CO1	Differentiate between different types of pavements, both structurally and functionally.
		CO2	Execute Axle Load Survey and Estimate Design Traffic.
		CO3	Classify different stresses, strains and deflections in flexible and rigid pavements.
		CO4	Design different components of bituminous pavement.
		CO5	Identify the specifications and design criteria of low-volume rigid pavement.
		CO6	Recognize the principles of Pavement Maintenance and identify various pavement distresses
CE(PE)705C	Transportation System Planning	CO1	Interpret the concept of transportation planning methodologies and processes while making transportation policies.
		CO2	Explain the multi-dimensional transportation system while solving demand, operational and economic problems.
		CO3	Execute the construction process of multi-level transit system.
		CO4	Identify the operational characteristics of different transit facilities.
		CO5	Execute transportation planning surveys and studies with proper analysis.
		CO6	Design transportation planning mechanism for a specific target zone and study area.
CE(PE)801A	GIS & Remote Sensing	CO1	Memorise the fundamental concepts of GIS and remote sensing, including energy sources, electromagnetic spectrum, and GIS components.
		CO2	Explain the basic principles of remote sensing and GIS, such as image processing, classification, and coordinate systems.

Course Code	Course Title	CO	Course Outcomes
		CO3	Use remote sensing and GIS tools to analyse and solve spatial problems, demonstrating the ability to interpret geospatial data.
		CO4	Relate different remote sensing techniques and GIS concepts, contrasting methods like SAR, LiDAR, and image processing tools for analysing spatial data.
		CO5	Judge the selection of GIS and remote sensing methods for solving real-world engineering problems, such as watershed analysis and urban growth modelling.
		CO6	Design innovative solutions for complex civil engineering problems using GIS and remote sensing to address challenges like pollution monitoring and climate change.
CE(PE)801B	Rock Mechanics	CO1	Describe rock mechanics concepts and their engineering applications.
		CO2	Classify rock masses using RQD, RSR, RMR, and Q-systems, and assess geological structures.
		CO3	Differentiate the strength and failure behaviour of rocks using uniaxial and Triaxial tests, and explain failure theories, crack propagation, and the influence of water and structural features on rock behaviour.
		CO4	Define tests to determine tensile, compressive, and shear strength of rocks.
		CO5	Appraise strain and displacement behaviour of rock masses and explain the principles of rock reinforcement, support systems, and ground subsidence.
		CO6	Implement knowledge of rock mechanics to solve basic geotechnical engineering problems involving rock mass behaviour and support systems.
CE(PE)801C	Environmental laws and Policy	CO1	Define the concept of environment, ecosystem and need for environmental laws.
		CO2	Discuss the essence of sustainable development.
		CO3	Interpret the relevant measures to mitigate pollution from different sources.
		CO4	Recognize the effects of the various pollutants on the environment as a whole according to the formulated laws and policies.
		CO5	Appraise the various alternatives to reduce pollution.
		CO6	Formulate standards of the various parameters corresponding to their impact on the environment with changing time and compare in international perspective.
CE(PE)801D	Pavement Materials and Design	CO1	To identify the engineering properties and characteristics of the different materials that concern the pavement engineer

Course Code	Course Title	CO	Course Outcomes
		CO2	To use the modern testing techniques of soil, granular and bituminous materials for pavement analysis and design
		CO3	To implement the use of different superlative aggregate tests and requirements
		CO4	To solve the design mix of rigid pavement
		CO5	To discuss the relationship between key materials and their properties along with the behaviour of pavement component systems.
		CO6	To select the proper pavement techniques, the deflection of pavements, and methods of maintenance of pavements.

(VI) OPEN ELECTIVE COURSES

Course Code	Course Title	CO	Course Outcomes
CE(OE)601A	Soft Skills and Interpersonal Communication - I	CO1	Analyse the dynamics of business communication and communicate accordingly.
		CO2	Write business letters and reports
		CO3	Learn to articulate opinions and views with clarity
		CO4	Appreciate the use of language to create beautiful expressions
		CO5	Analyse and appreciate literature.
		CO6	Communicate in an official and formal environment.
CE(OE)601B	Introduction to Philosophical Thoughts	CO1	Understand the origin and fundamental concepts of Indian philosophy, including Vedas and Upanishads.
		CO2	Explain the philosophical principles of Charvaka, Samkhya, and Yoga schools.
		CO3	Analyse the epistemological and metaphysical concepts in Nyaya and Mimansa philosophies.
		CO4	Interpret the metaphysical categories and epistemology in Vaisheshika philosophy.
		CO5	Differentiate between Buddhist and Jaina philosophies regarding knowledge, ethics, and liberation.

Course Code	Course Title	CO	Course Outcomes
		CO6	Evaluate the relevance and impact of ancient philosophical thoughts in the modern context.
CE(OE)701A	Metro Systems & Engineering	CO1	Describe the overview of metro system and engineering.
		CO2	Design the method of construction for civil engineering structures required for metro system.
		CO3	Develop the method of planning and survey and the management system for civil engineering construction works for metro system and engineering.
		CO4	Explain electronics and communication system required for Metro system and engineering.
		CO5	Identify different parts of the mechanical structure involved in metro system and engineering.
		CO6	Implement the knowledge in solving complex engineering problems on electrical system required for metro system and engineering.
CE(OE)701B	ICT for Development	CO1	Explain the concepts of ICT, new media, and its use in e-learning, web commerce, and mobile telephony.
		CO2	Discuss ICT projects in India and the Northeast, identifying challenges and prospects.
		CO3	Differentiate digital communication theories and concepts like information society, digital divide, and network society.
		CO4	Interpret the role of ICT in development, Millennium Development Goals, and democratic processes.
		CO5	Demonstrate the use of computer-mediated communication (CMC) and multimedia platforms for development.
		CO6	Develop convergent journalism methods like precision journalism and citizen journalism to support participatory culture.
CE(OE)701C	Cyber Law & Ethics	CO1	Explain the basics of cyber laws, jurisdiction, and key legislations in India and globally.
		CO2	Discuss ethical, privacy, and legal issues, including digital evidence and professional conduct.
		CO3	Relate intellectual property rights issues like copyright, piracy, and trademarks.

Course Code	Course Title	CO	Course Outcomes
		CO4	Interpret the Indian IT Act and auditing standards for information security and risk management.
		CO5	Compare international cyber laws and assess challenges like net neutrality in India.
		CO6	Design strategies for Business Continuity Plans (BCP) and Disaster Recovery (DR).
CE(OE)801A	Human Resource Development and Organizational Behavior	CO1	Discuss the various aspects of organizational behaviour.
		CO2	Explain personality, attitude and perception.
		CO3	Discuss the various theories of motivation.
		CO4	Explain group behaviour, communication and leadership.
		CO5	Differentiate organizational politics and conflict management.
		CO6	Discuss the various organizational structures and their effects.
CE(OE)801B	Bridge Engineering	CO1	Understand IRC Loading and its application in bridge design, including live load, dead load, impact load, and other factors as per IRC standards.
		CO2	Understand the process of site investigation for bridges, and analyse potential flooding hydrologics, assessing the environmental impact of the project.
		CO3	Design small RCC bridges according to IRC loading standards, including analyzing loads, choosing materials, designing the structure, and considering water flow for the project.
		CO4	Design small RCC culverts based on IRC loading standards, including load analysis, material selection, structural design, and evaluating water flow conditions.
		CO5	Relate the basics of bridge parts like bearings, joints, articulation, abutments, piers, and well foundations, and analyse their design potential and use in bridge construction.
		CO6	Analyse and design cable-stayed bridges, including how loads are distributed and the visual aspects of the structure.
CE(OE)801C	Deep Foundations	CO1	Explain the concept of bearing capacity for deep foundation.
		CO2	Differentiate in what circumstances pile is needed and how to estimate pile and pile group capacity under various soil conditions Characterize.
		CO3	Design the safe bearing capacity including settlement consideration for deep foundations.

Course Code	Course Title	CO	Course Outcomes
		CO4	Select a suitable deep foundation system for various site conditions and also analysis of that.
		CO5	Identify different types and methods of construction for cassion foundation.
		CO6	Explain different types and suitable design method of well foundation to check their stability analysis.
CE(OE)801D	Groundwater Contamination	CO1	Understand the principles of groundwater occurrence and contamination processes.
		CO2	Apply Darcy's law and flow equations to analyse groundwater hydraulics in aquifers.
		CO3	Compare national and international standards of groundwater quality.
		CO4	Identify and classify sources of groundwater pollution and propose prevention techniques.
		CO5	Analyse and design artificial recharge systems and groundwater conservation strategies.
		CO6	Simulate contaminant transport using mathematical models and suggest remediation methods.
CE(OE)802A	Soft Skills and Personality Development	CO1	To Describe the fundamental concepts of soft skills and self-awareness, including personality traits and time management techniques.
		CO2	To Demonstrate effective verbal and non-verbal communication in group discussions, presentations, and professional settings.
		CO3	To Execute interpersonal and teamwork skills by engaging in collaborative and leadership-based activities.
		CO4	To Develop professional behavior, grooming, and etiquette suitable for workplace environments.
		CO5	To Construct a career development plan, including resume preparation, interview strategies, and personal branding.
		CO6	To Implement techniques for stress management, emotional well-being, and positive thinking in both academic and personal life.
CE(OE)802B	Earthquake Engineering	CO1	Discuss the basics of seismology and earthquake engineering.
		CO2	Use the earthquake data as inputs for earthquake analysis.

Course Code	Course Title	CO	Course Outcomes
		CO3	Test the stability and response of structures using earthquake analysis.
		CO4	Assess the behaviour of the complex structures under earthquake occurrence.
		CO5	Assess the soil-structure interaction by using mathematical and numerical modelling.
		CO6	Design base isolation techniques and methods for earthquake resistant design of structures.
CE(OE)802C	Urban Transport Planning	CO1	Classify Urbanization and travel demand, Urban activity systems and travel patterns.
		CO2	Distinguish Trip based and Activity based approach
		CO3	Describe Urban Transportation Planning Goals, Objectives and Constraints.
		CO4	Compare Trip end and trip interchange models and Probabilistic models.
		CO5	Design the various Traffic assignments and Transportation networks.
		CO6	Sketch urban development planning policy based on various case studies.
CE(OE)802D	Environmental Impact Assessment and Life cycle Analysis	CO1	Recognize perspectives from ecological and social sciences to understand complex socio- ecological issues in developmental projects at multiple spatial scales.
		CO2	Appraise the impact of any activity (large or small scale) on the surrounding environment.
		CO3	Implement the process of environmental impact modelling and prediction as a design tool.
		CO4	Formulate mitigation strategies to protect the environment leading to sustainability.
		CO5	Critique the environmental performance of energy and production systems.
		CO6	Examine the intricacies of Life Cycle Analysis and basic knowledge for coherent existence.

