



**CHAITANYA BHARATHI
INSTITUTE OF TECHNOLOGY (A)**

Kokapet(Village), Gandipet, Hyderabad, Telangana-500075. www.cbit.ac.in



COMMITTED TO
RESEARCH,
INNOVATION AND
EDUCATION

44
years

M.E (Structural Engineering) Program

M.E. Program Outcomes (PO's)

PO1: An ability to independently carry out research /investigation and development work to solve practical problems.

PO2: An ability to write and present a substantial technical report/document.

PO3: Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program

PO4: Formulate / refine the problem and apply suitable methods of solution that result into a sustainable outcome.

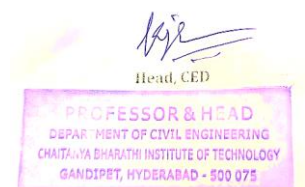
M.E – Structural Engineering

Department Vision

To strive for excellence in academics, research and consultancy in the field of Civil Engineering and contribute to the sustainable development of the country by producing quality Civil Engineers with professional and ethical values.

Department Mission

1. Maintaining high academic standards to develop analytical thinking and independent judgment among the students so that they are fit for industry and higher studies.
2. Promoting skills and values among the students to prepare them as responsible global citizens who can solve complex problems.
3. Preparing the students as good individuals and team members with professional attitude, ethics, concern for environment and zeal for lifelong learning who can contribute to society.



M.E – Structural Engineering

Program Educational Objectives (PEO's):

The PEOs are to facilitate the graduating students to

1. **PEO1:** : Analyze and design structural systems in compliance with guidelines of various codes
2. **PEO2:** Identify and employ sustainable, alternative, and cost-effective materials in construction with strict quality control practices in place.
3. **PEO3:** Communicate effectively, and demonstrate leadership qualities and professional ethics.
4. **PEO4:** Engage in life-long learning for career growth and to rise to societal needs

Department of Civil Engineering
Course Outcomes
Academic Year 2022-2023

S. No.	Year/ Sem	Name of the Course	
1	I/I	20CE C101 - STRUCTURAL DYNAMICS	
		20CE C101.1	The student gains expertise and confidence to tackle field dynamic problems, especially in the field of earthquake and wind engineering.
		20CE C101.2	Gets the ability to model any dynamic system and get its response
		20CE C101.3	Can carry out modal analysis and can easily handle any software and can correctly interpret the results.
		20CE C101.4	Can effectively use practical vibration analysis methods and obtain the dynamic parameters.
		20CE C101.5	Gets the ability to apply numerical methods to get the dynamic response of the systems
2	I/I	20CE C102- FINITE ELEMENT METHOD IN STRUCTURAL ENGINEERING	
		20CE C102.1	The fundamentals of FEM, elements of theory of elasticity
		20CE C102.2	Principle of minimum potential energy and variation formulation of FEM and analyze simple problems using bar elements.
		20CE C102.3	The analysis of trusses beams and rigid jointed plane frames.
		20CE C102.4	The formulation of Global stiffness matrix, load matrix and analysis structures using 1 st order triangular elements, isoperimetric elements, and quadrilateral elements
		20CE C102.5	Application of Axi-Symmetric and Tetra-Hedron elements.
3	I/I	(ELECTIVE-I)	
		20CE E101- THEORY OF THIN PLATES AND SHELLS	
		20CE E101.1	Able to analyze thin rectangular plates under pure bending and provide classical solutions to plate problems
		20CE E101.2	Capable of analyzing axi-symmetric circular plates and employ approximate methods to rectangular plate problems.
		20CE E101.3	Able to analyze the plate problems for stability and thermal stresses
		20CE E101.4	Capable of distinguishing between different shell roofs and analyze thin shells by DKJ and Schorer's theories
4	I/I	20CE E102- ADVANCED STRUCTURAL ANALYSIS	
		20CE E102.1	Analyse continuous beams and redundant trusses using force and displacement approaches (flexibility & stiffness approaches) of matrix methods
		20CE E102.2	Analyse rigid jointed plane frames and grids by flexibility methods.
		20CE E102.3	Analyse rigid jointed plane frames and grids by stiffness methods
		20CE E102.4	Applies the concepts of (beams of semi-infinite and infinite lengths) an elastic foundation to field problems and analytical models.
		20CE E102.5	Solve the boundary value problems using approximate methods.
5	I/I	20CE E103- THEORY OF STRUCTURAL STABILITY	

