



Excellence in Higher Education

AKSHAYA

COLLEGE OF ENGINEERING AND TECHNOLOGY

(Approved by AICTE, Recognized by UGC and Affiliated to Anna University)

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DEPARTMENT OF CIVIL ENGINEERING
M.E. STRUCTURAL ENGINEERING
COURSE OUTCOMES (REGULATION 2021)

SEMESTER I

Course Code / Course Name: MA4153 / Advanced Mathematical Methods

CO No.	Course Outcomes (COs)
C101.1	Apply the Laplace and Fourier transforms to the initial value, initial-boundary value and boundary value problems in Partial Differential Equations.
C101.2	Demonstrate accurate and efficient use of maximizing and minimizing the functions in various branches of Engineering Disciplines.
C101.3	Explain the fundamental concepts of conformal mappings between various domains and to study the problems in physics and engineering, particularly fluid and heat flow problems.
C101.4	Understand the basic concepts of tensor algebra and its applications and to solve mathematical problems involving tensors.
C101.5	Apply the tensor analysis as a tool in the field of applied sciences and related fields.

Course Code / Course Name: ST4101 / Theory of Elasticity and Plasticity

CO No.	Course Outcomes (COs)
C102.1	Derive the fundamental equations of elasticity and develop constitutive models based on material behaviour.
C102.2	Illustrate the application of plane stress and plane strain in both cartesian and polar coordinate systems.
C102.3	Solve torsion problems in both circular and non-circular cross-sections by analyzing the distribution of shear stresses and angular deformations.
C102.4	Demonstrate the behavior of beams resting on elastic foundations by analyzing the interaction between the beam and foundation.
C102.5	Analyse the simple boundary value problems with elasto-plastic and strain hardening properties.

Course Code / Course Name: ST4102 / Structural Dynamics and Earthquake Engineering

CO No.	Course Outcomes (COs)
C103.1	To vibration analysis of system/structures with a single degree of freedom and can explain the method of damping the systems
C103.2	To dynamic analysis of system/structures with Multi degrees of freedom under free and forced vibration

C103.3	To derive a mathematical model of a continuous system and do a dynamic analysis under free and forced vibration
C103.4	To explain the causes and effects of an earthquake and evaluation of earthquake forces as per codal provisions
C103.5	To design masonry and RC structures for the earthquake forces as per their commendations of IS codes of practice

Course Code / Course Name: RM4151 / Research Methodology and IPR

CO No.	Course Outcomes (COs)
C104.1	Understand and adhere to ethical guidelines, avoiding plagiarism and ensuring data integrity.
C104.2	Develop skills in formulating research questions and designing robust methodologies.
C104.3	Learn techniques for collecting and analyzing data to derive meaningful insights.
C104.4	Understand the process of commercializing research innovations through licensing and collaboration.
C104.5	Examine the impact of intellectual property laws on innovation and economic development.

Course Code / Course Name: ST4004 / Prefabricated Structures

CO No.	Course Outcomes (COs)
C105.1	Gain knowledge on different requirements for planning and layout using IS Codes along with safety factors and deflection controls.
C105.2	Understand the concept of long wall and cross-wall large panel buildings, different types of slabs, framed building and connections.
C105.3	Recognize the floor and roof slabs, handling and erection of staircase and deflection control under short-term and long-term loads.
C105.4	Determine the types of wall panels, curtains, partition walls and also to calculate ultimate strength in shear and flexure.
C105.5	Identify the industrial sheds with crane gantry systems, R.C. Roof Trusses, Roof Panels, corbels and columns, wind bracing. Cylindrical, Folded plate and paraboloid shells, Erection and jointing of components in industrial buildings.

