



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

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



COMMITTED TO
RESEARCH,
INNOVATION AND
EDUCATION

44
years

R20:

Department Vision

To be the destination for aspiring young minds to become globally competitive, enlightened, innovative, immediate contributors to the industry and successful in higher studies in the field of mechanical engineering.

Department Mission

1. To impart quality and innovative education in mechanical engineering with basic and specialised training, internships to meet the current and emerging needs of the industry.
2. To prepare the students for successful professional career by inculcating ethical, entrepreneurial and leadership qualities.
3. To foster Research and Development environment by disseminating knowledge and technology by involving the students in publications, sponsored projects and consultancy.

PEOs of M.E. (CAD/CAM)

1. Graduates will become professional contributors in the industry related to the area of CAD/CAM.
2. Graduates will excel in Research, Development and Consultancy
3. Graduates will become Entrepreneurs in CAD/CAM industry.


PSOs of M.E. (CAD/CAM)

1. Apply and analyze the concepts of design engineering to provide solution for emerging needs in Mechanical Engineering.
2. Demonstrate use of design and analysis software tools to solve real world problems.
3. Develop and implement new ideas on product design with modern CAD/CAM tools, while ensuring global trends and best manufacturing practices.

M.E. Program Outcomes (PO's)

1. **PO 1:** An ability to independently carry out research /investigation and development work to solve practical problems
2. **PO 2:** An ability to write and present a substantial technical report/document
3. **PO 3:** 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
4. **PO 4:** Ethics: apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice


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5. **PO 5:** Project management and finance: demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work as a member and leader in a team. to manage projects and in multidisciplinary environments
 6. **PO 6:** Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technology



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Gandipet, Hyderabad -75

Department Of Mechanical Engineering

Course Outcomes Statements for ME (CAD-CAM)-R20

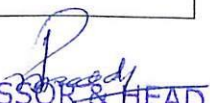
S.no.	Course		Course Outcomes Statements
	Code	Name	
1	20ME C101	COMPUTER AIDED MODELING AND DESIGN	1.Understand the design process, visualize models through graphics standards and apply principles of computer graphics like geometric transformations, windowing and clipping
			2. Recognize various wireframe entities and model them
			3. Apply surface modelling techniques for generating various parts
			4. Differentiate various solid modelling techniques
			5. Understand various advanced modelling concepts like parametric and variational modelling , feature based design, interference detection
2	20ME C102	COMPUTER INTEGRATED MANUFACTURING	1. Select the necessary computing tools for development of product
			2. Use appropriate database systems for manufacturing a product and store the same for future use
			3. Use modern manufacturing techniques and tools including principles of networking
			4. Apply the concepts of lean manufacturing and agile manufacturing
			5. Apply the latest technology of manufacturing systems and software for the development of a product.
3	20ME E101	ADVANCED MACHINE DESIGN	1. Predict failure of engineering components using failure theories
			2. Identify and explain the types of fractures of engineered materials and their characteristic features
			3. Understand LEFM approach
			4. Estimate life of components using stress life and strain life
			5. Categorize different types of surface failure
4	20ME E102	ADVANCED VIBRATIONS AND ACOUSTICS	1.Predict response of a SDOF system, damped or undamped, subjected to simple harmonic excitations. They will be able to obtain Step Response Spectrum of SDOF systems for such excitations
			2. Write differential equations of motion for MDOF systems, should be able to obtain the Eigen-values and mode shapes of natural vibrations and response to harmonic excitations, able to measure damping in the system using logarithmic decrement and half power method

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			3. Obtain the frequency and mode shapes for string, rod and beam using continuous systems.
			4. Understand basic concept of acoustics, source of models, and measuring of noise.
			5. Understand vibration and noise measuring instruments.
5	20ME E103	OPTIMIZATION TECHNIQUES	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 plan and execute project successfully
			4. Apply queing and inventory concepts in industrial applications
			5. Apply sequencing models and game theory in industries
6	20ME E104	AUTOMATION	1. Conceptualize and design automated flow lines.
			2. Implement line balancing concepts in production and assembly lines
			3. Understand and develop automated material handling systems for plant operations.
			4. Design, implement and use and appropriate automated inspection facility.
			5. Design and develop an automated production system for manufacturing a product using futuristic technologies
7	20ME E105	DESIGN FOR MANUFACTURING AND ASSEMBLY	1. Understand the product development cycle
			2. Know the manufacturing issues that must be considered in the mechanical engineering design process
			3. Know the effect of manufacturing process and assembly operations on the product
			4. Know the principles of assembly to minimize the assembly time
			5. Be familiar with tools and methods to facilitate development of manufacturing mechanical designs
8	20ME E106	INDUSTRIAL ROBOTICS	1. Principle of working of a robot , types and prepare specifications for various requirements..
			2. Transformations, kinematics of robots to find out the position and orientation.
			3. Singularities, avoiding singularities while designing, find jacobian and trajectory planning of a robot to prepare the robot for various tasks
			4. dynamic analysis using various formulations and design the robots


