CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)
Kokapet, Gandipet, Hyderabad - 500 0 75.
DEPARTMENT OF CIVIL ENGINEERING

M. E Civil (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.

Programme Outcomes: At the end of the program, graduate will be able to

PO1: Apply the principles of Structural Engineering to the appropriate problems with an ability to carry out research independently.
PO2: Investigate, analyze and formulate solutions to the complex real world problems related to Structural Engineering.
PO3: Demonstrate the use of modern tools and techniques in the field of Civil & Structural Engineering.
PO4: Formulate / refine the problem and apply suitable methods of solution that result into a sustainable outcome.

Course Outcomes:

S. No	Course Code	Course Name	Course Outcomes:
Semester I			
1	19CE C101	ADVANCED STRUCTURAL ANALYSIS	**Course Outcomes:** At the end of the course, student will be able to 1. Analyse continuous beams and redundant trusses using force and displacement approaches (flexibility & stiffness approaches) of matrix methods 2. Analyse rigid jointed plane frames and grids by flexibility methods. 3. analyse rigid jointed plane frames and grids by stiffness methods. 4. Applies the concepts of (beams of semi-infinite and infinite lengths) an elastic

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			foundation to field problems and analytical models. 5. Solve the boundary value problems using approximate methods.
2	19CE C102	ADVANCED SOLID MECHANICS	**Course Out Comes:** The students 1. Will be able to solve the problems of 3-D elasticity with confidence. 2. Can independently work with the problems of 2-D elasticity in Cartesian/Polar Coordinates. 3. Are familiarized with the use of Airy's stress function in 2-D problems of elasticity in Cartesian/Polar Coordinates. 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. 5. Will be able to solve plasticity problems in Structural engineering.
3	19CE E101	THEORY OF THIN PLATES AND SHELLS	**Course Outcomes:** At the end of the course, the student will be 1. Able to analyze thin rectangular plates under pure bending and provide classical solutions to plate problems. 2. Capable of analyzing axi-symmetric circular plates and employ approximate methods to rectangular plate problems. 3. Able to analyze the plate problems for stability and thermal stresses. 4. Capable of distinguishing between different shell roofs and analyze thin shells by DKJ and Schorer's theories. 5. Able to perform the shell analysis using membrane theory.
4	19CE E102	THEORY AND APPLICATIONS OF CEMENT COMPOSITES	**Course Outcomes:** At the end of the course, student is able to 1. Classify the composite materials as per orthotropic and anisotropic behavior. 2. Formulate the constitutive relationship and compare the mechanical behavior of cement composites. 3. Prepare, Analyze and design structural elements made of cement composites. 4. Determine the mechanical properties and durability characteristics of cement composites. 5. Utilize Ferro cement and Fiber reinforced concretes in housing, water storage and boats by understanding the constitutive

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			relationship of materials.
5.	19CEE103	THEORY OF STRUCTURAL STABILITY	**Course Outcomes**: At the end of the cause the student 1. Applied the concepts of elastic and inelastic stability to columns andthe concepts of elastic stability to frames. 2. Uses Eigen value solution to solve the stability problems of discreteand continuous systems 3. Analyses the buckling problems of this walled member includingtorsion, wrapping axial loading and bending. 4. Deals with the problems of lateral buckling of beams & applies energymethods 5. Solve the problems of buckling of rectangular plates with simplysupported and other edge conditions.
6	19MTE103	ANALYTICAL AND NUMERICALMETHODS FOR STRUCTURAL ENGINEERING	**Course Outcomes:** At the end of the course, student is able to 1. Know the roots of convergence of iterative methods and theirimportance 2. Develop the skills of finding approximate curve fitting techniques forgiven data 3. Know the interpolation techniques (Methods) to the approximate thevalue of the integral for the functions whose ant derivatives can't befound 4. Obtain the solution of IVPS of first order differential equations using numerical techniques 5. Obtain the solution of system of linear equations by using iterative method 6. Understand the mathematical and computational foundations of the numerical approximations and solutions in engineering.
7	19CEE104	STRUCTURAL HEALTH MONITORING	**Course Outcomes:** At the end of the course, students will be able to 1. Appraise importance of Diagnosis the distress in the structure,develop an understanding the root causes and factors. 2. Assess the health of structure using static field methods. 3. Assess the health of structure using dynamic field tests. 4. Identify the locations for repairs and