(VII) INTERNSHIP AND PROJECT

CE(IN)791	Industrial Internship (after sixth semester)	CO1	Use fundamental principles of engineering to find solutions based on a systems approach which integrates theory with practice.
		CO2	Demonstrate skills to work in a team and understand to work with people from diverse backgrounds.

		CO3	Develop the skills required in a profession to become updated with the latest technical advancements and adapt to the changes of the industry.
		CO4	Develop communication and interpersonal skills as per the Industry standards.
		CO5	Execute leadership skills by accomplishing the tasks assigned by the industry.
		CO6	Examine the challenges and future of potential career in an organization in particular and the sector in general.
CE(PROJ)792	Project -1 (Project work)	CO1	To recognize the scope of the problem and conduct a Literature review
		CO2	To use existing/new methods to apply the fundamental aspects of civil engineering and their relevance with respect to the societal benefit
		CO3	To set up experimentation/design/development of models to analyze and compare the results
		CO4	To identify the modern techniques to collect the data & solve the real-life problems
		CO5	To Identify the solutions and relate them with the literature with proper analysis of the problem
		CO6	To develop the ability of working in the groups and to develop skills related to comprehensive report writing.
CE(CV)881	Comprehensive Viva Voce	CO1	Recall fundamental concepts, theories, and principles across various civil engineering domains.
		CO2	Explain core civil engineering concepts and their applications in real-world scenarios.
		CO3	Apply civil engineering knowledge to solve practical problems and case studies.
		CO4	Examine and analyse complex engineering problems to identify key components and interrelationships.
		CO5	Critically assess and justify engineering decisions based on technical, economic, and sustainability considerations.
		CO6	Develop innovative solutions and propose new methodologies for emerging challenges in civil engineering.
CE(PROJ)882	Project-2 (Continued from VII)	CO1	To recognize the scope of the problem and conduct a Literature review
		CO2	To use existing/new methods to apply the fundamental aspects of civil engineering and their relevance with respect to the societal benefit
		CO3	To set up experimentation/design/development of models to analyze and compare the results

		CO4	To identify the modern techniques to collect the data & solve the real-life problems
		CO5	To Identify the solutions and relate them with the literature with proper analysis of the problem
		CO6	To develop the ability of working in the groups and to develop skills related to comprehensive report writing.

PROGRAM ARTICULATION MATRIX

(I) BASIC SCIENCE

Course Code	Course Title	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
BS-PH101	Physics-I	CO1	2	1	1	1	-	-	-	-	-	-	-	1	2	1	-	-
		CO2	2	1	1	1	-	-	-	-	-	-	-	1	2	1	-	-
		CO3	2	1	1	1	-	-	-	-	-	-	-	1	2	1	-	-
		CO4	2	1	1	1	-	-	-	-	-	-	-	1	2	1	-	-
		CO5	2	1	1	1	-	-	-	-	-	-	-	1	2	1	-	-
		CO6	2	1	1	1	-	-	-	-	-	-	-	1	2	1	-	-
BS-M102	Mathematics IB	CO1	3	3	3	3	1	1	-	-	-	1	1	3	3	3	3	-
		CO2	3	3	3	3	1	2	-	-	-	1	1	3	3	3	2	-
		CO3	3	3	3	3	2	1	-	-	-	1	1	3	3	3	2	-
		CO4	3	3	3	3	2	1	-	-	-	1	1	3	3	3	3	-

Course Code	Course Title	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
		CO5	3	3	3	3	1	2	-	-	-	1	1	3	3	3	3	-
		CO6	3	3	3	3	2	1	-	-	-	1	1	3	1	1	1	-
BS-CH191	Physics I Laboratory	CO1	3	2	2	2	-	-	-	-	-	-	-	1	3	3	-	-
		CO2	3	2	2	1	-	-	-	-	-	-	-	1	3	3	-	-
		CO3	3	3	3	3	-	-	-	-	-	-	-	1	3	3	-	-
		CO4	3	2	3	3	-	-	-	-	-	-	-	1	3	3	-	-
		CO5	3	3	3	3	-	-	-	-	-	-	-	1	3	3	-	-
		CO6	3	3	3	3	-	-	-	-	-	-	-	1	3	3	-	-
BS-CH201	Chemistry-I	CO1	2	1	1	1	-	-	-	-	-	-	-	1	2	1	-	-
		CO2	2	1	1	1	-	-	-	-	-	-	-	1	2	1	-	-
		CO3	2	1	1	1	-	-	-	-	-	-	-	1	2	1	-	-
		CO4	2	1	1	1	-	-	-	-	-	-	-	1	2	1	-	-
		CO5	2	1	1	1	-	-	-	-	-	-	-	1	2	1	-	-
		CO6	2	1	1	1	-	-	-	-	-	-	-	1	2	1	-	-
BS-M202	Mathematics IIB	CO1	2.2	2.2	0.8	2.2	1.5	0.8	0.8	0.8	-	0.8	0.8	1.5	2.2	2.2	2.2	-
		CO2	2.8	2.8	2.8	2.8	2.8	2.8	1.9	1.0	1.0	1.0	1.9	1.0	2.8	2.8	2.8	-
		CO3	2.2	2.2	2.2	2.2	2.2	2.2	0.8	0.8	0.8	0.8	1.5	1.5	2.2	2.2	2.2	-
		CO4	2.2	2.2	2.2	2.2	2.2	2.2	0.8	0.8	0.8	0.8	1.5	2.2	2.2	2.2	2.2	-
		CO5	2.2	2.2	2.2	2.2	1.5	2.2	1.5	-	1.5	1.5	1.5	0.8	2.2	2.2	2.2	-

[illegible]

(II) ENGINEERING SCIENCE COURSES

ES-EE101	Basic Electrical Engineering	CO1	3	3	2	2	-	-	-	-	-	-	-	2	3	-	-	2
		CO2	3	3	1	-	-	-	-	-	-	-	-	2	3	-	-	2
		CO3	3	3	1	-	-	-	-	-	-	-	-	2	3	-	-	2
		CO4	3	3	2	2	-	-	-	-	-	-	-	2	3	-	-	2
		CO5	3	3	1	-	-	1	-	-	-	-	-	2	3	-	-	2
		CO6																
ES-EE191	Basic Electrical Engineering Laboratory	CO1	3	2	-	-	1	1	-	-	-	-	-	2	3	-	-	2
		CO2	3	3	2	-	-	-	-	-	-	-	-	2	3	-	-	2
		CO3	3	2	-	-	-	-	-	-	-	-	-	2	3	-	-	2
		CO4	3	2	1	-	-	-	-	-	-	-	-	2	3	-	-	2
		CO5	3	2	2	2	-	-	1	-	-	-	-	2	3	-	-	2
		CO6																
ES-ME192	Workshop/Manufacturing Practices (Gr-B)	CO1	3	1	1	1	1	1	-	1	1	1	-	1	3	3	2	2
		CO2	3	1	1	1	1	1	-	1	1	1	-	1	3	3	2	3
		CO3	3	1	1	1	1	1	-	1	1	1	-	1	3	3	3	3
		CO4	3	1	1	1	1	1	-	1	1	1	-	1	3	3	2	2
		CO5	3	1	1	1	1	1	-	1	1	1	-	1	3	3	2	3
		CO6	3	1	1	1	1	1	-	1	1	1	-	1	3	3	2	3

ES-CS201	Programming for Problem Solving	CO1	2	1	1	1	-	-	-	-	-	-	-	1	2	1	-	-
		CO2	2	1	1	1	-	-	-	-	-	-	-	1	2	1	-	-
		CO3	2	1	1	1	-	-	-	-	-	-	-	1	2	1	-	-
		CO4	2	1	1	1	-	-	-	-	-	-	-	1	2	1	-	-
		CO5	2	1	1	1	-	-	-	-	-	-	-	1	2	1	-	-
		CO6	2	1	1	1	-	-	-	-	-	-	-	1	2	1	-	-
ES-CS291	Programming for Problem Solving (Practical)	CO1	3	1	-	-	-	1	-	-	3	1	-	1	1.5	2	1	-
		CO2	3	1	-	-	-	1	-	-	3	1	-	1	1.41	2	1	-
		CO3	3	1	-	-	-	1	-	-	3	1	-	1	1.45	2	1	-
		CO4	3	2	-	-	-	1	-	-	3	2	-	1	1.32	2	1	-
		CO5	3	2	-	-	-	1	-	-	3	2	-	1	1.23	2	1	-
		CO6	3	1	-	-	-	1	-	-	1	1	-	1	1.36	2	1	-
ESME291	Engineering Graphics & Design	CO1	3	1	1	1	1	1	-	1	1	1	-	1	3	3	2	2
		CO2	3	1	1	1	1	1	-	1	1	1	-	1	3	3	2	3
		CO3	3	1	1	1	1	1	-	1	1	1	-	1	3	3	3	3
		CO4	3	1	1	1	1	1	-	1	1	1	-	1	3	3	2	2
		CO5	3	1	1	1	1	1	-	1	1	1	-	1	3	3	2	3
		CO6	3	1	1	1	1	1	-	1	1	1	-	1	3	3	2	3
CE(ES)301	Engineering Mechanics	CO1	3	3	3	2	-	-	-	-	-	-	1	3	3	3	3	2
		CO2	3	3	3	2	-	-	-	-	-	-	1	2	3	3	3	2

		CO3	3	3	3	2	-	-	-	-	-	-	1	3	3	3	3	2
		CO4	3	3	3	3	1	-	-	-	-	-	1	2	3	3	3	2
		CO5	3	3	3	3	1	-	-	-	-	-	1	3	3	3	3	2
		CO6	3	3	3	3	1	-	-	-	-	-	1	2	3	3	3	2
CE(ES)302	Energy Science & Engineering	CO1	3	3	2	3	2	2	3	-	1	1	-	2	3	1	-	-
		CO2	3	3	3	2	3	2	3	-	1	2	1	2	1	1	-	1
		CO3	3	1	1	3	2	3	2	-	2	0	1	3	2	2	2	1
		CO4	3	3	3	2	3	2	3	-	2	3	2	3	2	2	1	1
		CO5	3	2	3	3	3	2	3	3	2	3	3	2	2	2	1	1
		CO6	3	3	3	3	2	2	3	3	2	2	2	2	2	2	1	1
CE(ES)391	Basic Electronics	CO1	3	2	1	1	1	1	1	1	1	1	1	2	3	2	1	1
		CO2	3	2	2	1	1	2	1	1	2	2	1	2	3	2	2	2
		CO3	3	2	3	2	2	2	2	2	2	2	2	2	3	2	1	1
		CO4	3	2	3	1	2	2	2	2	2	2	2	1	3	2	2	2
		CO5	3	2	2	3	2	2	2	1	2	2	2	1	3	2	1	2
		CO6	3	2	3	2	2	1	1	1	2	2	1	1	3	2	1	1
CE(ES)392	Computer- aided Civil Engineering Drawing	CO1	3	2	1	-	-	-	-	-	-	-	-	2	3	1	1	1
		CO2	3	2	-	-	3	-	-	-	-	-	-	2	3	1	1	1
		CO2	3	3	3	1	1	-	-	-	2	1	-	2	3	1	1	1
		CO4	3	3	1	2	1	-	-	-	2	1	-	2	3	1	1	1

