DEPARTMENT OF CIVIL ENGINEERING

COURSE OUTCOMES (A.Y:2024-2025)

S.No	Semester	Course Code	Course Name	CO No.	Course Outcomes
1	III	2BS303HS	Numerical Methods and Partial Differential Equations	CO1	Find the solution of algebraic and transcendental equations using numerical methods.
				CO2	Apply numerical techniques to solve ordinary differential equations and definite integrals.
				CO3	Apply numericalmethods to interpolate values and fit different curves from given data.
				CO4	Find solutions of first order linear and non linear partial differential equations
				CO5	Apply the solution of partial differential equations to physical problems
2	III	2HS302HS	Managerial Economics & Financial Accountancy	CO1	Determine the responsibilities & decision making in the Organization
				CO2	Understand the various factors influencing demand & market structure
				CO3	Understand the principles of accounting & solve the problems
				CO4	Analyse the Financial performance
				CO5	Understand the capital structure & to take decision on selection of projects
3	III	2ES301CS	Programming for problem solving ©	CO1	Formulate algorithms and learn fundamental program methodologies of C programming.
				CO2	Understand control statements and interpret derived data types with mathematical and engineering problems.
				CO3	Develop modular programming techniques to solve searching, sorting and file system problems

				CO4	Implement pointers and structures concept
				CO5	Recognize pre-processor directives and user defined usage
4	III	2PC301CE	Building Materials and Concrete Technology	CO1	Differentiate between various building materials i.e., both conventional and smart building materials
				CO2	Explain the process of plastering, pointing and damp proofing.
				CO3	Describe the properties of fresh Concrete & Hardened Concrete
				CO4	Explain the procedure for testing of concrete materials and on fresh and hardened concrete as per IS code
				CO5	Design the concrete mix according to requirements of IS, BIS and ACI codes.
5	III	2PC302CE	Solid Mechanics	CO1	Apply the fundamental concepts of stress and strain in the analysis and design of axially loaded members
				CO2	Analyse determinate beams to construct shear force diagram and bending moment diagrams
				CO3	Determine the bending and shear stress distribution in beams and also the stresses in members subjected to combined axial and bending loads.
				CO4	Analyse the compound stresses at a point and evaluate principal stresses and apply in evaluating stresses in cylindrical pressure vessels
				CO5	Evaluate the stresses of circular members subjected to torsion and analyze different types of springs.
6	III	2PC303CE	Surveying	CO1	Explain the terminologies and concepts involved in basic and modern surveying equipment & technologies.
				CO2	Demonstrate the working principles and applications of basic and modern surveying instruments
				CO3	Apply the knowledge of surveying & levelling in calculating lengths, bearings, reduced levels, elevation differences and plotting.
				CO4	Apply the knowledge of theodolite and trigonometry in finding horizontal and vertical angles, heights of inaccessible points
				CO5	Make use of knowledge of curves concept in surveying, in setting out both horizontal and vertical curves.
				CO1	Understand the concepts of Indian culture and Traditions and their importance.