Course Code / Course Name: ST4161 / Advanced Construction Engineering and Experimental Techniques Laboratory

CO No.	Course Outcomes (COs)
C106.1	Use the IS and ACI codal provisions to determine the mix proportion. Apply the experimental techniques to connect with the theory to acquire practical understanding.
C106.2	Test the concrete in a non-destructive manner using rebound hammer. Learn the usage of electrical and optical systems for various measurements.
C106.3	Understand the properties of concrete's permeability. Utilize graphical analysis and analytical methods to understand the experimental results.
C106.4	Examine the impact of the chemical and mineral admixtures in concrete. Learn about non-destructive testing in practice.
C106.5	Study the flow characteristics of self-compacting concrete. Learn to calibrate and use proving rings and LVDTs

Course Code / Course Name: ST4111 / Technical Seminar

CO No.	Course Outcomes (COs)
C107.1	Analyze the latest advancements in structural engineering, such as the integration of sustainable materials and smart technologies.
C107.2	Apply technical writing skills to effectively communicate ideas for seminars, conferences, and journal publications.
C107.3	Create dynamic and engaging presentations that clearly communicate complex concepts to diverse audiences.
C107.4	Evaluate and generate innovative ideas on technical concepts and Synthesize input from diverse perspectives to develop comprehensive solutions
C107.5	Analyze emerging trends in structural engineering to gain a deeper understanding of future developments.


Course Code / Course Name: ST4201 / Advanced Steel Structures

CO No.	Course Outcomes (COs)
C108.1	Design the steel members such as purlins, gable wind girders subjected to combined forces
C108.2	Explain and design different types of steel connections such as welded and bolted flexible as well as moment resisting connections
C108.3	Analyze and design industrial structures such as trusses and portal frames subjected to wind and seismic forces
C108.4	Explain the effect of axial force and shear force on steel structures and analyse continuous beams and frames using plastic theory
C108.5	Evaluate the behaviour and design of compression and flexural Cold-formed Steel members

Course Code / Course Name: ST4202 / Advanced Concrete Structures

CO No.	Course Outcomes (COs)
C109.1	Explain the structural behaviour of flexural members and design of RC beams in shear and torsion members.
C109.2	Design the compression members and behaviour of short column under axial load with uniaxial and biaxial moments.
C109.3	Design the special elements like corbels, simply supported and continuous deep beams and grid floor.
C109.4	Design flat slab, spandrel beams, yield line theory of slabs, virtual work method and equilibrium method
C109.5	To predict the moment curvature behaviour, detail concrete elements based on ductility and cast -in -situ joints in frames.

Course Code / Course Name: ST4203 / Finite Element Analysis in Structural Engineering

CO No.	Course Outcomes (COs)
C110.1	Formulate a finite element problem using basic mathematical principles method.
C110.2	Explain the various types of elements and select the appropriate element for modelling

C110.3	Examine a frame structure by modelling it with truss elements to analyze its behavior under various loads.
C110.4	Formulate and analysis the two and three dimensional solid finite element problems.
C110.5	Analyse shells, thick and thin plates and explain the dynamic analysis using FEM

Course Code / Course Name: CN4071 / Advanced Concrete Technology (ACT)

CO No.	Course Outcomes (COs)
C111.1	Gain familiarity with the different materials used in the production of concrete.
C111.2	Use the guidelines to create concrete mix designs using different techniques.
C111.3	Develop knowledge in the different methods of manufacturing of concrete.
C111.4	Gain and develop knowledge in special types of concrete which are useful in the enhancement of mechanical properties.
C111.5	Analyze the characteristics of both fresh and hardened concrete by comprehending the test protocols in accordance with the most recent IS code.

Course Code / Course Name: ST4073 / Maintenance, Repair and Rehabilitation of Structures (MRRS)

CO No.	Course Outcomes (COs)
C112.1	Know about the Importance of maintenance and assessment method of distressed structures.
C112.2	Gain knowledge about the quality of concrete based on strength, durability properties and their effects due to climate and temperature.
C112.3	Know about the Recent development of special, eco-friendly concrete, and its application in construction,
C112.4	Familiarising the different techniques used to repair concrete elements and Corrosion protection reinforced concrete and steel structures.
C112.5	Summarize the Repair, rehabilitation and retrofitting of structures and demolition methods.

Course Code / Course Name: ST4211 / Numerical and Finite Element Analysis Laboratory

CO No.	Course Outcomes (COs)
C113.1	Apply thorough knowledge to effectively operate FE software, analyzing complex structural problems.
C113.2	Analyze the results to identify potential issues and propose solutions for improved structural performance.
C113.3	Analyze the behavior of thin and thick plates under different loading conditions and apply the findings to optimize design solutions.
C113.4	Conduct a stability analysis to assess the behavior of structures under various conditions.
C113.5	Analyze and integrate MATLAB codes to solve complex structural problems and interpret the results.