CE(ES)491	Fluid Mechanics Laboratory	CO1	3	2	-	-	-	1	-	-	2	1	-	1	3	3	1	-
		CO2	3	2	-	-	-	1	-	-	2	1	-	1	3	3	1	-
		CO2	3	2	-	-	-	1	-	-	2	1	-	1	3	3	1	-
		CO4	3	2	-	-	-	1	-	-	2	1	-	1	3	3	1	-
		CO5	3	2	-	-	-	1	-	-	2	1	-	1	3	3	1	-
		CO6	3	2	-	-	-	1	-	-	2	1	-	1	3	3	1	-
CE(ES)492	Solid Mechanics Laboratory	CO1	3	3	1	2	1	-	-	-	2	1	-	1	3	2	1	1
		CO2	3	3	1	2	1	-	-	-	2	1	-	1	3	2	1	1
		CO2	3	3	1	2	1	-	-	-	2	1	-	1	3	2	-	-
		CO4	3	3	1	2	1	-	-	-	2	1	-	1	3	2	1	1
		CO5	3	3	1	2	1	-	-	-	2	1	-	1	3	2	1	-
		CO6	3	1	-	1	1	-	-	-	1	1	-	1	3	2	1	2
CE(ES)493	Engineering Geology Laboratory	CO1	3	2	1	1	1	-	-	-	-	1	-	-	3	1	1	-
		CO2	3	2	1	1	1	-	-	-	-	1	-	-	3	1	1	-
		CO2	2	2	1	1	1	-	-	-	-	1	-	-	2	1	2	-
		CO4	2	3	2	2	2	-	1	-	-	1	-	1	2	2	2	-
		CO5	2	3	2	2	2	-	1	-	-	1	-	1	2	2	1	-
		CO6	3	2	1	1	2	-	-	-	-	1	-	0	3	1	2	-

(III) HUMANITIES & SOCIAL SCIENCE

HM-HU201	English	CO1	3	2	2	-	-	1	1	-	-	-	-	1	-	3	3	2
		CO2	3	2	2	-	-	1	1	-	-	-	-	1	-	3	3	2
		CO3	3	2	2	-	-	1	1	-	-	-	-	1	-	3	3	2
		CO4	3	2	2	-	-	1	1	-	-	-	-	1	-	3	3	3
		CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		CO6	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-
HM-HU291	Language Laboratory	CO1	2	2	2	2	2	1	1	1	3	3	1	3	1	3	1	2
		CO2	2	2	1	2	1	1	1	1	2	3	1	3	1	3	1	2
		CO3	1	2	3	2	1	2	1	3	3	3	2	3	1	3	1	2
		CO4	3	3	3	3	1	3	2	2	3	3	3	3	1	3	1	2
		CO5	2	3	3	2	1	2	1	2	3	3	3	3	1	3	1	2
		CO6	3	1	1	2	2	1	1	1	1	3	1	3	1	3	1	2
CE(HS)301	Humanities-I (Effective Technical Communication)	CO1	3	3	3	2	-	-	-	-	-	-	1	3	3	3	3	2
		CO2	3	3	3	2	-	-	-	-	-	-	1	2	3	3	3	2
		CO3	3	3	3	2	-	-	-	-	-	-	1	3	3	3	3	2
		CO4	3	3	3	3	1	-	-	-	-	-	1	2	3	3	3	2
		CO5	3	3	3	3	1	-	-	-	-	-	1	3	3	3	3	2
		CO6	3	3	3	3	1	-	-	-	-	-	1	2	3	3	3	2
CE(HS)302	Introduction to Civil Engineering	CO1	3	1	2	1	-	-	-	-	-	-	-	2	1	2	-	-
		CO2	3	1	2	1	-	-	-	-	-	-	-	2	1	2	1	2

		CO3	3	1	2	1	-	-	-	-	-	-	-	2	2	3	2	2
		CO4	3	1	2	1	2	-	-	-	-	-	-	2	2	2	2	2
		CO5	3	1	2	1	-	-	-	-	-	-	-	2	1	2	1	2
		CO6	-	-	-	-	-	-	-	-	-	-	-	2	1	1	-	1
CE(HS)401	Civil Engineering- Societal & Global Impact	CO1	3	2	-	-	-	2	2	-	-	-	-	1	2	1	1	1
		CO2	3	3	3	2	-	2	2	-	-	-	-	1	3	1	1	1
		CO3	3	1	-	-	1	-	-	-	-	-	-	-	3	2	1	2
		CO4	3	2	2	2	-	2	3	2	1	-	2	2	2	2	1	2
		CO5	2	2	3	2	-	3	3	1	-	1	2	2	2	2	1	2
		CO6	3	3	3	3	1	3	3	2	2	2	2	3	3	3	2	3
CE(HS)801	Professional Practice, law & Ethics	CO1	-	1	-	-	-	2	-	3	0	1	-	2	-	-	1	-
		CO2	-	2	-	-	-	2	-	1	0	1	-	1	-	1	2	-
		CO3	-	2	-	-	-	2	-	2	1	1	-	1	-	1	2	-
		CO4	-	2	-	-	-	1	-	-	-	1	-	1	-	1	2	-
		CO5	-	0	-	-	-	1	-	-	-	-	-	-	-	-	1	-
		CO6	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-

(IV) PROFESSIONAL CORE SUBJECTS

Course Code	Course Title	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CE(PC)401		CO1	3	3	3	3	-	1	1	-	-	-	-	1	3	3	1	-

Course Code	Course Title	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
	Soil Mechanics - I	CO2	3	3	3	3	-	1	1	-	-	-	-	1	3	3	1	-
		CO2	3	3	3	3	-	1	1	-	-	-	-	1	3	3	1	-
		CO4	3	3	3	3	-	1	1	-	-	-	-	1	3	3	1	-
		CO5	3	3	3	3	-	1	1	-	-	-	-	1	3	3	1	-
		CO6	3	3	3	3	-	1	1	-	-	--	-	1	3	3	1	-
CE(PC)402	Environmental Engineering-I	CO1	3	3	2	2	-	1	2	-	-	-	-	1	3	2	1	-
		CO2	3	2	-	1	-	-	3	-	-	-	-	1	3	3	1	-
		CO2	3	3	-	-	-	2	1	-	-	-	-	3	3	2	1	-
		CO4	3	3	-	2	-	1	1	-	-	-	-	-	3	3	1	-
		CO5	3	3	-	3	-	2	3	-	-	-	-	-	3	3	1	-
		CO6	3	-	3	1	-	2	3	-	-	-	-	1	3	2	1	2
CE(PC)403	Surveying & Geomatics	CO1	3	3	2	2	3	1	-	-	3	2	2	3	3	2	-	1
		CO2	3	2	3	2	3	3	1	-	2	2	3	3	3	2	-	1
		CO2	3	3	2	3	3	3	-	-	3	2	3	2	3	2	1	1
		CO4	3	3	3	3	3	3	-	-	1	1	2	2	2	2	1	1
		CO5	3	3	2	2	3	1	-	-	3	2	3	2	2	2	1	1
		CO6	3	3	3	2	3	2	-	-	2	2	3	2	2	2	1	1
CE(PC)404		CO1	3	3	1	2	1	-	-	-	0	1	-	1	3	2	-	-

Course Code	Course Title	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
	Concrete Technology	CO2	2	2	-	1	1	-	-	-	-	-	-	-	3	1	-	-
		CO2	2	2	1	1	2	-	-	-	-	1	-	-	2	1	-	-
		CO4	3	3	2	2	1	-	1	-	-	-	-	-	3	2	-	-
		CO5	3	2	2	1	2	-	-	-	-	1	-	-	3	2	1	-
		CO6	1	1	-	-	1	-	-	-	-	-	-	-	2	1	1	1
CE(PC)493	Surveying & Geomatics	CO1	3	3	1	2	2	2	-	1	-	-	-	1	3	3	1	1
		CO2	3	3	1	2	2	2	-	1	-	-	-	1	3	3	1	1
		CO2	3	3	1	2	2	1	-	-	-	-	-	1	3	3	1	1
		CO4	3	3	2	2	1	1	-	-	-	-	-	1	3	3	1	1
		CO5	3	3	2	2	1	1	-	1	-	-	-	1	3	3	1	1
		CO6	3	3	3	2	1	1	-	-	-	-	-	1	3	3	1	1
CE(PC)494	Concrete Technology Laboratory	CO1	3	1	-	1	1	1	-	-	1	1	-	1	3	3	1	-
		CO2	2	1	-	1	1	1	-	-	1	1	-	1	3	3	1	-
		CO2	2	3	1	1	2	1	-	-	2	1	-	1	3	3	1	-
		CO4	2	3	2	1	2	1	-	-	2	1	-	1	3	3	1	-
		CO5	3	3	1	1	2	2	-	1	2	2	-	1	3	3	1	-
		CO6	3	3	2	3	3	3	1	1	3	2	1	1	3	3	1	-
CE(PC)501		CO1	3	2	3	-	-	1	1	-	-	1	-	1	3	3	1	-