7	III	2MC302HS	Essence of Indian Traditional Knowledge	CO2	Distinguish the Indian languages and literature
				CO3	Learn the philosophy of Ancient, Medieval and Modern India.
				CO4	Acquire the information about the fine arts in India
				CO5	Know the contribution of scientists of different eras, interpret the concepts and theimportance to protect Intellectual property of the nation.
8	III	2ES351CS	Programming for Problem Solving Laboratory ©	CO1	Choose appropriate data type for implementing programs in C language
				CO2	Design and implement modular programs involving I/O, decision making and loops
				CO3	Apply derived data types and implement programs using structures and files
				CO4	Demonstrate problem-solving using searching, sorting, recursion and algorithms
				CO5	Demonstrate life-long learning and problem solving skills
9	III	2PC351CE	Surveying Laboratory	CO1	Demonstrate the working principles and handling procedures of basic surveying instruments like chain, cross staff in finding out linear measurements
				CO2	Demonstrate the levelling instruments and apply the knowledge of levelling in finding out the reduced levels of ground
				CO3	Demonstrate the working principles and handling procedures of theodolite, total station and Hand-held GPS
				CO4	Make use of surveying equipment in computing lengths, areas & bearings of given field work
				CO5	Apply the knowledge of trigonometrical levelling in finding out reduced levels of elevated objects which are both accessible and inaccessible points
10	III	2PC352CE	Concrete Technology Laboratory	CO1	Determine the properties of given cement sample and assess its suitability for use in construction.
				CO2	Determine the properties of fine and coarse aggregate samples to assess their suitability for use in construction works.
				CO3	Measure the workability of concrete and recommend its suitability for structural works
				CO4	Determine the compressive strength of concrete
				CO5	Conduct destructive and non-destructive tests to evaluate the quality and strength of concrete

11	IV	2HS403HS	Human Values and Professional Ethics	CO1	Understand the significance of value inputs in a classroom and start applying them in their life and profession
				CO2	Assess their own ethical value sand the social context of problems
				CO3	Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
				CO4	Understand the role of a human being in ensuring harmony in society and nature.
				CO5	Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.
12	IV	2ES403CS	Python Programmig	CO1	Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
				CO2	Demonstrate proficiency in handling Strings and File Systems.
				CO3	Create, run and manipulate Python Programs using core data structures like Lists, Tuples and Dictionaries.
				CO4	Interpret the concepts of Object-Oriented Programming as used in Python
				CO5	Create and animate a variety of shapes and develop an application with graphical user interface (GUI).
13	IV	2PC404CE	Mechanics of Materials and Structures	CO1	Calculate the deflections of determinate beams due to transverse loads by various methods
				CO2	Evaluate the buckling/critical load of columns for various end conditions using different theories
				CO3	Analyze the beams subjected to unsymmetrical bending and compute the location of the shear centre for various sections
				CO4	Determine the static and kinematics indeterminacy of indeterminate structures and analyze propped cantilever, fixed beams and continuous beams using force method of analysis
				CO5	Apply the energy principles and various energy methods to analyze beams, indeterminate trusses and frames to find deflections and redundant forces
				CO1	Define the characteristic strength of materials and partial safety factors for load and materials & explain the design philosophies of working stress method and Limit state method

14	IV	2PC405CE	Design of Reinforced Concrete Structures	CO2	Apply the key concepts, theories and mathematical fundamentals to analyze and design the structural elements.
				CO3	Analyze the moment capacity of structural elements & design the structural elements for flexure, shear and torsion
				CO4	Examine the serviceability of structural elements
				CO5	Design simple structural members to be able to safely resist bending,shear, torsion, deflection and compression within the imposed factors of safety
15	IV	2PC406CE	Fluid Mechanics	CO1	Elucidate the fluids and different properties of fluids.
				CO2	Relate types of flows with the corresponding mathematical equations
				CO3	Solve the problems on pressure calculations, hydrostatic forces on bodies and buoyancy
				CO4	Make use of Euler's, Bernoulli's and Momentum equation to solve fluid dynamic problems
				CO5	Apply principles of fluid dynamics to make flow measurement calculations
16	IV	2PC407CE	Hydrology	CO1	Outline the interaction among various processes in the hydrologic cycle
				CO2	Determine evaporation, transpiration and infiltration rates from surface water bodies
				CO3	Develop the Rainfall – Runoff relationship
				CO4	Evaluate drawdown and yield in aquifers
				CO5	Estimate the Design flood for Water Resources Structures
17	IV	2MC403HS	Indian Constitution	CO1	Have a general knowledge and back ground about the Constitution of India and its importance.
				CO2	Will distinguish and understand the working of the Central, state and provincial levels of administration.
				CO3	Will be conscious about the fundamental duties, responsibilities and rights as an ideal citizen of India
				CO4	Will be able to perceive and interpret the functioning and distribution of resources between centre and state.
				CO5	Have an awareness and relate to the existing hierarchy of the social structure, election process and Grievance redressal in a democracy
				CO1	Appraise the behaviour of a ductile material under direct tension test, in addition to gaining knowledge on elastic properties of the material.