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			various repair methods. can ableto suggest rehabilitation methods for structure 5. Adapt and implement EMI technique.
8	19CE E105	STRUCTURAL OPTIMIZATION	**Course Outcomes:** As the end of the course the student should be able to 1. Apply the basic principles of optimization and classical methods of optimizations. 2. Solve the problems of linear programming and Networks analysisand apply them to Civil Engineering problem. 3. Apply the Nonl inear programming and Geometric & Dynamicprogramming methods to field problems. 4. Use the principles of optimum structural design to beams and concretemix design. 5. Optimize the structural design of Reinforced concrete T & L beams, planar trusses and Grid.
9	19ME C103	RESEARCH METHODOLOGY AND IPR	**Outcomes:** At the end of the course, student will be able to 1. Define research problem, review and asses the quality of literaturefrom various sources 2. Improve the style and format of writing a report for technical paper/Journal report, understand and develop various research designs 3. Collect the data by various methods: observation, interview, questionnaires 4. Analyze problem by statistical techniques: ANOVA, F-test, Chi-square 5. Understand apply for patent and copyrights.
10	19CE C103	STRUCTURAL DESIGN LAB	**Course Outcomes:** At the end of the course, student is able to 1. Idealize beam grids and frames for the given plan of a building 2. Calculate loads on building elements for a given plan 3. Analyze building frames using a manual method and software 4. Design all structural elements of a given building with a practicalapproach and grouping the design. 5. Prepare structural drawings with good detailing, in a professional way.

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11	19CE C104	ADVANCED CONCRETE LAB	**Course Outcomes:** At the end of the course, student is able to 1. Deduce the stress - strain values for a given high strength concrete and checks its suitability for a purpose. 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. 3. Suggest suitable grade and quantity of steel for resisting cyclic loads. 4. Conduct suitable non-destructive test for the condition assessmentof existing concrete members 5. Take proper precaution to avoid flexural and shear failures in concretebeams 6. Strengthen the concrete members to resist torsion.
Semester II			
1	19CE C105	FINITE ELEMENT METHODS IN STRUCTURAL ENGINEERING	**Course Outcomes:** At the end of the course, student is able to 1. The fundamentals of FEM, elements of theory of elasticity. 2. Principle of minimum potential energy and variation formulation ofFEM and analyze simple problems using bar elements. 3. The analysis of trusses beams and rigid jointed plane frames. 4. The formulation of Global stiffness matrix, load matrix and analysisstructures using 1st order triangular elements, isoperimetric elements, and quadrilateral elements. 5. Application of Axi-Symmetric and Tetra-Hedron elements.
2	19CE C106	STRUCTURAL DYNAMICS	**Course Outcomes:** At the end of the course, student is able to 1. The student gains expertise and confidence to tackle field dynamic problems, especially in the field of earthquake and wind engineering. 2. Gets the ability to model any dynamic system and get its response. 3. Can carry out modal analysis and can easily handle any software andcan correctly interpret the results. 4. Can effectively use practical vibration analysis methods and obtainthe dynamic

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			parameters. 5. Gets the ability to apply numerical methods to get the dynamicresponse of the systems.
3	19CE E106	ADVANCED STEEL DESIGN	**Course Out comes:** 1. Students will understand behaviour of structural steel, pressed steeland design philosophies of steel structures. 2. Students will be able to analyze and design of grillage foundation. 3. Students will able to analyze and design of overhead steel and pressed steel water tanks. 4. Students will be able to analyze and design of tubular trusses. 5. Students will be able to analyze and design of bunkers and silos. 6. Students will be able to analyze and design of foundations ofTransmission line towers overall arrangements and design of membersof Transmission line towers. 7. Students will be able to analyze and design of Beam –Columns subjected to uni-axial and bi-axial bending.
4	19CE E108	DESIGN OF HIGH RISE STRUCTURES	**Course Outcomes:** The students learns 1. Various structural systems usually considered for the functional design of the tall buildings 2. Various methods of calculation lateral forces (both wind forces and seismic/ earth quake forces) on the tall buildings 3. The provisions of relevant IS codes (IS:875 - Part-3, IS:1893 - Part-1) in calculating the lateral forces mentioned above, on tall buildings 4. Various structural systems for RCC and steel buildings, differential shortening of columns, panel zone effects, second order effects of gravity loading, floor levelling problems and P – Delta Analysis. 5. Design aspects of RCC chimneys and steel transmission line towers.
5	19CE E109	DESIGN OF MASONRY STRUCTURES	**Course Outcomes:** At the end of the course, students will be able to 1. Select appropriate masonry unit and mortar mixes for masonry construction. 2. Distinguish from a wide range of materials for their suitability to arriveat feasible and optimal solutions for masonry