Course Code	Course Title	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
	Design of RC Structures	CO2	3	2	3	-	-	1	1	-	-	1	-	1	3	3	1	-
		CO3	3	2	3	-	-	1	1	-	-	1	-	1	3	3	1	-
		CO4	3	2	3	-	-	1	1	-	-	1	-	1	3	3	1	-
		CO5	3	2	3	-	-	1	1	-	-	1	-	1	3	3	1	-
		CO6	3	2	3	-	-	1	1	-	-	1	-	1	3	3	1	-
CE(PC)502	Engineering Hydrology	CO1	3	2	1	1	-	2	2	-	-	-	-	1	3	2	2	1
		CO2	3	3	1	1	1	-	1	-	-	-	-	1	3	3	2	1
		CO3	3	3	1	1	1	-	1	-	-	-	-	1	3	3	2	1
		CO4	3	3	1	2	1	-	1	-	-	-	-	1	3	3	2	2
		CO5	3	3	2	2	1	-	1	-	-	1	-	1	3	3	2	2
		CO6	3	3	3	2	2	1	2	-	-	1	1	1	3	3	2	2
CE(PC)503	Structural Analysis - I	CO1	3	3	3	-	-	1	1	-	-	-	-	2	3	3	1	-
		CO2	3	3	3	-	-	1	1	-	-	-	-	2	3	3	1	-
		CO3	3	3	3	-	-	1	1	-	-	-	-	2	3	3	1	-
		CO4	3	3	3	-	-	1	1	-	-	-	-	2	3	3	1	-
		CO5	3	3	3	-	-	1	1	-	-	-	-	2	3	3	1	-
		CO6	3	3	3	-	-	1	1	-	-	-	-	2	3	3	1	-
CE(PC)504	Soil Mechanics - II	CO1	3	3	3	3	-	1	1	-	-	-	-	1	3	3	1	-
		CO2	3	3	3	3	-	1	1	-	-	-	-	1	3	3	1	-

Course Code	Course Title	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
		CO3	3	3	3	3	-	1	1	-	-	-	-	1	3	3	1	-
		CO4	3	3	3	3	-	1	1	-	-	-	-	1	3	3	1	-
		CO5	3	3	3	3	-	1	1	-	-	-	-	1	3	3	1	-
		CO6	3	3	3	3	-	1	1	-	-	--	-	1	3	3	1	-
CE(PC)505	Environmental Engineering - II	CO1	3	3	2	2	-	1	2	-	-	-	-	1	3	2	1	-
		CO2	3	3	3	-	-	1	3	-	-	-	-	-	3	3	1	2
		CO3	3	3	2	-	-	1	3	-	-	-	-	3	3	2	1	-
		CO4	3	3	3	2	-	1	2	-	-	-	-	1	3	3	1	-
		CO5	3	2	-	1	-	1	3	-	-	-	-	-	3	2	1	-
		CO6	3	2	3	-	1	1	3	-	-	-	-	1	3	2	1	2
CE(PC)506	Transportation Engineering	CO1	1	1	2	-	1	1	2	2	-	1	1	1	3	1	2	-
		CO2	1	2	3	1	1	1	1	2	-	1	1	1	2	2	-	-
		CO3	1	-	3	-	2	-	1	2	-	1	2	1	1	1	1	-
		CO4	1	2	3	1	1	1	1	2	-	1	1	1	1	1	1	-
		CO5	1	2	3	1	2	-	1	2	-	1	1	1	3	2	2	-
		CO6	1	-	2	-	1	2	3	2	-	1	1	1	1	-	2	2
CE(PC)591	RC Design Sessional	CO1	2	1	-	1	-	1	-	-	-	-	-	-	3	3	1	-
		CO2	2	2	1	2	-	-	-	-	-	1	-	-	3	3	1	-

Course Code	Course Title	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
		CO3	3	3	3	2	-	1	-	1	-	-	-	3	3	3	1	-
		CO4	3	3	3	2	-	1	-	1	-	1	-	1	3	3	1	-
		CO5	3	3	3	1	-	1	-	1	-	-	-	1	3	3	1	-
		CO6	3	3	2	-	1	1	-	-	-	2	-	2	3	3	1	-
CE(PC)594	Soil Mechanics Laboratory	CO1	3	3	1	2	2	-	1	-	3	2	-	1	3	3	1	-
		CO2	3	3	1	3	-	-	1	-	3	2	-	1	3	3	1	-
		CO3	3	3	1	3	2	-	1	-	3	2	-	1	3	3	1	-
		CO4	3	3	1	3	-	-	1	-	3	2	-	1	3	3	1	-
		CO5	3	3	1	3	2	-	1	-	3	2	-	1	3	3	1	-
		CO6	3	3	2	3	2	-	1	-	3	2	-	1	3	3	1	-
CE(PC)595	Environmental Engineering Laboratory	CO1	3	3	-	3	-	2	3	-	2	2	-	1	3	2	1	-
		CO2	3	2	-	2	-	2	3	-	2	2	-	1	3	2	1	-
		CO3	3	3	-	2	-	2	3	-	2	2	-	1	3	2	1	-
		CO4	3	3	3	2	2	2	2	-	2	2	-	1	3	3	1	-
		CO5	3	2	-	2	-	1	2	-	2	2	-	1	3	3	1	1
		CO6	3	2	3	1	-	2	3	-	2	2	-	1	3	2	2	2
CE(PC)596	Transportation Engineering Laboratory	CO1	3	1	-	-	-	1	-	-	3	1	-	1	3	3	1	-
		CO2	3	1	-	-	-	1	-	-	3	1	-	1	3	3	1	-
		CO3	3	1	-	-	-	1	-	-	3	1	-	1	3	3	1	-

Course Code	Course Title	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
		CO4	3	2	-	-	-	1	-	-	3	2	-	1	3	3	1	-
		CO5	3	2	-	-	-	1	-	-	3	2	-	1	3	3	1	-
		CO6	3	1	-	-	-	1	-	-	1	1	-	1	3	3	1	-
CE(PC)597	Computer Application in CE	CO1	3	2	2	0	2	2	2	1	2	1	0	2	3	3	1	2
		CO2	3	3	2	0	2	2	2	1	2	2	0	2	3	3	1	2
		CO3	3	3	3	1	3	2	2	1	2	3	0	2	3	3	1	2
		CO4	3	3	3	1	3	2	2	1	2	3	0	2	3	2	1	2
		CO5	3	3	2	1	2	2	2	1	2	3	0	2	3	3	1	2
		CO6	3	3	3	3	3	2	2	1	3	3	3	2	3	3	1	2
CE(PC)601	Construction Engineering & Management	CO1	3	3	3	-	-	-	-	-	-	-	-	1	3	3	1	-
		CO2	3	3	3	-	1	-	-	-	-	-	2	1	3	3	1	-
		CO3	3	3	3	-	1	-	-	-	-	-	-	1	3	3	1	-
		CO4	3	3	3	-	3	-	-	-	-	-	-	1	3	3	1	-
		CO5	2	-	2	-	1	-	-	-	-	-	1	1	3	3	1	-
		CO6	1	-	-	-	-	1	-	1	-	-	3	1	3	3	1	-
CE(PC)602	Engineering Economics, Estimation & Costing	CO1	2	1	-	1	-	2	2	1	-	-	1	2	3	2	2	1
		CO2	2	3	1	2	1	-	1	-	-	-	1	2	2	3	2	2
		CO3	2	3	2	2	1	-	1	-	-	-	1	2	2	3	2	2
		CO4	-	2	-	-	3	-	-	-	3	1	3	3	3	2	2	3

Course Code	Course Title	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
		CO5	3	2	-	3	-	-	-	-	3	1	3	3	3	3	2	3
		CO6	-	3	-	-	-	-	-	-	2	2	2	1	2	2	2	3
CE(PC)603	Water Resources Engineering	CO1	3	2	-	-	1	-	-	-	-	-	-	-	3	3	-	-
		CO2	3	1	-	-	-	-	-	-	-	-	-	-	3	3	-	-
		CO3	3	2	-	1	1	-	-	-	-	-	1	-	3	3	1	1
		CO4	3	3	3	-	2	-	2	-	-	-	1	-	3	3	1	1
		CO5	3	2	3	-	2	-	2	-	-	-	1	-	3	3	1	1
		CO6	3	2	-	2	-	-	2	-	-	-	-	-	3	3	-	-
CE(PC)604	Design of Steel Structures	CO1	3	3	3	3	1	1	1	-	-	-	1	2	3	3	3	2
		CO2	3	3	3	3	-	-	1	-	-	-	-	1	3	3	3	2
		CO3	3	3	3	3	-	-	-	-	-	-	-	-	3	3	3	2
		CO4	3	3	3	3	-	-	-	-	-	-	-	-	3	3	3	2
		CO5	3	3	3	3	-	-	-	-	-	-	-	-	3	3	3	2
		CO6	3	3	3	3	-	-	-	-	-	-	-	1	3	3	3	2
CE(PC)693	Water Resource Engineering Laboratory	CO1	3	1	1	-	3	-	1	-	1	2	1	3	3	-	2	-
		CO2	3	3	2	1	-	2	2	-	2	2	1	1	3	3	1	-
		CO3	3	2	-	1	3	-	2	-	3	2	1	2	3	-	1	-
		CO4	3	2	-	-	3	-	2	-	3	2	1	2	3	2	1	-

Course Code	Course Title	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
		CO5	3	2	0	0	3	-	2	-	3	2	1	2	3	1	1	-
		CO6	3	1	0	1	3	1	2	-	3	2	1	3	3	-	3	-
CE(PC)694	Steel Structure Design Sessional	CO1	2	2	1	2	-	2	2	-	2	2	-	1	3	3	1	2
		CO2	2	2	1	2	-	1	1	-	3	1	-	3	3	3	1	2
		CO3	2	3	2	1	-	3	1	-	1	1	-	1	3	3	1	2
		CO4	2	3	3	2	-	2	2	-	2	3	-	2	3	3	1	2
		CO5	2	2	1	1	-	1	2	-	2	1	-	3	3	3	1	2
		CO6	3	2	1	2	-	3	1	-	1	3	-	3	3	3	1	2
CE(PC)695	Quantity Survey Estimation and Valuation Sessional	CO1	3	-	-	-	-	2	1	-	-	1	2	-	3	3	1	-
		CO2	3	2	-	-	1	2	-	2	-	1	2	1	3	3	1	-
		CO3	3	1	2	-	-	2	-	1	-	1	2	1	3	3	1	-
		CO4	3	3	2	1	2	2	-	1	2	1	2	1	3	3	1	-
		CO5	3	1	-	-	3	2	2	3	2	2	3	1	3	3	1	-
		CO6	3	-	2	-	2	2	1	3	3	2	3	3	3	3	1	-

(V) PROFESSIONAL ELECTIVE SUBJECTS

Course Code	Course Title	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CE(PE)601A	Stability of Slopes	CO1	3	2	2	1	-	-	1	-	-	-	-	1	3	3	2	1
		CO2	3	2	2	2	-	-	1	-	-	-	-	1	3	2	2	1

