

Department of Civil Engineering

Program: M.Tech- Structural Engineering

Academic Year 2023-24

Course Code	Course Title	No. of Co	Description of the Course Outcome
23CE5101	Advanced Mechanics of Solids	Co1	Interpret the theory of elasticity including strain/displacement and Hooke's law relationships in two dimensional planes
		Co2	Able to analyse the two-dimensional problems in polar coordinates
		Co3	Able to analyse the Three-dimensional problems in polar coordinates
		Co4	Able to analyse the Plasticity deformations of stress and strain.
23CE5102	Advanced Prestressed Concrete Design	Co1	Understand the concepts of prestressed concrete and analyze the prestressed concrete beams.
		Co2	Analyze losses in prestressed concrete and deflection of the prestressed concrete members
		Co3	Design reinforcement for Ultimate shear, torsion and bending of prestressed concrete members.
		Co4	Design end blocks as per IS 1343 recommendations.
		Co5	Design of prestressed members, composite sections, continuous prestressed beams
23CE5103	Advanced Concrete Technology	Co1	Able to analyse the Characteristics of the Concrete Making Materials
		Co2	Able to design Concrete Mixes as per the Different Codal Provisions
		Co3	Able to design Concrete Mixes for Special Concretes
		Co4	Able to analyse the Durability Issues of Concrete and the Service Life of Concrete.

			Able to Design the Concrete Mix for various structures and able to cast and test the structural elements
23CE5104	Structural Dynamics	Co1	Solve response of free and forced vibrations
		Co2	Solve response to Arbitrary, Step and Pulse Excitations (SDOF)
		Co3	Solve Earthquake Response of Linear Systems (SDOF)
		Co4	Build Generalized Single Degree of Freedom Systems
23CE5205	Theory of Plates and Shells	Co1	Derive the pure bending and curvature of plates
		Co2	Derive the differential equation for laterally loaded rectangular plates
		Co3	Derive the deformation of shells without bending
		Co4	Understand the general theory of Cylindrical shells
		Co5	Derive the pure bending and curvature of plates
23CE5206	Finite Element Analysis	Co1	Understand the Basic Finite Element Concepts
		Co2	Analysis of Trusses, Beam Bending, Structural Frames and Column buckling using Finite Element Methods
		Co3	Analysis of Higher order elements for one dimensional problems and Isometric quadrilateral elements and triangular elements
		Co4	Analyse the applications based on general two-dimensional boundary value problem
		Co5	Demonstrate the ANSYS software to develop the models using Finite element method
23CE5207	Bridge Engineering	Co1	Introduction to different types of bridges and codal provisions for designing the bridge components.
		Co2	Analysis and Design of slab Culvert.
		Co3	Analysis and Design of T-Beam, sub-structure components and bearings
		Co4	Understanding the designing of cable supported bridges.
23CE5208	Earthquake Resistant Design of	Co1	Understanding the designing of cable supported bridges.

	Structures	Co2	Understand the system of base isolation in structures for resistance towards earthquakes and general detailing requirements of ductile structure.
		Co3	Analyze a structure for earthquake forces onto the structure under static and dynamic behavior.
		Co4	Design the structure for earthquake forces on 2 – storey building
23CE51A1	Pre-Engineered structures	Co1	Introduction to PES
		Co2	Design Of Industrial Buildings And Shell Roofs
		Co3	Design Of Pre-Engineered Structures
		Co4	Applications & Pratical Orientation
23CE51A2	Design of offshore structures	Co1	Analysis of Wave theories
		Co2	Analysis Forces of offshore structures
		Co3	Design of offshore structure & Analysis of offshore structures
		Co4	Design of offshore structures
23CE51B1	Design and detailing of RC Structures	Co1	Design of RC members
		Co2	Analysis, design and detailing of flat slab, grid slab
		Co3	Design and detailing of Elevated water tanks, cantilever and counterfort retaining walls
		Co4	Earthquake resistant design, Ductile detailing
23CE51B2	Repair and Rehabilitation of structures	Co1	Understand the concept of Deterioration of structures with aging, Need for rehabilitation
		Co2	Understand the damage level of structures affected due to seismic loads, Damage assessment and evaluation models
		Co3	Understand procedure of rehabilitation methods like Grouting; Detailing; Imbalance of structural stability
		Co4	Understand the retrofiting methodology and procedure
23CE52C1	Fracture Mechanics	Co1	Understanding the basic concepts of Fracture and Linear Elastic Fracture Mechanics (LEFM)

		Co2	Understanding the concept of Crack Tip Plasticity
		Co3	Understanding the concept Elastic Plastic Fracture Mechanics (EPFM)
		Co4	Understanding the concept of Fatigue Crack Growth and practical problems of fracture mechanics
23CE52C2	Design of Tall Structures	Co1	Understanding the design criteria of Tall structures
		Co2	Understanding the Loadings On Tall Structures
		Co3	Understanding the behaviour of Rigid-Frame Structures and Shear Wall Structures
		Co4	Understanding the behaviour of Tubular Structures
23CE52D1	Green Buildings	Co1	Understand the concept of Green Building Materials and Equipment in India
		Co2	Understand Benefits Experienced in Green Buildings, Launch of Green Building Rating Systems, Residential Sector; Opportunities of Green Building
		Co3	Understand HVAC System design, Chiller selection, pump selection, Selection of cooling towers, Selection of air handling units
		Co4	Understand about Air Conditioning, Material conservation, Indoor Environment Quality and Occupational Health
23CE52D2	Stability of Structures		Introduction to buckling of columns
			Analysis of lateral buckling of beams
			Analysis of lateral buckling of plates and shells
			Understanding the Mathematical treatment of stability problems
23CE52A3	HYDRATION,POROSITY,& STRENGTH OF CEMENTITIOUS MATERIAL	Co1	Cement and concrete is the backbone of infrastructure development, ,
		Co2	and it is important that engineers have a clear understanding of issues involved not only with cement
		Co3	hydration and strength development
		Co4	but also porosity, permeability and durability

23CE52B3	STRUCTURAL RELIABILITY	Co1	Partial safety factor based approach of basic design variables
		Co2	Checking safety and economy at some selected locations on the failure boundaries (i.e. limit states) considering uncertainties.
		Co3	Exact assessment of safety based on detailed probabilistic analysis of the structural systems as a whole
		Co4	Understanding the Mathematical treatment of stability problems
23CE52C3	DESIGN OF CONNECTIONS IN STEEL STRUCTURES	Co1	The course “Design of Connections in Steel Structures” helps students understand the fundamental mechanism of how different types of connections behave
		Co2	Analysis and design process accounts for the same
		Co3	The course also includes solved examples of various types of steel connections
		Co4	simple connection, ordinary moment connections, ductile moment connections, connections in members subjected to axial forces, gusset plate design, etc.
23CE52D3	SOIL STRUCTURE INTERACTION	Co1	The course will focus on the different soil-structure interaction models for shallow foundation under various loading conditions and subgrade characteristics.
		Co2	Piles under uplift and lateral loading conditions will also be discussed.
		Co3	Beams and plates on elastic foundation problems & different foundation models and their solution
		Co4	Finite Difference Method (FDM) will be discussed. The application of foundation models in real life problems will also be discussed.