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			constructions. 3. Apply knowledge of structural masonry for advanced research andconstruction procedures. 4. Justify the design of masonry buildings for sustainable development. 5. Repair and strengthen the existing masonry structures for seismicloads.
6	19CEE110	DESIGN OF ADVANCED CONCRETE STRUCTURES	**Course out Comes:** Upon the completion of this course, the student should beable to 1. Analyze and Design curved and deep beam as per the fieldrequirements. 2. be able to find the stresses in domes for various loads and designthem. 3. With the thorough knowledge acquired during the course, the studentis able to analyze and design Bunkers and Silos with ease. 4. be able to assess the structural behavior of Raft, Pile and Machinefoundations and design them. 5. Gets reasonable expertise to implement ductile detailing and alsodesign solid shear walls.
7	19CEE111	ADVANCED FOUNDATION ENGINEERING	**Course Outcomes**: At the end of the course, students will be able to 1. Decide the sustainability of soil strata for different projects. 2. Design shallow foundations by deciding the bearing capacity of Soil. 3. Analyze and design the pile foundation. 4. Understand analysis methods and design for well foundation. 5. Interpret and implement the concepts of coffer dams and sheet piles.
8	19CEE112	SOIL STRUCTURE INTERACTION	**Course Outcomes:** At the end of the course, student is able to 1. Analyze soil behavior. 2. Analyze the interaction between soil structures with reference torelative stiffness of beams under different loading conditions. 3. Analyze infinite and Winkler plate and numerical solutions for finiteplates. 4. Give theoretical solutions for settlement and load distribution of pileand pile group. 5. Predict load deflection for laterally

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			loaded piles and its subgradereaction and give solutions with influence charts.
9	19CEE113	DESIGN OF INDUSTRIAL STRUCTURES	**Course Outcomes:** 1. The student gets the ability to compute design loads and design Steel Gantry Girders for various complex situations. 2. The student can analyze and design bunkers and silos and can effectively get them executed with the knowledge acquired during the course. 3. The student, with his sound knowledge acquired, can proportion various accessories of steel chimneys and be able to design chimneys along with foundations. 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. 5. The student is conversant with the fire effects on structures and has sound knowledge in fire models, fire engineering design 6. Steel structures and mechanical properties of steel at elevated temperatures.
10	19CE C107	MODEL TESTING LAB	**Course Outcomes:** At the end of the course, student is able to 1. Estimate the natural frequencies and mode shapes of a beam. 2. Evaluate the dynamic response of a building model using shake table / mini shake table set up. 3. Evaluate the response of building models under wind loads, usingwind tunnel setup. 4. Determine the pattern of deflection and cracks in RC slab elementsand portal frames, under static loading. 5. Use piezoelectric sensor for the determination of vibrationcharacteristics of a beam.
11	19CE C108	NUMERICAL ANALYSIS LAB	**Course Outcomes:** At the end of the course, student is able to 1. To find roots of nonlinear equations by using numerical methods 2. To know how to fit the given data in different curves

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			3. To know how to solve system of linear equations by using direct and indirect methods 4. To know how to integrate by using numerical methods 5. To find solution of first order ODE by numerical methods 6. To know how to apply computational methods in engineering by using MAT Lab program.
12	19CE C109	MINI PROJECT with SEMINAR	**Outcomes:** Students are able to 1. Formulate a specific problem and give solution. 2. Develop model/models either theoretical/practical/numerical form. 3. Solve, interpret/correlate the results and discussions. 4. Conclude the results obtained. 5. Write the documentation in standard format.
Semester III			
1	19CE E114	DESIGN OF PRE-STRESSED CONCRETE STRUCTURES	**Course Outcomes:** At the end of the course, student is able to 1. Understand the basic aspects of pre stressed concrete fundamentals, and calculate losses in the pre stressed concrete. 2. Analyze and design pre stressed concrete beam/girders. 3. Design pre stressed concrete end blocks and understand the mechanism of anchorage zones. 4. Analyze and Design continuous prestressed beams members. 5. Analyze and design slabs with partial and full pre stressing, and also analyses the crack formations rationally.
2	19CE E115	DESIGN OF BRIDGES	**Course Outcomes:** 1. Attains ability to design slab and T beam bridges and gets well versed with lateral load distribution for T girders. 2. Acquires sound knowledge about various structural actions of box girder bridges. He also gets the ability to analyses box girders 3. Using some approximate methods and design single cell box girder bridges. 4. Gets thorough knowledge in Railway loadings and can design both Plate girder and Truss girder bridges with ease and