		20CE E103.1	Applied the concepts of elastic and inelastic stability to columns and the concepts of elastic stability to frames
		20CE E103.2	Uses Eigen value solution to solve the stability problems of discrete and continuous systems.
		20CE E103.3	Analyses the buckling problems of this walled member including torsion, wrapping axial loading and bending.
		20CE E103.4	Deals with the problems of lateral buckling of beams & applies energy methods
		20CE E103.5	Solve the problems of buckling of rectangular plates with simply supported and other edge conditions.
		20ME E103- ANALYTICAL AND NUMERICAL METHODS FOR STRUCTURAL ENGINEERING	
		20ME E103.1	Know the roots of convergence of iterative methods and their importance
		20ME E103.2	Develop the skills of finding approximate curve fitting techniques for given data
		20ME E103.3	Know the interpolation techniques (Methods) to approximate the value of the integral for the functions whose ant derivatives can't be found
		20ME E103.4	Obtain the solution of IVPS of first order differential equations using numerical techniques
		20ME E103.5	Obtain the solution of system of linear equations by using iterative method
		20ME E103.6	Understand the mathematical and computational foundations of the numerical approximations and solutions in engineering
		20CE E104-STRUCTURAL HEALTH MONITORING	
		20CE E104.1	Appraise importance of Diagnosis the distress in the structure, develop an understanding the root causes and factors.
		20CE E104.2	Assess the health of structure using static field methods
		20CE E104.3	Assess the health of structure using dynamic field tests
		20CE E104.4	Identify the locations for repairs and various repair methods, can able to suggest rehabilitation methods for structure.
		20CE E104.5	Adapt and implement EMI technique
		20CE E105- STRUCTURAL OPTIMIZATION	
		20CE E105.1	Apply the basic principles of optimization and classical methods of optimizations.
		20CE E105.2	Solve the problems of Linear programming and Networks analysis and apply them to Civil Engineering problem
		20CE E105.3	Apply the Non-linear programming and Geometric & Dynamic programming methods to field problems
		20CE E105.4	Use the principles of optimum structural design to beams and concrete mix design.
		20CE E105.5	Optimize the structural design of Reinforced concrete T & L beams, planar trusses and Grid
		20ME M103- RESEARCH METHODOLOGY AND IPR	
		20ME M103.1	Define research problem, review and assess the quality of literature from various sources.
		20ME M103.2	Improve the style and format of writing a report for technical paper/ Journal report, understand and develop various research designs.
6	I/I		
7	I/I		
8	I/I		
9	I/I		