18	IV	2PC453CE	Mechanics of Materials Laboratory	CO2	Identify the hardness of various metals like brass, copper, aluminium etc
				CO3	Assess and understand the flexural properties of beams (simplysupported, cantilever and fixed) of different materials like wood, steel, copper, aluminium etc
				CO4	Interpret the application of tension and compression springs in practice to understand the properties like stiffness, capacity, shear modulus etc. of the springs
				CO5	Understand the impact properties of the materials and also energy absorption
19	IV	2PC454CE	Building Drawing & Drafting Laboratory	CO1	Illustrate the basic principles of building planning and drawings as per codal provisions.
				CO2	Apply the tools of AUTOCAD software to prepare structural drawings of various building components.
				CO3	Draw plan, elevation and sectional drawings of residential buildings in AutoCAD software.
				CO4	Develop isometric views of Single storey.
				CO5	Develop isometric views of Double storey residential buildings.
20	IV	2ES453CS	Python Programmig Laboratory	CO1	Demonstrate solutions to simple computational problems using Python programs.
				CO2	Solve complex problems using Python functions and control structures.
				CO3	Use Python lists, tuples and dictionaries for representing compound data
				CO4	Develop object-oriented programs with python classes
				CO5	Develop Python programs for GUI applications
21	V	2ES506CE	Disaster Preparedness and Planning	CO1	Apply the concepts of disaster management to evaluate a disaster situation
				CO2	Interpreting the causes of disaster and after effects of disasters.
				CO3	Select appropriate pre-disaster, during disaster and post-disaster measures and framework
				CO4	Identify the disaster management acts and frameworks specific to India relevant to a situation.
				CO5	Identify a suitable technological application to aid disaster management
				CO1	Solve statically indeterminate beams and portal frames using slope deflection, moment distribution and Kani’s method.

22	V	2PC508CE	Structural Analysis	CO2	Analyze the difference between slope deflection, moment distribution and Kani's method of analysis.
				CO3	Analyze SFD and BMD of statically indeterminate beams and portal frames using slope deflection, moment distribution and Kani's method.
				CO4	Develop Stiffness matrix to analyze continuous beams and portal frames
				CO5	Analyze both the two hinged and three hinged arches with different geometry and subjected to different loading conditions
23	V	2PC509CE	Soil Mechanics	CO1	Classify the soil and interpret their index properties
				CO2	Explain capillarity and laboratory procedure to determine the permeability parameters. Calculate the capillarity and permeability parameters of soils.
				CO3	Explain Seepage, quick sand condition and soil stresses. Draw a flow net to compute the seepage quantity in soils
				CO4	Illustrate the mechanisms of the process of compaction and consolidation of soils, and the laboratory procedures to determine their characteristics
				CO5	Analyse the soils for their shear strength and predict the stability of slopes
24	V	2PC510CE	Hydraulics Engineering	CO1	Classify various types of flow in pipes
				CO2	Demonstrate friction loss in laminar and turbulent flows
				CO3	Solve various problems in open channels
				CO4	Illustrate the hydraulic jumps and its uses
				CO5	Apply their knowledge of fluid mechanics in addressing problems in hydraulic machinery.
25	V	2PC511CE	Water Resources Engineering	CO1	Find crop–water requirements
				CO2	Explain the design aspects of different types of wells and regulatory systems
				CO3	Design different types of storage works and fixation of different levels of reservoirs.
				CO4	Analyze and design gravity dams and earthen dams.
				CO5	Analyze the different types of cross drainage structures
26	V	2PC512 CE	Design of Steel Structures	CO1	Explain the composition of structural steel and IS codal provisions and load combinations implemented in the design codes for steel structures
				CO2	Analyze and design simple connections between structural members including riveted and welded connections.
				CO3	Analyze tension &compression members and column bases