Course Code	Course Title	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
		CO3	3	3	3	2	1	-	-	-	-	-	-	1	3	3	3	1
		CO4	3	3	3	2	1	-	-	-	-	-	-	1	3	3	3	1
		CO5	3	3	3	2	1	-	-	-	-	-	-	1	3	2	3	1
		CO6	3	3	3	3	1	-	1	-	-	-	-	1	3	3	3	1
CE(PE)601B	Foundation Engineering	CO1	3	3	3	1	-	-	-	-	-	-	-	-	3	3	2	-
		CO2	3	3	3	1	-	-	-	-	-	-	-	-	3	3	2	-
		CO3	3	2	3	3	1	-	-	-	-	-	-	1	3	-	3	-
		CO4	3	2	2	2	1	-	1	-	-	-	-	1	3	2	3	-
		CO5	3	3	2	1	-	-	-	-	-	-	-	-	3	3	3	1
		CO6	3	1	2	2	-	-	1	-	-	-	-	-	3	-	2	2
CE(PE)601C	Ground Improvement Technique	CO1	3	2	2	1	-	-	1	-	-	-	-	1	3	3	2	1
		CO2	3	2	2	1	1	-	-	-	-	-	-	1	3	2	2	1
		CO3	3	3	3	2	1	-	-	-	-	-	-	1	3	3	3	1
		CO4	3	3	3	2	1	-	1	-	-	-	-	1	3	3	3	1
		CO5	3	3	3	3	1	-	-	-	-	-	-	1	3	3	3	1
		CO6	3	3	3	3	1	-	1	-	-	-	-	1	3	3	3	1
CE(PE)602A	Building Construction Practice	CO1	2	2	2	2	-	2	1	-	-	-	1	1	3	3	2	1
		CO2	2	2	2	2	-	2	1	-	-	-	1	1	3	3	2	1
		CO3	2	2	2	2	-	2	1	-	-	-	1	1	3	3	2	1

Course Code	Course Title	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
		CO4	2	2	2	2	-	2	1	-	-	-	1	1	3	3	2	1
		CO5	2	2	2	2	-	2	1	-	-	-	1	1	3	3	2	1
		CO6	2	2	2	2	-	2	1	-	-	-	1	1	3	3	2	1
CE(PE)602B	Structural Analysis-II	CO1	3	3	2	-	-	1	1	-	-	-	-	1	3	3	3	2
		CO2	2	2	2	-	-	1	1	-	-	-	-	1	3	3	2	1
		CO3	2	2	2	-	-	-	1	-	-	-	-	1	3	3	1	1
		CO4	3	2	2	-	-	-	1	-	-	-	-	1	3	3	1	1
		CO5	3	3	3	-	-	1	1	-	-	-	-	1	3	3	3	2
		CO6	3	3	3	-	-	1	1	-	-	-	-	1	3	3	3	2
CE(PE)602C	Industrial Structures	CO1	3	-	2	2	-	-	-	-	-	-	-	-	2	2	1	-
		CO2	3	3	1	2	2	2	3	-	1	2	1	2	1	2	-	1
		CO3	3	2	3	3	2	2	2	3	2	3	3	2	1	1	1	1
		CO4	3	3	1	2	2	2	2	-	1	2	1	2	2	1	2	-
		CO5	3	3	3	2	3	2	3	-	1	2	1	2	1	-	-	2
		CO6	3	1	2	2	3	2	2	-	2	1	2	1	1	1	1	-
CE(PE)701A	Computational Hydraulics	CO1	2	3	1	2	2	1	1	-	-	1	-	1	3	3	2	2
		CO2	3	3	2	3	2	2	2	1	1	2	1	2	3	3	2	3
		CO3	3	3	3	3	3	2	2	1	1	2	1	2	3	3	2	3
		CO4	3	3	2	3	3	2	2	1	1	2	1	2	3	3	2	3

Course Code	Course Title	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
		CO5	3	3	3	3	3	3	3	1	2	3	2	3	3	3	3	3
		CO6	3	3	3	3	3	3	3	2	2	2	2	3	3	3	3	3
CE(PE)701B	Disaster Preparedness and Planning	CO1	3	3	3	2	3	2	3	-	2	3	2	3	2	2	1	-
		CO2	3	3	3	2	3	2	3	-	1	2	1	2	2	2	1	1
		CO3	3	2	3	3	3	2	3	3	2	3	3	2	1	1	1	1
		CO4	3	3	3	2	3	2	3	-	1	2	1	2	2	1	2	-
		CO5	3	3	3	2	3	2	3	-	1	2	1	2	2	-	-	2
		CO6	3	3	3	2	3	2	3	-	2	3	2	3	1	1	1	-
CE(PE)701C	Hydraulic Structure	CO1	2	1	2	2	1	1	2	-	-	-	-	-	3	2	1	-
		CO2	2	3	3	3	2	1	1	-	-	-	-	-	2	3	1	-
		CO3	2	2	3	2	1	1	1	-	-	-	1	1	3	2	1	-
		CO4	2	2	3	2	1	1	-	-	-	-	1	1	3	3	1	-
		CO5	2	2	2	1	2	1	1	-	-	-	-	1	2	3	1	-
		CO6	2	2	2	2	2	1	1	-	-	-	1	-	2	2	1	-
CE(PE)702A	Prestressed Concrete	CO1	3	3	3	-	-	1	1	-	-	1	-	2	2	3	2	2
		CO2	3	3	3	-	-	1	1	-	-	1	-	2	3	3	1	2
		CO3	3	3	3	-	-	1	1	-	-	1	-	2	3	3	1	2
		CO4	3	3	3	-	-	-	-	-	-	1	-	2	2	2	1	2

Course Code	Course Title	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
		CO5	3	3	3	-	-	-	-	-	-	1	-	2	2	3	1	1
		CO6	3	3	3	-	-	-	-	-	-	1	-	2	2	3	1	1
CE(PE)702B	Repair & Rehabilitation of Structures	CO1	3	2	2	-	-	1	-	-	-	1	-	2	2	3	2	2
		CO2	3	3	2	-	-	1	-	-	-	1	-	2	3	3	1	2
		CO3	3	3	3	2	2	1	-	-	1	1	-	3	3	3	1	2
		CO4	3	3	3	-	-	2	-	-	-	1	-	2	2	2	1	2
		CO5	3	3	3	2	-	2	2	-	1	1	1	3	2	3	1	1
		CO6	3	3	3	3	3	3	2	-	1	1	1	3	2	3	1	1
CE(PE)702C	Finite Element Method	CO1	2	1	1	-	1	1	-	-	1	1	-	-	1	1	1	-
		CO2	2	2	-	-	2	1	-	-	-	1	-	-	1	1	1	-
		CO3	3	2	2	-	3	2	-	-	2	2	-	-	1	1	1	-
		CO4	3	3	2	2	3	2	2	2	2	3	-	-	1	1	1	-
		CO5	3	3	3	2	3	2	2	2	3	3	-	-	1	1	1	-
		CO6	3	3	3	2	3	3	2	2	3	3	3	-	1	1	1	-
CE(PE)703A	Air and Noise Pollution and Control	CO1	3	3	3	3	-	2	3	-	-	-	-	1	1	-	1	-
		CO2	3	3	3	3	-	2	3	-	-	-	-	1	1	1	1	-
		CO3	3	3	3	3	-	2	3	-	-	-	-	1	1	2	1	-
		CO4	3	3	3	3	-	2	3	-	-	-	-	1	1	2	1	-

Course Code	Course Title	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
		CO5	3	3	3	3	-	2	3	-	-	-	-	1	1	-	1	-
		CO6	3	3	3	3	-	2	3	-	-	--	-	1	1	2	1	-
CE(PE)703B	Physico-Chemical Processes for Water and Wastewater Treatment	CO1	3	3	2	2	-	1	2	-	-	-	-	1	3	2	1	-
		CO2	3	3	3	-	-	1	3	-	-	-	-	-	3	3	1	2
		CO3	3	3	2	-	-	1	3	-	-	-	-	3	3	2	1	-
		CO4	2	3	3	2	-	1	2	-	-	-	-	1	3	3	1	-
		CO5	3	2	-	1	-	1	3	-	-	-	-	-	3	2	1	-
		CO6	3	2	2	-	1	1	3	-	-	-	-	1	3	2	1	2
CE(PE)703C	Water and Air Quality Modelling	CO1	3	3	2	2	1	2	-	-	2	1	-	1	3	3	2	2
		CO2	3	3	2	3	2	-	-	-	2	1	1	1	3	3	2	3
		CO3	3	3	2	3	3	-	-	-	2	1	1	1	3	3	2	3
		CO4	3	3	3	3	3	-	-	-	2	1	1	1	3	3	3	3
		CO5	3	3	3	3	3	3	-	-	3	1	2	1	3	3	3	3
		CO6	2	2	1	1	1	-	-	-	3	1	1	1	2	2	1	1
CE(PE)704A	Structural Dynamics	CO1	2	1	1	-	1	1	-	-	1	1	-	-	1	1	1	-
		CO2	3	2	2	-	2	2	-	-	2	2	-	-	1	1	1	-
		CO3	3	3	3	-	3	3	-	-	3	3	-	-	1	1	1	-
		CO4	3	3	3	2	3	3	2	2	3	3	-	-	1	1	1	-
		CO5	3	3	3	2	3	2	2	2	3	3	-	-	1	1	1	-

Course Code	Course Title	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
		CO6	3	3	3	2	3	3	2	2	3	3	3	-	1	1	1	-
CE(PE)704B	Advanced Structural Analysis	CO1	3	3	3	3	-	-	-	-	-	-	-	2	3	3	3	2
		CO2	3	3	3	3	-	-	-	-	-	-	-	2	3	3	3	2
		CO3	3	3	3	3	-	-	-	-	-	-	-	1	3	3	3	2
		CO4	3	3	3	3	-	-	-	-	-	-	-	2	3	3	3	2
		CO5	3	3	3	3	-	-	-	-	-	-	-	1	3	3	3	2
		CO6	3	3	3	3	-	-	-	-	-	-	-	1	3	3	3	2
CE(PE)704C	Coastal Hydraulics and Sediment Transport	CO1	3	2	2	2	1	-	1	-	-	-	-	1	3	2	2	1
		CO2	3	2	3	2	1	-	-	-	-	-	-	1	3	3	2	1
		CO3	3	3	3	2	1	-	-	-	-	-	-	1	3	3	3	1
		CO4	3	3	3	3	1	-	1	-	-	-	-	1	3	3	3	1
		CO5	3	3	3	3	1	-	1	-	-	-	-	1	3	3	3	1
		CO6	3	3	3	3	1	-	1	-	-	-	-	1	3	3	3	1
CE(PE)705A	Railway and Airport Engineering	CO1	1	1	2	-	-	1	-	2	-	1	1	1	2	1	1	-
		CO2	1	2	3	-	-	1	-	2	-	1	1	1	2	2	2	-
		CO3	1	1	3	-	1	1	-	2	-	1	1	1	3	3	3	1
		CO4	1	2	3	-	1	1	-	2	-	1	2	1	3	3	3	1
		CO5	1	-	1	-	-	1	-	2	-	1	1	1	2	1	1	-
		CO6	1	2	3	-	1	1	1	2	-	1	1	1	3	3	2	1