Course Code / Course Name: ST4212 / Structural Design Studio

CO No.	Course Outcomes (COs)
C114.1	Understand the requirements of a structure and model it accordingly using computer software

C114.2	Analyze the structure for various loads and load combinations according to the relevant IS codes
C114.3	Design and detail structures using computer software/tools and check the correctness using manual approximate methods
C114.4	Prepare complete structural drawings using computer software by analyzing design specifications and incorporating relevant details.
C114.5	Observe the flow of forces within a structure by analyzing how different load conditions affect its behavior.

SEMESTER III

Course Code / Course Name: ST4010 / Design of Industrial Structures

CO No.	Course Outcomes (COs)
C201.1	Develop the concept of planning by analyzing the functional requirements based on industrial standards.
C201.2	Analyse and design Steel Gantry girders & Crane girders and RCC design of corbels, nibs and staircase.
C201.3	Analyze the structural requirements for cooling towers, bunkers, silos, and pipe-supporting structures by evaluating load conditions and material properties.
C201.4	Analyse & design of steel transmission line towers and chimney by evaluating their load-bearing capacities and design.
C201.5	Design the foundation for cooling towers, chimneys, and turbo generators by analyzing their structural requirements and environmental factors.

Course Code / Course Name: ST4091 / Design of Bridge Structures

CO No.	Course Outcomes (COs)
C202.1	To explain the different types of bridges and design philosophies in working Stress method and limit state method of design
C202.2	To design an RC solid slab culvert bridge and Orthotropic plate theory, load distribution techniques
C202.3	To design an RC Tee beam, slab bridge and design principles of continuous girder bridges, box girder bridges, balanced cantilever bridges
C202.4	To design the bridge bearings and substructure by analyzing the load distribution and environmental factors.
C202.5	To explain the design principles of PSC bridges, box girder bridges, truss bridges and vertical and horizontal stiffeners

Course Code / Course Name: CX4016 / Environmental Sustainability

CO No.	Course Outcomes (COs)
C203.1	To study about environment and ecosystems understanding with interrelationships in various factors.
C203.2	To study about different types of natural resource, understanding their characteristics and uses.
C203.3	To understand the key concepts of biodiversity and its importance for ecosystem stability.
C203.4	Basic knowledge and concept of causes, effect and control of different type of environmental pollution
C203.5	To develop a knowledge of natural resources and its conservation and their significance to the environment.

Course Code / Course Name: ST4311 / Practical Training

CO No.	Course Outcomes (COs)
C204.1	Describe the key components and functions of a structural engineering organization and industry standards.
C204.2	Identify and explain the various functions involved in construction activities and evaluate how function contribute to the overall success.
C204.3	Gain an understanding of groups and group dynamics and apply this understanding to improve group interactions and outcomes.
C204.4	Evaluate project processes and outcomes to assess performance and suggest improvements for future projects.
C204.5	Apply the theoretical knowledge acquired to solve real-world problems and improve future applications.

Course Code / Course Name: ST4312 / Project Work I

CO No.	Course Outcomes (COs)
C205.1	Apply the knowledge gained from theoretical and practical courses in solving problems.
C205.2	Recognize the importance of literature review and identify the gaps, applying this understanding to support and enhance your own research.
C205.3	Develop a clear outline and methodology for the project by synthesizing relevant information.
C205.4	Identify potential research gaps by analyzing existing literature and recognizing areas lacking sufficient exploration.
C205.5	Report and present the findings of the work conducted and evaluate their implications to communicate meaningful conclusions.

SEMESTER IV**Course Code / Course Name: ST4411 / Project Work II**

CO No.	Course Outcomes (COs)
C205.1	Discover potential research areas in the field of Structural Engineering by analyzing current advancements and challenges.
C205.2	Apply the knowledge gained from theoretical and practical courses to be creative, well-planned, organized and coordinated
C205.3	Represent data acquired in graphical and reader-friendly formats by applying appropriate visualization techniques.
C205.4	Derive detailed conclusions from work carried out by synthesizing the results and analyzing their significance.
C205.5	Report and present the findings of the work by organizing data effectively and analyzing key results.