				CO4	Design tension &compression members and column bases
				CO5	Evaluate the loading on roof trusses and design of purlins
27	V	6OE501ME	Start Up & Enterpreneurship	CO1	Explain and discuss the concept of entrepreneurship, functions of entrepreneurship, characteristics of entrepreneurs and the role of small-scale industries in economic growth
				CO2	Explain and discuss the Indian industrial environment, types of enterprises and the role of women and first-generation entrepreneurs.
				CO3	Apply and use the concept of project formulation to analyze market demand, technical feasibility and financial feasibility of a business plan
				CO4	Apply and use the concept of Intellectual Property Rights in understanding patent protection, licensing and technology transfer.
				CO5	Analyze the concept of start-ups, start-up strategies, policies and the growth of start-ups in India.
28	V	2PC555CE	Soil Mechanics Laboratory	CO1	Determine Specific gravity of different soils by test results, interpret and validate the same
				CO2	Analyze particle size distribution of soil by conducting sieve analysis test.
				CO3	Analyze the behavior of soils with water by conducting tests
				CO4	Analyze shear strength of soils on application of stress in laboratory.
				CO5	Determine permeability and compaction characteristics of various soils
29	V	2PC556CE	Fluid Mechanics & Hydraulic Engineering Laboratory	CO1	Compute discharge flowing through streams and canals
				CO2	Determination the type of flow in pipe, and discharge through pipes and losses in pipes
				CO3	Competence in understanding flow phenomenon in open channels
				CO4	Analyze the force acting due to jets concept and its application in hydraulic machines
				CO5	Demonstrate working principles of hydraulic pumps and turbines.
30	V	PW501CE	Practice School - I/Internship Evaluation	CO1	Explain techniques, processes and tools used in the industry
				CO2	Discuss the current needs of the industry in his/her area of interest
				CO3	Explain the practical knowledge acquired in the chosen area/work done
				CO4	Summarize and prepare a technical report on practice school completed at industry
				CO5	Adapt to work in a team or as an individual effectively

31	VI	2PC613CE	Construction Engineering & Management	CO1	Understand the construction industry, construction practices, and management systems to construction projects
				CO2	Apply various network theories such as PERT, CPM in construction management to construction projects
				CO3	Analyze cost-time analysis, resource optimization techniques and apply project management software for resource optimization in construction projects.
				CO4	Understand various types of contract documents, tenders, detailed project reports and labor acts in construction practice.
				CO5	Apply optimization techniques and linear programming in construction practice
32	VI	2PC614CE	Transportation Engineering	CO1	Demonstrate fundamental concepts of transportation engineering
				CO2	Apply concepts to solve transportation problems
				CO3	Explain various traffic engineering studies and tests on materials.
				CO4	Apply the knowledge of pavement materials to a real-world problem.
				CO5	Remember the different types of transportation systems management
33	VI	2PC615CE	Environmental Engineering	CO1	Determine the water demand for different cities and Design the water supply network
				CO2	Design the components of water treatment plant and understand the concept of Building plumbing
				CO3	Calculate the sewage flow using different approaches through various sources and design the components of a simple sewerage system
				CO4	Explain the knowledge on sludge, solid waste treatment and disposal
				CO5	Identify air and noise pollution problems, pollution control methods, mechanism and devices.
34	VI	2PC616CE	Foundation Engineering	CO1	Define theories related to stress distribution of soil, types of foundations and their various bearing capacities as well as settlements
				CO2	Explain Safe bearing capacity of shallow foundations, sinking and stability of well foundations.
				CO3	Explain necessity, types, methods and suitability of pile foundations, caissons, coffer dams, geotechnical investigations and dewatering techniques