Course Code	Course Title	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CE(PE)705B	Pavement Design	CO1	2	2	-	-	-	-	-	-	-	-	-	-	2	3	1	1
		CO2	3	3	3	3	1	-	-	-	-	1	-	2	2	2	-	-
		CO3	3	3	-	-	-	-	-	-	-	-	-	1	2	3	-	1
		CO4	3	3	3	3	-	-	-	-	-	1	-	2	1	1	2	1
		CO5	3	3	3	3	-	-	2	-	-	1	-	1	2	2	2	2
		CO6	3	3	-	-	-	-	-	-	-	-	-	-	2	2	1	3
CE(PE)705C	Transportation System Planning	CO1	3	3	3	2	-	-	-	-	-	-	-	2	2	-	3	-
		CO2	3	3	-	-	-	-	-	-	-	-	-	2	3	-	3	-
		CO3	3	3	3	2	-	-	-	-	-	-	-	2	3	-	-	3
		CO4	3	3	-	-	-	-	-	-	-	-	-	2	2	-	3	-
		CO5	3	3	3	1	1	1	-	-	-	-	-	2	3	-	3	-
		CO6	3	3	3	3	-	2	-	-	-	-	2	2	2	-	3	-
CE(PE)801A	GIS & Remote Sensing	CO1	2	2	1	1	2	1	1	-	-	1	0	1	3	2	1	1
		CO2	2	3	2	2	3	2	2	-	-	1	0	1	3	3	2	2
		CO3	2	3	2	3	3	1	2	1	1	1	1	2	2	3	3	2
		CO4	1	2	2	2	3	2	2	-	-	2	-	1	2	3	2	2
		CO5	2	3	3	2	3	3	3	1	2	3	2	2	2	3	2	3
		CO6	3	3	3	3	3	3	3	2	2	2	2	3	3	3	3	3
CE(PE)801B	Rock Mechanics	CO1	3	2	-	1	1	-	1	-	-	1	-	2	3	2	2	1

Course Code	Course Title	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
		CO2	3	3	2	2	2	-	1	-	-	1	-	2	3	3	2	2
		CO3	3	3	2	2	2	-	1	-	-	1	-	2	3	3	2	2
		CO4	3	3	1	3	3	-	1	-	-	1	-	2	3	3	2	2
		CO5	3	3	2	2	2	1	2	-	1	2	1	2	3	3	2	3
		CO6	3	3	3	2	3	1	2	1	2	2	2	3	3	3	3	3
CE(PE)801C	Environmental laws and Policy	CO1	3	3	2	2	-	1	2	-	-	-	-	1	3	2	1	-
		CO2	3	2	-	1	-	-	3	-	-	-	-	1	3	3	1	-
		CO3	3	3	-	-	-	2	1	-	-	-	-	3	3	2	1	-
		CO4	3	3	-	2	-	1	1	-	-	-	-	-	3	3	1	-
		CO5	3	3	-	3	-	2	3	-	-	-	-	-	3	3	1	-
		CO6	3	-	3	1	-	2	3	-	-	-	-	1	3	2	1	2
CE(PE)801D	Pavement Materials and Design	CO1	3	2	2	3	2	2	2	-	2	2	2	2	2	-	1	1
		CO2	3	2	3	3	2	2	1	-	3	3	2	2	2	-	-	1
		CO3	3	2	3	3	2	2	1	-	3	3	2	2	3	-	-	1
		CO4	3	3	3	3	3	2	3	-	2	2	2	3	3	-	-	1
		CO5	3	3	3	3	3	2	3	-	2	2	3	2	2	-	1	2
		CO6	3	3	3	3	3	2	3	-	2	3	3	2	2	-	-	2

(VI) OPEN ELECTIVE COURSES

CE(OE)601A	Soft Skills and Interpersonal Communication - I	CO1	3	2	2	-	-	1	1	-	-	-	-	1	3	3	2	3
		CO2	3	2	2	-	-	1	1	-	-	-	-	1	3	3	2	1
		CO3	3	2	2	-	-	1	1	-	-	-	-	1	3	3	2	3
		CO4	3	2	2	-	-	1	1	-	-	-	-	1	3	3	3	1
		CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CE(OE)601B	Introduction to Philosophical Thoughts	CO1	3	2	2	1	-	1	1	-	-	-	-	1	2	2	1	-
		CO2	3	2	2	2	-	1	1	-	-	-	-	1	2	2	1	-
		CO3	3	3	2	2	-	1	1	-	-	-	-	1	2	2	1	-
		CO4	3	3	2	2	-	1	1	-	-	-	-	1	2	2	1	-
		CO5	3	3	3	2	-	1	1	-	-	-	-	1	2	2	1	-
		CO6	3	3	3	3	-	1	1	-	-	-	-	1	2	2	1	-
CE(OE)701A	Metro Systems & Engineering	CO1	2	-	-	-	-	1	2	-	-	-	-	-	2	-	1	2
		CO2	3	3	3	3	-	1	1	-	-	-	-	-	3	3	2	3
		CO3	3	1	3	3	-	1	1	-	-	-	2	-	1	1	3	1
		CO4	3	1	1	1	-	1	1	-	-	-	-	-	1	1	-	1
		CO5	3	1	1	1	-	1	1	-	-	-	-	-	1	2	-	1
		CO6	3	3	3	1	-	1	1	-	-	-	-	-	1	2	-	1
CE(OE)701B	ICT for Development	CO1	1	1	1	1	2	1	2	1	1	2	1	2	2	1	2	2
		CO2	1	2	1	2	1	3	3	2	1	2	1	2	2	2	2	3

		CO3	1	2	1	1	2	2	3	2	1	2	1	3	3	2	3	2
		CO4	1	2	1	2	2	3	3	3	2	2	2	3	2	2	3	3
		CO5	1	2	3	2	3	2	3	2	2	3	1	3	2	2	2	3
		CO6	1	2	3	1	3	3	3	2	3	3	2	3	2	1	3	3
CE(OE)701C	Cyber Law & Ethics	CO1	2	2	1	1	1	3	2	3	1	1	1	2	2	1	1	1
		CO2	2	2	2	1	1	3	2	3	1	2	2	3	2	1	2	2
		CO3	2	2	2	1	1	3	2	3	1	2	1	2	2	1	2	1
		CO4	3	3	2	2	2	3	2	3	1	2	2	3	3	2	2	2
		CO5	3	3	2	2	2	3	3	3	1	2	2	3	3	2	2	3
		CO6	3	3	3	2	2	3	3	3	2	3	3	3	3	3	3	3
CE(OE)801A	Human Resource Development and Organizational Behavior	CO1	0	0	0	2	1	3	3	3	1	2	1	3	3	1	1	2
		CO2	0	0	0	2	1	3	3	3	1	2	1	3	3	1	1	2
		CO3	0	0	0	2	1	3	3	3	1	2	1	3	3	1	1	2
		CO4	0	0	0	2	1	3	3	3	3	3	3	3	3	1	1	2
		CO5	0	0	0	2	1	3	3	3	1	2	3	3	3	1	1	2
		CO6	0	0	0	2	1	3	3	3	1	2	1	3	3	1	1	2
CE(OE)801B	Bridge Engineering	CO1	3	3	2	-	-	-	-	-	-	-	-	1	3	3	2	1
		CO2	2	2	2	1	2	1	1	-	-	-	-	2	3	3	3	2
		CO3	2	2	3	2	1	-	1	-	-	-	-	2	3	3	3	2
		CO4	3	2	3	2	-	-	1	-	-	-	-	2	3	3	3	2

		CO5	3	3	2	-	-	-	-	-	-	-	-	1	3	3	2	2
		CO6	3	3	2	1	1	-	-	-	-	-	-	2	3	3	3	2
CE(OE)801C	Deep Foundations	CO1	3	2	1	-	-	-	-	-	-	1	-	-	3	3	2	-
		CO2	3	3	3	1	1	1	1	-	1	1	-	-	3	3	3	-
		CO3	3	3	3	2	1	1	1	-	-	1	1	-	3	3	3	-
		CO4	3	3	3	2	1	1	1	-	-	1	-	-	3	3	3	-
		CO5	3	1	2	-	2	-	-	-	-	1	-	-	2	2	2	-
		CO6	3	2	2	1	1	-	-	-	-	1	-	-	2	2	2	-
CE(OE)801D	Groundwater Contamination	CO1	3	2	1	1	-	1	2	-	-	-	-	1	2	2	1	-
		CO2	3	3	3	3	1	-	-	-	-	-	-	1	3	3	3	1
		CO3	3	2	2	2	-	1	2	-	-	-	-	1	2	2	2	1
		CO4	3	3	2	2	-	1	3	1	-	-	-	1	2	3	3	1
		CO5	3	3	3	2	1	-	1	-	-	-	-	1	3	3	3	1
		CO6	3	3	3	3	1	-	1	-	-	-	-	1	3	3	3	1
CE(OE)802A	Soft Skills and Personality Development	CO1	2	1	1	1	1	2	1	2	1	2	2	3	2	1	2	3
		CO2	1	1	2	1	2	2	1	2	3	3	2	3	3	2	2	2
		CO3	1	2	2	1	2	2	1	2	3	3	2	3	2	3	2	2
		CO4	1	2	2	1	2	3	1	3	2	3	3	3	2	2	3	2
		CO5	1	2	3	2	2	3	1	2	2	3	3	3	3	2	2	3
		CO6	1	2	2	2	2	3	2	2	2	2	2	3	2	2	2	3