		20ME M103.3	Collect the data by various methods: observation, interview, questionnaires
		20ME M103.4	Analyze problem by statistical techniques: ANOVA, F-test, Chisquare
		20ME M103.5	Understand apply for patent and copyrights
10	I/I	20CE C103-STRUCTURAL DESIGN LAB	
		20CE C103.1	Idealize beam grids and frames for the given plan of a building
		20CE C103.2	Calculate loads on building elements for a given plan
		20CE C103.3	Analyse building frames using a manual method and software
		20CE C103.4	Design all structural elements of a given building with a practical approach and grouping the design.
		20CE C103.5	Prepare structural drawings with good detailing, in a professional way
11	I/I	20CE C104-ADVANCED CONCRETE LAB	
		20CE C104.1	Deduce the stress - strain values for a given high strength concrete and checks its suitability for a purpose.
		20CE C104.2	Interpret the correlation between the cube strength, cylindrical strength split tensile strength and modulus of rupture and determines any missing value among these, others being known.
		20CE C104.3	Suggest suitable grade and quantity of steel for resisting cyclic loads
		20CE C104.4	Conduct suitable non-destructive test for the condition assessment of existing concrete members
		20CE C104.5	Take proper precaution to avoid flexural and shear failures in concrete beams
		20CE C104.6	Strengthen the concrete members to resist torsion
12	I/II	20CE C105- DESIGN OF HIGH-RISE STRUCTURES	
		20CE C105.1	Understand the loads acting on the tall buildings.
		20CE C105.2	Learn the concept of analysis of high rise building for wind loads
		20CE C105.3	Learn the concept of analysis of high rise building for seismic loads
		20CE C105.4	Learn the different structural systems for high rise buildings
		20CE C105.5	Learn the assessment of nonlinear performance of the structures
13	I/II	20CE C106-ADVANCED SOLID MECHANICS	
		20CE C106.1	Will be able to solve the problems of 3-D elasticity with confidence.
		20CE C106.2	Can independently work with the problems of 2-D elasticity in Cartesian/Polar Coordinates.
		20CE C106.3	Are familiarized with the use of Airy's stress function in 2-D problems of elasticity in Cartesian/Polar Coordinates.
		20CE C106.4	Are equipped with the knowledge of various theories of torsion of prismatic bars of various cross sections and can solve the problems of torsion.
		20CE C106.5	Will be able to solve plasticity problems in Structural engineering
14	I/II	(ELECTIVE-III)	
		20CE E106 -ADVANCED STEEL DESIGN	
		20CE E106.1	Students will understand behaviour of structural steel, pressed steel and design philosophies of steel structures.

		20CE E106.2	Students will be able to analyze and design of grillage foundation.
		20CE E106.3	Students will be able to analyze and design of overhead steel and pressed steel water tanks
		20CE E106.4	Students will be able to analyze and design of bunkers and silos
		20CE E106.5	Students will be able to analyze and design of foundations of Transmission line towers overall arrangements and design of members of Transmission line towers.
15	I/II	20CE E107-REPAIR AND RETROFITTING OF STRUCTURE	
		20CE E107.1	Identify reasons for distress and suggest remedial measures
		20CE E107.2	Analyze the causes for corrosion and identify the durability factors for the safety of structures
		20CE E107.3	Identify and suggest various repair materials
		20CE E107.4	Analyze and suggest the retrofitting methods
		20CE E107.5	Identify the suitable Tests required for SHM
16	I/II	20CE E108- DESIGN OF MASONRY STRUCTURES	
		20CE E108.1	Select appropriate masonry unit and mortar mixes for masonry construction.
		20CE E108.2	Distinguish from a wide range of materials for their suitability to arrive at feasible and optimal solutions for masonry constructions
		20CE E108.3	Apply knowledge of structural masonry for advanced research and construction procedures.
		20CE E108.4	Justify the design of masonry buildings for sustainable development.
		20CE E108.5	Repair and strengthen the existing masonry structures for seismic loads
17	I/II	20CE E109 - DESIGN OF ADVANCED CONCRETE STRUCTURES	
		20CE E109.1	Analyse and Design curved and deep beam as per the field requirements.
		20CE E109.2	Be able to find the stresses in domes for various loads and design them.
		20CE E109.3	With the thorough knowledge acquired during the course, the student is able to analyze and design Bunkers and Silos with ease
		20CE E109.4	be able to assess the structural behaviour of Raft, Pile and Machine foundations and design them
		20CE E109.5	Gets reasonable expertise to implement ductile detailing and also design solid shear walls
18	I/II	20CE E110- ADVANCED FOUNDATION ENGINEERING	
		20CE E110.1	Decide the sustainability of soil strata for different projects.
		20CE E110.2	Design shallow foundations by deciding the bearing capacity of Soil.
		20CE E110.3	Analyze and design the pile foundation.
		20CE E110.4	Understand analysis methods and design for well foundation.
		20CE E110.5	Interpret and implement the concepts of coffer dams and sheet piles.
19	II/I	20CE E111-DESIGN OF INDUSTRIAL STRUCTURES	
		20CE E111.1	The student gets the ability to compute design loads and design Steel Gantry Girders for various complex situations.
		20CE E111.2	The student can analyze and design bunkers and silos and can effectively get them executed with the knowledge acquired during