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			5. Working of sensors and controllers for finding position and orientation, analyze robot vision for image acquisition and processing and plan for various tasks and programming
9	20ME M103	RESEARCH METHODOLOGY AND IPR	1. Define research problem, review and assess the quality of literature from 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	20CE A101	DISASTER MITIGATION AND MANAGEMENT	1. Analyze and critically examine existing programs in disaster management regarding vulnerability, risk and capacity at different levels
			2. Understand and choose the appropriate activities and tools and set up priorities to build a coherent and adapted disaster management plan
			3. Understand various mechanisms and consequences of human induced disasters for the participatory role of engineers in disaster management
			4. 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 participatory approaches/strategies and their application in disaster management
11	20EE A101	SANSKRIT FOR TECHNICAL KNOWLEDGE	1. Develop passion towards Sanskrit 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
12	20EC A101	VALUE EDUCATION	1. Gain necessary Knowledge for self-development.
			2. Learn the importance of Human values and their application in day to day professional life.
			3. Appreciate the need and importance of interpersonal skills for successful career and social life


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			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
13	20IT A101	PEDAGOGY STUDIES	1.illustrate the pedagogical practices followed by teachers in developing countries both in formal and informal classrooms.
			2. Examine the effectiveness of pedagogical practices.
			3. Understand the concept, characteristics and types of educational research and perspectives of research.
			4. Describe the role of classroom practices, curriculum and barriers to learning..
			5. Understand Research gaps and learn the future directions
14	20EG A101	ENGLISH FOR RESEARCH PAPER WRITING	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 where to publish their original research papers
15	20EG A102	INDIAN CONSTITUTION AND FUNDAMENTAL RIGHTS	1. Understand the making of the Indian Constitution and its features.
			2. Understand the Rights of equality, the Right of freedom and the Right to constitutional remedies.
			3. Have an insight into various Organs of Governance - composition and functions.
			4. Understand powers and functions of Municipalities, Panchayats and Co-operative Societies.
			5. Understand Electoral Process, special provisions
16	20EG A103	STRESS MANAGEMENT BY YOGA	1. 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
17	20EG A104	PERSONALITY DEVELOPMENT THROUGH LIFE'S ENLIGHTENMENT SKILLS	1. Develop their personality and achieve their highest goal of life.
			2. Lead the nation and mankind to peace and prosperity.
			3. Practice emotional self regulation.
			4. Develop a positive approach to work and duties.
			5. Develop a versatile personality
18	20ME C104	INTEGRATED DESIGN AND MANUFACTURING	1. Generate complex components in the part module and assemble them by using suitable constraints..
			2. Generate engineering drawing and apply size, form and

		G LAB	positional tolerances on the drawing
			3. Write part programs using G and M codes for lathe and milling operations for various components.
			4. Differentiate additive and subtractive methods of manufacturing and their integration to build the component
			5. Gain confidence to operate the 3d printing machine
19	20ME C105	VIBRATION AND ACOUSTICS LAB	1. Predict response of a SDOF system, damped or undamped, subjected to simple harmonic excitations. They will be able to obtain Step Response Spectrum of SDOF systems for such excitations
			2. Measure damping in the system using logarithmic decrement and half power method.
			3. Obtain the frequency and mode shapes for beam using continuous systems
			4. Understand basic concept of acoustics, source of models, and measuring of noise.
			5. Understand vibration and noise measuring instruments.
20	20ME C106	FINITE ELEMENT TECHNIQUES	1. Apply FE method for solving field problems using virtual work and potential energy formulations
			2. Analyze linear problems like axial, truss and beam, torsional analysis of circular shaft
			3. Analyze 2D structural problems using CST element and analyze the axi-symmetric problems with triangular elements. Write shape functions for 4 node quadrilateral, isoparametric elements and apply numerical integration and Gaussian quadrature to solve the problems.
			4. Evaluate the eigen values and eigen vectors for stepped bar, formulate 3 D elements, check for convergence requirements
			5. Solve linear 1 D and 2 D heat conduction and convection heat transfer problems, Use of Fea software ANSYS for engineering solutions
21	20ME C107	MECHANICAL DESIGN AND ANALYSIS	1. Apply knowledge of mathematics, sciences and computations in solving the stresses & strains in pressure vessels
			2. Demonstrate the ability to identify, formulate and solve problems for a given flat plate bending applications
			3. Design a system for a component to meet the desired needs of fracture mechanics
			4. Understand, solve various Eigen value and Eigen vectors and will understand different mode extraction methods to calculate frequencies
			5. Understand methods in solving single degree freedom dynamic analysis problems
22	20ME E206	COMPUTATIONAL FLUID DYNAMICS	1. Derive CFD governing equations and turbulence models
			2. Apply elliptical, parabolic and hyperbolic PDEs and forward, backward and center difference methods
			3. Understand errors, stability, consistency and develop O,H and Cgrid generated models
			4. Evaluate the use of Crank-Nicolson, Implicit and Explicit methods and analyze problem by Jacobi, Gauss Seidel and ADI methods