CE(OE)802B	Earthquake Engineering	CO1	3	1	-	-	-	-	-	-	-	-	-	3	3	0	3	-
		CO2	3	2	1	-	1	1	1	-	-	-	-	3	3	1	3	-
		CO3	3	3	2	2	3	2	2	-	-	-	-	3	3	1	3	-
		CO4	3	3	3	3	3	3	2	-	-	-	-	3	3	2	3	-
		CO5	3	3	3	3	3	3	2	-	-	-	-	3	3	3	3	-
		CO6	3	3	3	3	3	3	3	-	-	-	-	3	3	2	3	-
CE(OE)802C	Urban Transport Planning	CO1	1	0	-	2	1	1	1	-	-	-	1	2	3	3	3	1
		CO2	1	1	-	1	-	1	-	-	-	-	2	1	3	3	3	1
		CO3	1	1	-	-	-	1	-	-	-	-	1	2	3	3	3	1
		CO4	2	2	3	3	1	1	-	-	-	-	2	1	3	3	3	1
		CO5	3	3	3	3	-	1	-	-	-	-	2	1	3	3	3	1
		CO6	2	2	3	3	1	1	-	-	-	-	1	2	3	3	3	1
CE(OE)802D	Environmental Impact Assessment and Life cycle Analysis	CO1	3	3	2	-	-	1	2	-	-	-	-	1	3	2	1	-
		CO2	3	3	3	-	-	1	3	-	-	-	-	-	3	2	1	-
		CO3	3	3	2	-	-	1	3	-	-	-	-	3	3	2	1	-
		CO4	3	3	3	-	-	1	3	-	-	-	-	1	3	2	1	-
		CO5	3	2	-	-	-	1	3	-	-	-	-	-	3	2	1	-
		CO6	3	2	3	-	-	1	3	-	-	-	-	1	3	2	1	-

(VII) INTERNSHIP AND PROJECT

CE(IN)791	Industrial Internship (after sixth semester)	CO1	3	3	2	2	3	-	-	-	1	-	3	3	3	3	2	2
		CO2	-	-	1	1	2	2	-	2	3	1	3	3	1	1	1	3
		CO3	2	2	3	2	3	-	-	2	-	-	2	3	2	2	3	3
		CO4	-	-	-	-	1	-	-	-	-	3	2	3	1	1	1	3
		CO5	1	1	1	-	1	-	-	3	2	-	3	3	1	1	2	3
		CO6	0	2	3	1	2	2	1	2	1	-	2	3	2	2	3	3
CE(PROJ)7 92	Project -1 (Project work)	CO1	3	2	3	3	2	2	2	1	3	-	2	2	3	3	3	3
		CO2	3	3	3	3	2	2	2	-	3	-	3	2	3	3	3	3
		CO3	3	3	3	2	3	2	2	2	3	1	3	2	3	3	3	3
		CO4	3	3	3	2	3	3	3	2	3	2	3	2	3	3	3	3
		CO5	3	3	3	3	3	2	2	2	3	3	3	2	3	3	3	3
		CO6	3	2	3	2	3	2	-	3	3	3	3	3	3	3	3	3
CE(CV)881	Comprehensi ve Viva Voce	CO1	3	2	1	1	1	1	1	1	1	2	1	3	3	2	1	1
		CO2	3	2	1	2	2	1	1	1	1	2	1	3	3	2	1	1
		CO3	3	2	2	3	2	2	2	1	1	3	2	3	3	3	2	2
		CO4	3	2	3	3	2	2	2	2	2	3	2	3	3	3	3	2
		CO5	3	2	3	3	2	2	3	3	3	3	3	3	3	3	3	3
		CO6	3	2	3	3	3	2	3	3	3	3	3	3	3	3	3	3
CE(PROJ)8 82	Project-2 (Continued from VII)	CO1	3	2	1	1	1	1	1	1	1	2	1	3	3	3	3	3
		CO2	3	2	1	2	2	1	1	1	1	2	1	3	3	3	3	3

[illegible]

CURRICULUM

Course Structure

Course Category	Courses	No. of Credits	Weightage (%)
BASIC SCIENCE	8	24	15
ENGINEERING SCIENCE COURSES	21	35	21.875
PROFESSIONAL CORE SUBJECTS	24	49	30.625
HUMANITIES & SOCIAL SCIENCE	6	12	7.5
PROFESSIONAL ELECTIVE SUBJECTS	8	20	12.5
OPEN ELECTIVE COURSES	4	8	5
INTERNSHIP AND PROJECT	4	12	7.5
MANDATORY COURSES (NON CREDIT)	2	-	-
Total		160	100

(I) BASIC SCIENCE

Sl. No.	Course Code	Name of the course	Credits
1.	BS-PH101	Physics-I	4
2.	BS-CH101	Chemistry-I	4
3.	BS-M102	Mathematics-I	4
4.	BS-PH191	Physics-I Laboratory	1.5
5.	BS-CH191	Chemistry-I Laboratory	1.5
6.	BS-M202	Mathematics-II	4
7.	CE(BS)301	Biology for Engineers	3
8.	CE(BS)301	Mathematics-III	2
Total			24

(II) ENGINEERING SCIENCE COURSES

Sl. No.	Course Code	Course Title	Credits
1.	ES-EE101	Basic Electrical Engineering	4
2.	ES-EE191	Basic Electrical Engineering Laboratory	1
3.	ES-ME191	Engineering Graphics & Design	3
4.	ES-ME192	Workshop/Manufacturing Practices	3
5.	ES-CS201	Programming for Problem Solving	3
6.	ES-CS291	Programming for Problem Solving (Practical)	2
7.	CE(ES)301	Engineering Mechanics	4
8.	CE(ES)302	Energy Science & Engineering	2
9.	CE(ES)391	Basic Electronics	2
10.	CE(ES)392	Computer-aided Civil Engineering Drawing	2
11.	CE(ES)393	Life Science	2
12.	CE(ES)401	Introduction to Fluid Mechanics	2
13.	CE(ES)402	Introduction to Solid Mechanics	2
14.	CE(ES)491	Fluid Mechanics Laboratory	1
15.	CE(ES)492	Solid Mechanics Laboratory	1
16.	CE(ES)493	Engineering Geology Laboratory	1
Total			35

(II) HUMANITIES & SOCIAL SCIENCE

Sl. No.	Course Code	Course Title	Credits
1.	ES-EE101	English	4
2.	ES-EE191	Language Laboratory	1
3.	ES-ME191	Humanities-I	3
4.	ES-ME192	Introduction to Civil Engineering	3

5.	ES-CS201	Civil Engineering-Societal & Global Impact	3
6.	ES-CS291	Professional Practice, Law & Ethics	2
Total			12

(IV) PROFESSIONAL CORE SUBJECTS

Sl. No.	Course Code	Course Title	Credits
1.	CE(PC)401	Soil Mechanics–I	3
2.	CE(PC)402	Environmental Engineering-I	3
3.	CE(PC)403	Surveying & Geomatics	3
4.	CE(PC)404	Concrete Technology	3
5.	CE(PC)493	Surveying & Geomatics	1
6.	CE(PC)494	Concrete Technology Laboratory	1
7.	CE(PC)501	Design of RC Structures	3
8.	CE(PC)502	Engineering Hydrology	3
9.	CE(PC)503	Structural Analysis–I	3
10.	CE(PC)504	Soil Mechanics–II	3
11.	CE(PC)505	Environmental Engineering–II	3
12.	CE(PC)506	Transportation Engineering	3
13.	CE(PC)591	RC Design Sessional	1
14.	CE(PC)594	Soil Mechanics Laboratory	1
15.	CE(PC)595	Environmental Engineering Laboratory	1
16.	CE(PC)596	Transportation Engineering Laboratory	1
17.	CE(PC)597	Computer Application in CE	1
18.	CE(PC)601	Construction Engineering & Management	2
19.	CE(PC)602	Engineering Economics, Estimation & Costing	2
20.	CE(PC)603	Water Resources Engineering	2
21.	CE(PC)604	Design of Steel Structures	2
22.	CE(PC)693	Water Resource Engineering Laboratory	1

23.	CE(PC)694	Steel Structure Design Sessional	1
24.	CE(PC)695	Quantity Survey Estimation and Valuation Sessional	2
Total			49

(IV) ELECTIVES

a. PROFESSIONAL ELECTIVE SUBJECTS

Sl. No.	Course Code	Course Title	Credits
1.	CE(PE)601	Elective-I: Stability of Slopes/ Foundation Engineering/ Ground Improvement Technique	2
2.	CE(PE)602	Elective-II: Building Construction Practice/ Structural Analysis-II/ Industrial Structures	2
3.	CE(PE)701	Elective-III: Computational Hydraulics/ Disaster Preparedness and Planning/ Hydraulic Structure	3
4.	CE(PE)702	Elective-IV: Prestressed Concrete/ Repairs & Rehabilitation of Structures/ Finite Element Method	3
5.	CE(PE)703	Elective-V: Air and Noise Pollution and Control/ Physico-Chemical Processes for Water and Wastewater Treatment/ Water and Air Quality Modelling	3
6.	CE(PE)704	Elective-VI: Structural Dynamics/ Advanced Structural Analysis/ Coastal Hydraulics and Sediment Transport	3
7.	CE(PE)705	Elective-VII: Railway and Airport Engineering/ Pavement Design/ Transport System Planning	2
8.	CE(PE)801	Elective VIII: GIS & Remote Sensing/ Rock Mechanics/ Environmental laws and Policy/ Pavement Materials and Design	2
Total			20

b. OPEN ELECTIVE COURSES

Sl. No.	Course Code	Course Title	Credits
1.	CE(OE)601	Open Elective-I (Humanities): Soft Skills and Interpersonal Communication – I/ Introduction to Philosophical Thoughts	2
2.	CE(OE)701	Open Elective-II: Metro Systems & Engineering/ ICT for Development/ Cyber Law & Ethics	2
3.	CE(OE)801	Open Elective-III: Human Resource Development and Organizational Behavior/ Bridge Engineering/ Deep Foundations/ Groundwater Contamination	2
4.	CE(OE)802	Open Elective-IV: Soft Skills and Personality Development/ Earthquake Engineering/ Urban Transport Planning/ Environmental Impact Assessment and Life Cycle Analysis	2
Total			8

(V) INTERNSHIP AND PROJECT

Sl. No.	Course Code	Course Title	Credits
1.	CE(IN)791	Industrial Internship	1
2.	CE(PROJ)792	Project-1	5
3.	CE(CV)881	Comprehensive Viva Voce	1
4.	CE(PROJ)882	Project-2	5
Total			12

(V) MANDATORY COURSES

Sl. No.	Course Code	Course Title	Credits
1.	CE(MC)401	Management I (Organizational Behavior)	0
2.	CE(MC)501	Constitution of India/ Essence of Indian Knowledge Tradition	0
Total			0

CURRICULUM STRUCTURE

FOR B. Tech (CIVIL ENGINEERING) STUDENTS

Semester I (First year)