				CO4	Make use of field tests and settlement analysis to calculate vertical stresses, safe bearing capacity and settlements of shallow foundations.
				CO5	Make use of load tests and formulae to calculate load carrying capacities & efficiency of pile and pile groups.
35	VI	2PE601CE	Prestressed Structures	CO1	Explain the concept of pre-stressing and the behavior of concrete structures and recognize the general principles, methods of pre-stressing, and pre-stressing devices for pre- tensioning and post-tensioning
				CO2	Determine losses of pre-stress in pre-stressed concrete structures
				CO3	Apply the provisions of IS-1343(2012) code to the design of pre-stressed concrete structures for flexure and shear.
				CO4	Analyze the two-span continuous beam for different cable profile
				CO5	Analyze the stresses in anchorage zones and design end anchorages for prestressed concrete beams and evaluate the short- and long-term deflections of beams.
36	VI	2PE604CE	Advance Surveying	CO1	Discuss basics of Photogrammetry, flight planning and stereoscopic vision
				CO2	Determine elevations, scale and lengths of the lines from photographs
				CO3	Illustrate basics, energy interactions and sensor characteristics in Remote Sensing.
				CO4	Explain Segments, Errors and Positioning modes in GPS.
				CO5	Explain Map Projections, data models and spatial data creation and analysis in GIS.
37	VI	6OE602ME	3D Printing technologies	CO1	Describe the fundamentals of 3D printing, classify and explain advantages and disadvantages of 3D Printing technologies
				CO2	Select the suitable CAD data formats and software used in 3D Printing technology.
				CO3	Describe the operating principles, capabilities and limitations of liquid, solid & powder based 3D Printing Technologies.
				CO4	Compare different 3D printing technologies based on their process capabilities and applications
				CO5	Apply the capabilities and knowledge of 3D printing in different industrial sectors

38	VI	2HS653HS	Soft Skills Laboratory	CO1	Listen to a variety of speakers and texts and will be able to comprehend and perform the required tasks
				CO2	Interact in a group professionally and communicate confidently in terms of both the spoken and written communication
				CO3	Develop the skills and strategies of reading and writing
				CO4	Face any Interview confidently by managing time, making decisions by speaking appropriately according to the context
				CO5	Demonstrate right attitude and right skills to cope with team and communicate professionally.
39	VI	2PC657CE	Transportation Engineering Laboratory	CO1	Explain the principles of testing aggregates and bitumen
				CO2	Explain the principles of traffic engineering, such as capacity, level of service, and traffic signal design.
				CO3	Apply the IS 2386 code to perform tests on aggregates and bitumen
				CO4	Analyze traffic data to identify patterns and trends
				CO5	Evaluate the effectiveness of transportation engineering solutions to real-world problems
40	VI	2PC658CE	Environmental Engineering Laboratory	CO1	Analyse the water samples for the determination of pH, Acidity, Alkalinity, Total solids, Dissolved oxygen, BOD, COD etc.
				CO2	Ability to analyze the water and waste water samples and classify them.
				CO3	Ability to identify the potable water
				CO4	Ability to provide the type of treatment required.
				CO5	Demonstrate professional behavior in conducting the experiments and presenting the results effectively.
41	VII	2PC717CE	Estimation and Specification	CO1	Describe the types of estimates and different specifications required for construction works.
				CO2	Compute and prepare estimates for buildings using longwall-short wall method and center-line method.
				CO3	Compute and prepare estimates for roads, culverts, retaining walls, over-head tanks and irrigation canals.
				CO4	Estimate the steel quantities required for various Civil Engineering works and also prepare bar bending schedule.