			the course.
		20CE E111.3	The student, with his sound knowledge acquired, can proportion various accessories of steel chimneys and be able to design chimneys along with foundations
		20CE E111.4	The student gets clear understanding of cold formed sections and the related difficulties and problems. He gets the ability to design various structural components using cold formed sections.
		20CE E111.5	The student is conversant with the fire effects on structures and has sound knowledge in fire models, fire engineering design
		20CE E111.6	Steel structures and mechanical properties of steel at elevated temperatures.
20	I/II	20CE C107- MODEL TESTING LAB	
		20CE C107.1	Estimate the natural frequencies and mode shapes of a beam.
		20CE C107.2	Evaluate the dynamic response of a building model using shake table/ mini shake table set up.
		20CE C107.3	Evaluate the response of building models under wind loads, using wind tunnel setup.
		20CE C107.4	Determine the pattern of deflection and cracks in RC slab elements and portal frames, under static loading.
		20CE C107.5	Use Piezoelectric sensor for the determination of vibration characteristics of a beam
21	I/II	20CE C108-NUMERICAL ANALYSIS LAB	
		20CE C108.1	To find roots of non linear equations by using numerical methods
		20CE C108.2	To know how to fit the given data in different curves
		20CE C108.3	To know how to solve system of linear equations by using direct and indirect methods
		20CE C108.4	To know how to integrate by using numerical methods
		20CE C108.5	To find solution of first order ODE by numerical methods
		20CE C108.6	To know how to apply computational methods in engineering by using MAT Lab program
22	I/II	20CE C109- MINI PROJECT WITH SEMINAR	
		20CE C109.1	Formulate a specific problem and give solution.
		20CE C109.2	Develop model/models either theoretical/practical/numerical form.
		20CE C109.3	Solve, interpret/correlate the results and discussions.
		20CE C109.4	Conclude the results obtained.
		20CE C109.5	Write the documentation in standard format.
23	II/I	20CE E114 - Design of Prestressed Concrete Structures	
		20CE E114.1	Understand the basic aspects of pre stressed concrete fundamentals, and calculate losses in the pre stressed concrete
		20CE E114.2	Analyse and design pre stressed concrete beam/girders
		20CE E114.3	Design pre stressed concrete end blocks and understand the mechanism of anchorage zones.
		20CE E114.4	Analyse and Design continuous prestressed beams members.
		20CE E114.5	Analyse and design slabs with partial and full pre stressing, and also analyse the crack formations rationally

24	II/I	20CE E115 - Design of Bridges	
		20CE E115.1	Attains ability to design slab and T beam bridges and gets well versed with lateral load distribution for T girders.
		20CE E115.2	Acquires sound knowledge about various structural actions of box girder bridges. He also gets the ability to analyse box girders
		20CE E115.3	Using some approximate methods and design single cell box girder bridges
		20CE E115.4	Gets thorough knowledge in Railway loadings and can design both Plate girder and Truss girder bridges with ease and efficiency
		20CE E115.5	The student gets comprehensive idea about long span flexible bridges and the problems associated with them. He gets to know the
		20CE E115.6	Wind effects and the importance of aerodynamic stability. He also will be able to design elastomeric bearings for bridges
		20CE E115.7	The student gets a clear understanding of bridge foundations and also acquires knowledge about various construction techniques.
25	II/I	20CE E116 - Fracture Mechanics of Concrete Structures	
		20CE E116.1	To predict the effects of crack like defects on the performance of civil engineering structures.
		20CE E116.2	To employ modern numerical methods to determine critical crack sizes and fatigue crack propagation rates in engineering structures.
		20CE E116.3	To know the behavior of concrete subjected to tension and compression failure
		20CE E116.4	To select appropriate materials for engineering structures to insure damage tolerance.
20CE E116.5	To analyse the CTOD and CMD problems using various models		
26	II/I	20CE E117 - Design of Plates and Shells	
		20CE E117.1	Analyze the thin shells and folded plates with the knowledge of their behavior
		20CE E117.2	Design the shells with double curvature
		20CE E117.3	Design the cylindrical shells
		20CE E117.4	Design the hyperbolic paraboloid shells
20CE E117.5	Analyze and design folded plates		
27	II/I	20CS 0101-Business Analytics	
		20CS 0101.1	To understand the basic concepts of business analytics
		20CS 0101.2	Identify the application of business analytics and use tools to analyze business data
		20CS 0101.3	Become familiar with various metrics, measures used in business analytics
		20CS 0101.4	Illustrate various descriptive, predictive and prescriptive methods and techniques
20CS 0101.5	Model the business data using various business analytical methods and techniques		
28	II/I	20ME 0101- Industrial Safety	
		20ME 0101.1	Identify the causes for industrial accidents and suggest preventive measures.
		20ME 0101.2	Identify the basic tools and requirements of different maintenance procedures.
		20ME 0101.3	Apply different techniques to reduce and prevent Wear and corrosion in Industry.