Sl. No.	Category	Code	Course Title	Hours per week			Credits
				L	T	P	
Theory							
1	Basic Science courses	BS-H101	Physics-I	2	1	0	4
2	Basic Science courses	BS-M102	Mathematics IB	3	1	0	4
3	Engineering Science Courses	ES-101	Basic Electrical Engineering	1	1	0	4
Theory credits							12
Practical/ Sessional							
1	Basic Science courses	BS-H191	Physics I Laboratory	1	0	2	1.5
2	Basic Science courses	ES-E191	Basic Electrical Engineering Laboratory	1	0	2	1
3	Engineering Science Courses	ES-ME192	Workshop/Manufacturing Practices (Gr-B)	1	0	2	3
Practical credits							5.5
Total credits							17.5

Semester II (First year)

Semester II (First year)							
Sl. No.	Category	Code	Course Title	Hours per week			Credits
				L	T	P	
Theory							
1	Basic Science courses	BS-H201	Chemistry-I	2	1	0	4
2	Basic Science courses	BS-M202	Mathematics IIB	3	1	0	4
3	Engineering Science Courses	ES-CS201	Programming for Problem Solving	1	1	0	3
4	Humanities and Social Sciences including Management courses	HM-HU201	English				2
Theory credits							13
Practical/ Sessional							
1	Basic Science courses	BS-CH291	Chemistry-I Laboratory	1	0	2	1.5
2	Engineering Science Courses	ES-CS291	Programming for Problem Solving	1	0	2	2
3	Engineering Science Courses	ESME291	Engineering Graphics & Design	1	0	2	3
4	Basic Science courses	HM-HU291	Language Laboratory				1
Practical credits							7.5
Total credits							20.5

Semester III (Second year)

Sl. No.	Category	Code	Course Title	Hours per week			Credits
				L	T	P	
Theory							
1	Basic Science courses	CE(BS)301	Biology for Engineers	2	1	0	3
2	Engineering Science Courses	CE(ES)301	Engineering Mechanics	3	1	0	4
3	Engineering Science Courses	CE(ES)302	Energy Science & Engineering	1	1	0	2
4	Basic Science courses	CE(BS)301	Mathematics-III (Transform & Discrete Mathematics)	2	0	0	2
5	Humanities and Social Sciences including Management courses	CE(HS)301	Humanities-I (Effective Technical Communication)	3	0	0	3
6	Humanities and Social Sciences including Management courses	CE(HS)302	Introduction to Civil Engineering	1	1	0	2
Theory credits							16
Practical/ Sessional							
1	Engineering Science Courses	CE(ES)391	Basic Electronics	1	0	2	2
2	Engineering Science Courses	CE(ES)392	Computer-aided Civil Engineering Drawing	1	0	2	2
3	Engineering Science Courses	CE(ES)393	Life Science	1	0	2	2
Practical credits							6
Total credits							22

Semester IV (Second year]

Sl. No.	Category	Code	Course Title	Hours per week			Credits
				L	T	P	
Theory							
1	Engineering Science Courses	CE(ES)401	Introduction to Fluid Mechanics	2	0	0	2
2	Engineering Science Courses	CE(ES)402	Introduction to Solid Mechanics	2	0	0	2
3	Professional Core courses	CE(PC)401	Soil Mechanics – I	2	1	0	3
4	Professional Core courses	CE(PC)402	Environmental Engineering - I	2	1	0	3
5	Professional Core courses	CE(PC)403	Surveying & Geomatics	2	1	0	3
6	Professional Core courses	CE(PC)404	Concrete Technology	2	1	0	3
7	Humanities and Social Sciences including Management courses	CE(HS)401	Civil Engineering - Societal & Global Impact	2	0	0	2
8	Mandatory Courses (non-credit)	CE(MC)401	Management I (Organizational Behavior)	2	0	0	0
Theory credits							18
Practical/ Sessional							
1	Professional Core courses	CE(ES)491	Fluid Mechanics Laboratory	0	0	2	1
2	Professional Core courses	CE(ES)492	Solid Mechanics Laboratory	0	0	2	1
3	Professional Core courses	CE(ES)493	Engineering Geology Laboratory	0	0	2	1
4	Professional Core courses	CE(PC)493	Surveying & Geomatics	0	0	2	1
5	Professional Core courses	CE(PC)494	Concrete Technology Laboratory	0	0	2	1
Practical credits							5
Total credits							23

Semester V (Third year]

Sl. No.	Category	Code	Course Title	Hours per week			Credits	
				L	T	P		
Theory								
1	Professional courses	Core	CE(PC)501	Design of RC Structures	2	1	0	3
2	Professional courses	Core	CE(PC)502	Engineering Hydrology	2	1	0	3
3	Professional courses	Core	CE(PC)503	Structural Analysis – I	2	1	0	3
4	Professional courses	Core	CE(PC)504	Soil Mechanics – II	2	1	0	3
5	Professional courses	Core	CE(PC)505	Environmental Engineering – II	2	1	0	3
6	Professional courses	Core	CE(PC)506	Transportation Engineering	2	1	0	3
7	Mandatory (non-credit)	courses	CE(MC)501	Constitution of India/ Essence of Indian Knowledge Tradition	-	-	-	0
Theory credits								18
Practical/ Sessional								
1	Professional courses	core	CE(PC)591	RC Design Sessional	0	0	2	1
2	Professional courses	core	CE(PC)594	Soil Mechanics Laboratory	0	0	2	1
3	Professional courses	core	CE(PC)595	Environmental Engineering Laboratory	0	0	2	1
4	Professional courses	core	CE(PC)596	Transportation Engineering Laboratory	0	0	2	1
5	Professional courses	core	CE(PC)597	Computer Application in CE	0	0	2	1
Practical credits								5
Total credits								23

Semester VI (Third year]

Sl. No.	Category	Code	Course Title	Hours per week			Credits
				L	T	P	
Theory							
1	Professional Core courses	CE(PC)601	Construction Engineering & Management	2	0	0	2
2	Professional Core courses	CE(PC)602	Engineering Economics, Estimation & Costing	2	0	0	2
3	Professional Core courses	CE(PC)603	Water Resources Engineering	2	0	0	2
4	Professional Core courses	CE(PC)604	Design of Steel Structures	2	0	0	2
5	Professional Elective courses	CE(PE)601	Elective-I	2	0	0	2
6	Professional Elective courses	CE(PE)602	Elective-II	2	0	0	2
7	Open Elective courses	CE(OE)601	Open Elective-I (Humanities)	2	0	0	2
Theory credits							14
Practical/ Sessional							
1	Professional Core courses	CE(PC)693	Water Resource Engineering Laboratory	0	0	2	1
2	Professional Core courses	CE(PC)694	Steel Structure Design Sessional	0	0	2	1
3	Professional Core courses	CE(PC)695	Quantity Survey Estimation and Valuation Sessional	0	1	2	2
Practical credits							4
Total credits							18
CE(PE)601 (Elective-I)			CE(PE)602 (Elective-II)				
601A: Stability of Slopes 601B: Foundation Engineering 601C: Ground Improvement Technique			602A : Building Construction Practice 602B : Structural Analysis-II 602C : Industrial Structures				
CE(OE)601 (Open Elective-I)							
601A: Soft Skills and Interpersonal Communication – I 601B: Introduction to Philosophical Thoughts							

Semester VII (Fourth year]

Sl. No.	Category	Code	Course Title	Hours per week			Credits
				L	T	P	
Theory							
1	Open Elective courses	CE(OE)701	Open Elective-II	2	0	0	2
2	Professional Elective courses	CE(PE)701	Elective III	2	1	0	3
3	Professional Elective courses	CE(PE)702	Elective IV	2	1	0	3
4	Professional Elective courses	CE(PE)703	Elective V	2	1	0	3
5	Professional Elective courses	CE(PE)704	Elective-VI	2	1	0	3
6	Professional Elective courses	CE(PE)705	Elective-VII	2	0	0	2
Theory credits							16
Practical/ Sessional							
1	Internship	CE(IN)791	Industrial Internship (after sixth semester)				1
2	Project	CE(PROJ)792	Project-1 (Project work)	0	0	10	5
Practical credits							6
Total credits							22
CE(OE)701 (Open Elective-II)			CE(PE)701 (Elective-III)				
A: Metro Systems & Engineering			701A: Computational Hydraulics				
B: ICT for Development			701B: Disaster Preparedness and Planning				
C: Cyber Law & Ethics			701C: Hydraulic Structure				
CE(PE)702 (Elective-IV)			CE(PE)703 (Elective-V)				
702A: Prestressed Concrete			703A: Air and Noise Pollution and Control				
702B: Repairs & Rehabilitation of Structures			703B: Physico-Chemical Processes for Water and Wastewater Treatment				
702C: Finite Element Method			703C: Water and Air Quality Modelling				
CE(PE)704 (Elective-VI)			CE(PE)705 (Elective-VII)				
704A: Structural Dynamics			705A: Railway and Airport Engineering				
704B: Advanced Structural Analysis			705B: Pavement Design				
704C: Coastal Hydraulics and Sediment Transport			705C: Transport System Planning				

Semester VIII (Fourth year]

Sl. No.	Category	Code	Course Title	Hours per week			Credits
				L	T	P	
Theory							
1	Humanities and Social Sciences including Management courses	CE(HS)801	Professional Practice, law & Ethics	2	0	0	2
2	Professional Elective Courses	CE(PE)801	Elective VIII	2	0	0	2
3	Open Elective courses	CE(OE)801	Open Elective-III	2	0	0	2
4	Open Elective courses	CE(OE)802	Open Elective-IV	2	0	2	2
Theory credits							8
Practical/ Sessional							
1	Comprehensive Viva Voce	CE(CV)881	Comprehensive Viva Voce				1
2	Project	CE(PROJ)882	Project-2 (Continued from VII)	0	0	10	5
Practical credits							6
Total credits							14
CE(PE)801 (Elective-VIII)							
801A: GIS & Remote Sensing 801B: Rock Mechanics 801C: Environmental laws and Policy 801D: Pavement Materials and Design							
CE(OE)801 (Open Elective-III)			CE(OE)802 (Open Elective-IV)				
A: Human Resource Development and Organizational Behavior B: Bridge Engineering C: Deep Foundations D: Groundwater Contamination			A: Soft Skills and Personality Development B: Earthquake Engineering C: Urban Transport Planning D: Environmental Impact Assessment and Life cycle Analysis				

TOTAL CREDITS – [38+(22+23)+(23+18)+(21+15)]=160

SEM 1 & SEM 2	SEM3	SEM4	SEM5	SEM6	SEM7	SEM8	Total
38	22	23	23	18	21	15	160