				CO5	Analyse rates of different items of work based on specifications using Schedule of rates.
42	VII	2PC718CE	Highway Engineering and Pavement Design	CO1	Understand highway categories and assess their impact on design.
				CO2	Apply geometric design principles effectively for safe and efficient highways.
				CO3	Analyze stress in flexible and rigid pavements using relevant theories
				CO4	Understand factors influencing pavement design for optimal performance.
				CO5	Understand various pavement design approaches for both flexible and rigid pavements.
43	VII	2PE706CE	Sustainable Civil Engineering Materials	CO1	Understand sustainability in civil engineering, analyze environmental challenges, and apply Life Cycle Assessment (LCA) for evaluation
				CO2	Assess carbon emissions in cement production, explore alternative cements, and promote resource-efficient concrete solutions.
				CO3	Investigate operational energy reduction, net zero building techniques, and evaluate materials for minimizing resource utilization and water consumption
				CO4	Examine radiation budget, surface water balance, and implement energy-efficient building envelopes using sustainable insulation materials and technologies
				CO5	Explore sustainable building rating systems like LEED, analyze green projects, and pursue LEED Green Associate certification.
44	VII	2PE707CE	Repair, Retrofitting, and Maintenance of Structures	CO1	Distinguish between various definitions related to building repair and maintenance.
				CO2	Differentiate the types of defects, damage and explain the various deterioration mechanisms in structures
				CO3	Classify and explain the various non-destructive tests and condition assessment procedures.
				CO4	Describe various repair materials and techniques
				CO5	Explain the various retro fitting and rehabilitation procedures
				CO1	Evaluate and choose eco-friendly building sites, considering location, amenities, and ecology.
				CO2	Implement strategies to optimize energy and water usage, including efficient landscaping and renewable energy integration.

45	VII	2PE709CE	Principles of Green Building Practices	CO3	Select sustainable building materials, minimizing environmental impact and waste generation.
				CO4	Apply site analysis techniques to design buildings for energy efficiency and occupant comfort.
				CO5	Promote resource conservation and reduce carbon footprint through green building practices.
46	VII	2PE711CE	Principles of Climate Change	CO1	Describe the impacts of climate change on natural environment
				CO2	Explain the fundamentals of global water balance.
				CO3	Explain about climate changes and its impact on climate specifically hydrology
				CO4	Brief introduction of climate modelling using statistical downscaling techniques
				CO5	Describe Bias correction methods in climate science
47	VII	6OE703ME	Introduction to Robotics	CO1	Understand the principles and functions of robotic components
				CO2	Analyze the role of sensors, actuators, and controllers in robotic systems.
				CO3	Apply kinematic principles to model and control robot movement.
				CO4	Develop basic programming skills for robot control and simulation
				CO5	Understand socio economic aspects of robotics
48	VII	PW702CE	Guided Self-Study Software Certification Courses	CO1	Proficiency in using civil engineering software.
				CO2	Independent navigation and utilization of software
				CO3	Application of software tools to solve engineering problems.
				CO4	Development of self-directed learning skills
				CO5	Attainment of industry-recognized software certifications.
49	VII	PW703CE	Technical Report and Seminar/Mini Project (Case study Based)	CO1	Identify their domain interest through critical review of literature
				CO2	Explain the civil engineering techniques, processes and tools used in the respective case study
				CO3	Develop the technical skill in preparing a well-structured report on the chosen topic
				CO4	Develop the skill of presenting a structured seminar using Power Point presentation tools
				CO5	Adapt to work in a team or as an individual effectively
				CO1	Identify, locate, and critically evaluate relevant literature and resources related to the project topic

50	VII	PW804CE	Major Project (OR) Professional Practice School-II	CO2	Formulate clear, achievable, measurable objectives and comprehensive action plans for their project.
				CO3	Evaluate and select suitable methods and modern tools for solving complex civil engineering problems
				CO4	Evaluate methods for solving engineering problems, considering their environmental and societal implications, and select solutions that promote sustainability and societal well-being
				CO5	Function effectively with in a team to develop and implement comprehensive action plans for project execution