

Department of Civil Engineering

Program: M.Tech- Structural Engineering

Academic Year 2024-25

Course Code	Name of Course	No. of CO	CO Description
23MT5003	NM	CO1	Apply numerical methods like bisection, Newton Raphson methods to find root of the transcendental equations . Using Numerical Techniques finding Solution of Linear equations
		CO2	Apply Optimality Criteria, and Bracketing methods - Exhaustive Search Method, Bounding Phase Methods to solve the real world problems.
		CO3	Applying interpolation methods like Newton forward and backward interpolation, Newton divided difference interpolation, Lagrange interpolation to find missing information of real data
		CO4	Apply Numerical approach to solve Partial Differential Equations and their applications like one and Two dimensional equations.
		CO5	Applying numerical techniques to solve real world problems and their applicability and discussing their related project problems
23CE5103	SD	CO1	Introduction to Structural Dynamics. Basic concepts and terminology. Classification of dynamic loads Importance of structural dynamics in engineering design
		CO2	Single Degree of Freedom Systems. Equation of motion for single degree of freedom systems. Free vibration, forced vibration, and resonance Response to harmonic and impulsive loading
		CO3	Multi-Degree of Freedom Systems. Equation of motion for multi-degree of freedom systems. Eigenvalue and eigenvector analysis Modal superposition method

		CO4	Response Spectrum Analysis Introduction to response spectrum method. Generation of response spectra Application of response spectrum analysis in structural design
		CO5	Time History Analysis Introduction to time history analysis Generation of ground motion records Application of time history analysis in seismic design
		CO6	Use computational tools and software for dynamic analysis of structures.
		CO7	Develop and present solutions to complex structural dynamics problems, including innovative and practical approaches.
23CE5104	ASC	CO1	Gain a solid understanding of the basic components of concrete including cement, aggregates, water, and their interactions.
		CO2	Identify and describe the various types of chemical and mineral admixtures used in concrete, such as superplasticizers, air-entrainers, retarders, accelerators, and silica fume.
		CO3	Understand the implications of admixture interactions with other concrete ingredients and environmental conditions
		CO4	Explore various types of special concretes including high-performance concrete, self-compacting concrete, lightweight concrete, and fiber-reinforced concrete.
		CO5	Acquire the skills to design concrete mixes using both traditional methods and newer approaches that include admixtures and special ingredients.
		CO6	Learn the design principles and construction techniques of special concrete.
23CE5105	ASPCS	CO1	Understand prestressing system and material properties and Losses of prestress

		CO2	Analysis of prestressed members.
		CO3	Estimate the deflection, Shear and Torsion Resistance of Prestressed Concrete Member, Transmission of Pre-Stress
		CO4	Analyze the Composite construction and design of Prestressed concrete members
23CE5206	FEASE	CO1	Introduction to Finite Element Analysis Basic concepts and terminology Historical development of finite element methods Applications of finite element analysis in structural engineering
		CO2	Finite Element Formulation Variational principles and weak form formulation Shape functions, interpolation, and numerical integration Assembly of element equations and global stiffness matrix
		CO3	Finite Element Modeling Types of finite elements: truss, beam, plane stress, plane strain, and solid elements Mesh generation techniques: structured and unstructured meshing Material properties, boundary conditions, and loads
		CO4	Solution Techniques Direct and iterative solution methods Solution algorithms for linear and nonlinear problems Time integration methods for dynamic analysis
		CO5	Solution Techniques Direct and iterative solution methods Solution algorithms for linear and nonlinear problems Time integration methods for dynamic analysis
		CO6	Interpret and communicate finite element analysis results effectively through technical reports, presentations, and visualizations.
		CO7	Explore advanced topics in finite element analysis, such as mesh convergence, adaptive analysis, and optimization techniques.

23CE5207	BSS	CO1	Understand the various types of bridges and their structural components.
		CO2	Apply the principles of statics and dynamics to the analysis of bridge structures
		CO3	Analise bridges to withstand the forces of gravity, wind, and traffic.
		CO4	Evaluate bridges to withstand the forces of gravity, wind, and traffic
		CO5	Design bridges to withstand the forces of gravity, wind, and traffic
23IE5149	TP	CO1	Understand Literature Review and Problem Identification
		CO2	Understand Methodology and Implementation
23IE5201	ERD	CO1	Analyze existing research to identify a focused and answerable research question or develop a well-defined hypothesis
		CO2	Evaluate different research designs based on their strengths and weaknesses in relation to the chosen research question and data needs.
		CO3	Apply appropriate data collection methods considering the chosen research design and data characteristics.
		CO4	Analyze and interpret data using relevant data analysis methods to address the research question

23IE6150	DIS	CO1	Identify and articulate research problems within their field of study, demonstrating an understanding of current research gaps.
		CO2	Design and execute research methodologies, employing relevant techniques for data collection, analysis, and interpretation.
		CO3	Demonstrate advanced critical thinking skills, analyzing research findings within the context of existing literature to draw meaningful conclusions.
23IE6250	DIS	CO1	Demonstrate a comprehensive understanding of a chosen research topic and its significance in the broader field.
		CO2	Apply appropriate research methodologies to address research questions
		CO3	Analyze and interpret data effectively, drawing meaningful conclusions