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			efficiency. 5. The student gets comprehensive idea about long span flexible bridgesand the problems associated with them. He gets to know the 6. Wind effects and the importance of aerodynamic stability. He alsowill be able to design elastomeric bearings for bridges. 7. The student gets a clear understanding of bridge foundations andalso acquires knowledge about various construction techniques.
3	19CE E116	FRACTURE MECHANICS OF CONCRETE STRUCTURES	**Course Outcomes:** At the end of the course students will be able: 1. To predict the effects of crack like defects on the performance of civilengineering structures. 2. To employ modern numerical methods to determine critical crack sizesand fatigue crack propagation rates in engineering structures. 3. To know the behavior of concrete subjected to tension and compression failure. 4. To select appropriate materials for engineering structures to insuredamage tolerance. 5. To analyses the CTOD and CMD problems using various models.
4	19CE E117	DESIGN OF PLATES AND SHELLS	**Course Outcomes:** At the end of the course, the student will be able to 1. Analyze the thin shells and folded plates with the knowledge of theirbehavior 2. Design the shells with double curvature 3. Design the cylindrical shells 4. Design the hyperbolic parabolic shells 5. Analyze and design folded plates.
5	19CS O101	BUSINESS ANALYTICS	**Course Outcomes:** After completion of the course, students will be able 1. To understand the basic concepts of business analytics 2. Identify the application of business analytics and use tools to analyzebusiness data 3. Become familiar with various metrics, measures used in businessanalytics 4. Illustrate various descriptive, predictive and prescriptive methodsand techniques 5. Model the business data using various

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			business analytical methodsand techniques.
6	19ME O101	INDUSTRIAL SAFETY	**Outcomes:** At the end of the course the students will be able to 1. Identify the causes for industrial accidents and suggest preventive measures. 2. Identify the basic tools and requirements of different maintenance procedures. 3. Apply different techniques to reduce and prevent Wear and corrosion in Industry. 4. Identify different types of faults present in various equipment's likemachine tools, IC Engines, boilers etc. 5. Apply periodic and preventive maintenance techniques as required for industrial equipment's like motors, pumps and air compressors and machine tools etc.
7	19ME O102	INTRODUCTION TO OPTIMIZATION TECHNIQUES	**Outcomes:** At the end of the course, student will be able to 1. Formulate a linear programming problems (LPP) 2. Build and solve Transportation Models and Assignment Models. 3. Apply project management techniques like CPM and PERT to planand execute project successfully 4. Apply queuing and inventory concepts in industrial applications 5. Apply sequencing models in industries.
8	19CE O101	COST MANAGEMENT OF ENGINEERING PROJECTS	**Course Outcomes:** At the end of course students will able to 1. Acquire in-depth knowledge about the concepts of projectmanagement and understand the principles of project management. 2. Determine the critical path of a typical project using CPM and PERTtechniques. 3. Prepare a work break down plan and perform linear scheduling usingvarious methods. 4. Solve problems of resource scheduling and levelling using networkdiagrams. 5. Learn the concepts of budgetary control and apply quantitative techniques for optimizing project cost.

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9	19ME O103	COMPOSITE MATERIALS	**Outcomes**: At the end of the course, student will be able to 1. Classify and characterize the composite materials. 2. Describe types of reinforcements and their properties. 3. Understand different fabrication methods of metal matrix composites. 4. Understand different fabrication methods of polymer matrixcomposites. 5. Decide the failure of composite materials.
10	19EE O101	WASTE TO ENERGY	**Course outcomes:** After completion of this course, students will be able to: 1. Understand the concept of conservation of waste 2. Identify the different forms of wastage 3. Choose the best way for conservation to produce energy from waste 4. Explore the ways and means of combustion of biomass 5. Develop a healthy environment for the mankind.
11	19CE C110	DISSERTATION PHASE-I	**Course Outcomes:** At the end of the course: 1. Students will be exposed to self-learning various topics. 2. Students will learn to survey the literature such as books, national/ international refereed Journals and contact resource persons for theselected topic of research. 3. Students will learn to write technical reports. 4. Students will develop oral and written communication skills to present. 5. Student will defend their work in front of technically qualified audience.
Semester IV			
1	19CE C111	DISSERTATION PHASE-II	**Course Outcomes:**At the end of the course 1. Students will be able to use different experimental techniques and willbe able to use different software/ computational/analytical tools. 2. Students will be able to design and develop an experimental set up/ equipment/test rig. 3. Students will be able to conduct tests on existing set ups/equipment's and draw logical conclusions from the results after analyzing them. 4. Students will be able to either work in a research environment or in an industrial environment.