		20ME 0101.4	Identify different types of faults present in various equipment's like machine tools, IC Engines, boilers etc.
		20ME 0101.5	Apply periodic and preventive maintenance techniques as required for industrial equipment's like motors, pumps and air compressors and machine tools etc
29	II/I	20ME 0102 - Introduction to Optimization Techniques	
		20ME 0102.1	Formulate a linear programming problem (LPP)
		20ME 0102.2	Build and solve Transportation Models and Assignment Models
		20ME 0102.3	Apply project management techniques like CPM and PERT to plan and execute project successfully
		20ME 0102.4	Apply queuing and inventory concepts in industrial applications
		20ME 0102.5	Apply sequencing models in industries
30	II/I	20CE 0101 - Cost Management of Engineering Projects	
		20CE 0101.1	Acquire in-depth knowledge about the concepts of project management and understand the principles of project management
		20CE 0101.2	Determine the critical path of a typical project using CPM and PERT techniques.
		20CE 0101.3	Prepare a work break down plan and perform linear scheduling using various methods.
		20CE 0101.4	Solve problems of resource scheduling and levelling using network diagrams.
		20CE 0101.5	Learn the concepts of budgetary control and apply quantitative techniques for optimizing project cost.
31	II/I	20ME 0103 - Composite Materials	
		20ME 0103.1	Classify and characterize the composite materials
		20ME 0103.2	Describe types of reinforcements and their properties.
		20ME 0103.3	Understand different fabrication methods of metal matrix composites.
		20ME 0103.4	Understand different fabrication methods of polymer matrix composites.
		20ME 0103.5	Decide the failure of composite materials
32	II/I	20EE 0103 - Waste to Energy	
		20EE 0103.1	Understand the concept of conservation of waste
		20EE 0103.2	Identify the different forms of wastage
		20EE 0103.3	Chose the best way for conservation to produce energy from waste
		20EE 0103.4	Explore the ways and means of combustion of biomass 5
		20EE 0103.5	Develop a healthy environment for the mankind
33	II/II	20CE C110 - Dissertation Phase- I	
		20CE C110.1	Students will be exposed to self-learning various topics
		20CE C110.2	Students will learn to survey the literature such as books, national/international refereed Journals and contact resource persons for the selected topic of research.
		20CE C110.3	Students will learn to write technical reports.
		20CE C110.4	Students will develop oral and written communication skills to present.
		20CE C110.	Student will defend their work in front of technically qualified audience

34	II/II	20CE C111 - Dissertation Phase-II	
		20CE C111	Students will be able to use different experimental techniques and will be able to use different software/ computational/analytical tools.
		20CE C111	Students will be able to design and develop an experimental set up/ equipment/test rig.
		20CE C111	Students will be able to conduct tests on existing set ups/equipment's and draw logical conclusions from the results after analyzing them.
		20CE C111	Students will be able to either work in a research environment or in an industrial environment.
		20CE C111	Students will be conversant with technical report writing and will be able to present and convince their topic of study to the engineering community.

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