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			5. Students will be conversant with technical report writing and will beable to present and convince their topic of study to the engineering community.
AUDIT COURSE			
1	19EGA101	ENGLISH FOR RESEARCH PAPER WRITING	**Course Outcomes: After successful completion of the course, the students will be able to** 1. Interpret the nuances of research paper writing. 2. Differentiate the research paper format and citation of sources. 3. To review the research papers and articles in a scientific manner. 4. Avoid plagiarism and be able to develop their writing skills in presenting the research work. 5. Create a research paper and acquire the knowledge of how and whereto publish their original research papers.
2	19CEA101	DISASTER MITIGATION AND MANAGEMENT	**Course Outcomes:** At the end of the course the student 1. Ability to analyses and critically examine existing programs in disastermanagement regarding vulnerability, risk and capacity at different levels 2. Ability to understand and choose the appropriate activities and toolsand set up priorities to build a coherent and adapted disaster management plan 3. Ability to understand various mechanisms and consequences of human induced disasters for the participatory role of engineers in disaster management 4. To understand the impact on various elements affected by the disaster and to suggest and apply appropriate measures for the same 5. Develop an awareness of the chronological phases of disaster preparedness, response and relief operations for formulating effective disaster management plans and ability to understand various.
3	19EEA101	SANSKRIT FOR TECHNICAL KNOWLEDGE	**Course Outcomes**: After completion of this course, students will be able to: 1. Develop passion towards Sanskrit

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			language 2. Decipher the latent engineering principles from Sanskrit literature 3. Correlates the technological concepts with the ancient Sanskrit history. 4. Develop knowledge for the technological progress 5. Explore the avenue for research in engineering with aid of Sanskrit.
4	19EC A101	VALUE EDUCATION	**Course outcomes:** After completion of the Course, Students will be able to 1. Gain necessary Knowledge for self-development 2. Learn the importance of Human values and their application in day today professional life. 3. Appreciate the need and importance of interpersonal skills for successful career and social life 4. Emphasize the role of personal and social responsibility of an individual for all-round growth. 5. Develop a perspective based on spiritual outlook and respect women, other religious practices, equality, non-violence and universal brotherhood.
5	19EG A102	INDIAN CONSTITUTION AND FUNDAMENTAL RIGHTS	**Course Outcomes: After successful completion of the course he students will be able to** 1. Understand the making of the Indian Constitution and its features. 2. Understand the Rights of equality, the Right of freedom and the Rightto constitutional remedies. 3. Have an insight into various Organs of Governance - compositionand functions. 4. Understand powers and functions of Municipalities, Panchayats andCo-operative Societies. 5. Understand Electoral Process, special provisions.
6	19IT A101	PEDAGOGY STUDIES	**Course Outcomes:** Upon completing this course, students will be able to 1. Illustrate the pedagogical practices followed by teachers in developing countries both in formal and informal classrooms. 2. Examine the effectiveness of pedagogical practices.

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			3. Understand the concept, characteristics and types of educationalresearch and perspectives of research. 4. Describe the role of classroom practices, curriculum and barriers tolearning. 5. Understand Research gaps and learn the future directions.
7	19EGA103	STRESS MANAGEMENT BY YOGA	**Course Outcomes: After successful completion of the course, the students will be able to** 1. To understand yoga and its benefits. 2. Enhance Physical strength and flexibility. 3. Learn to relax and focus. 4. Relieve physical and mental tension through asanas 5. Improve work performance and efficiency.
8	19EGA104	PERSONALITY DEVELOPMENT THROUGH LIFE'S ENLIGHTENMENT SKILLS	**Course Outcomes: After successful completion of the course the students will be able to** 1. Develop their personality and achieve their highest goal of life. 2. Lead the nation and mankind to peace and prosperity. 3. To practice emotional self-regulation. 4. Develop a positive approach to work and duties. 5. Develop a versatile personality.

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