			5. Solve conduction and convection problems using FVM.
23	20ME E107	MECHANICS OF COMPOSITE MATERIALS	1. Understand different types of composites and their fabrication methods. 2. Characterize a UD lamina using micromechanics. 3. Analyze a given laminate for strains and stress. 4. Decide the failure of a UD lamina. 5. Design simple composite beams and plates
24	20ME E108	FRACTURE MECHANICS	1. Analyze the fracture mechanism 2. Gain familiarity with the different modes of failure under the presence of crack 3. Establish specimen size in accordance with the standard procedures 4. Distinguish between Plane stress fracture toughness and Plane strain fracture toughness 5. Accomplish the relationship between crack propagation and stress intensity factor
25	20ME E109	MULTI BODY DYNAMICS	1. Derive equations of motion for interconnected bodies in multi-body systems with three dimensional motions. 2. Implement and analyze methods of formulating equations of motion for interconnected bodies. 3. Write programs to solve constrained differential equations for analyzing multi-body systems. 4. Simulate and analyze all types of static and dynamic behaviors of the multi-body systems including the kineto-static analysis. 5. Lead team projects in academic research or the industry that require modeling and simulation of multi-body systems
26	20ME E110	TRIBOLOGY IN DESIGN	1. Understand surface topography and model a rough engineering surface. 2. Understand friction and wear aspects of machine. 3. Decide upon lubricants and lubrication regimes for different operating conditions. 4. Understand Hertz contact and rough surface contact. 5. Select material/surface properties based on the tribological requirements
27	20ME E111	FAILURE ANALYSIS AND DESIGN	1. Apply the concepts of design processes 2. Provide solutions by inventive problem solving techniques 3. Develop reliable and robust design 4. Analyze the behavior of buckling of cylinders under various loading conditions 5. Predict the fracture behavior under static and fatigue loads, apply the crack propagation concepts, fracture toughness of weld metals
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			3. Practice emotional self-regulation.
			4. Develop a positive approach to work and duties.
			5. Develop a versatile personality.
36	20ME C108	COMPUTER AIDED ENGINEERING LAB	1. Understand the applications of one and two-dimensional elements
			2. Solve engineering problems
			3. Find buckling factors
			4. Understand industrial applications of forming and sheet metal operations
			5. Find fracture toughness
37	20ME C206	COMPUTATIONAL FLUID DYNAMICS LAB	1.Analyze laminar flow problems in plates and pipes
			2. Solve steady and unsteady flow past a cylinder
			3. Perform analysisfor free and forced convection
			4. Evaluate the effect of angle of attack and velocity on NACA aerofoil
			5. Simulate compressible flow in a nozzle, premixed combustion
38	20MEC 109	MINI PROJECT WITH SEMINAR	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
39	20MEE112	ADVANCED FINITE ELEMENT METHOD	1.Demonstrate understanding of FE formulation for isoparametric element.
			2. Understand to evaluate the stresses in the elements.
			3. Model effectively and checks the parameters to get the converged solution and verify the solutions.
			4. Demonstrate use of FE formulation to shell elements and analyse for buckling loads.
			5. Solve nonlinear problems with a FE formulation.

40	20MEE113	DIGITAL MANUFACTURING AND DESIGN	1. Understand the concept of digital manufacturing, technology and its potential in modern manufacturing process.
			2. Design and manufacture sophisticated parts using subtractive manufacturing including metal-based additive manufacturing.
			3. Implement and manage digital factory by adopting virtual manufacturing
			4. Analyse the role of product life cycle and database management systems in manufacturing systems.
			5. Understand the concepts of digital design and shape digitization in manufacturing
41	20MEE114	PRODUCT DESIGN AND PROCESS PLANNING	1. Design and process of a product.
			2. Implement reliability techniques, IPR and value engineering.
			3. Understand and develop appropriate manufacturing techniques.
			4. Implement Ergonomic concepts and productivity techniques.
			5. Use computers in product design and process planning.
42	20CEO101	COST MANAGEMENT OF ENGINEERING PROJECTS	1. Acquire in-depth knowledge about the concepts of project management and understand the principles of project management.
			2. Determine the critical path of a typical project using CPM and PERT techniques.
			3. Prepare a work break down plan and perform linear scheduling using various methods.
			4. Solve problems of resource scheduling and levelling using network diagrams.
			5. Learn the concepts of budgetary control and apply quantitative techniques for optimizing project cost.
43	20EEO101	WASTE TO ENERGY	1. Understand the concept of conservation of waste
			2. Identify the different forms of wastage
			3. Chose 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
44	20CSO101	BUSINESS ANALYTICS	1. Identify and describe complex business problems in terms of analytical models.
			2. Apply appropriate analytical methods to find solutions to business problems that achieve stated objectives.
			3. Interpret various metrics, measures used in business analytics.
			4. Illustrate various descriptive, predictive and prescriptive methods and techniques.
			5. Model the business data using various business analytical methods and techniques.
			6. Create viable solutions to decision making problems.
45	20ME C110	INDUSTRIAL PROJECT / DISSERTATION	1. Students will be exposed to self-learning various topics.
			2. Students will learn to survey the literature such as books, national/

		PHASE - I	international refereed journals and contact resource persons for the selected 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.
46	20MEC111	INDUSTRIAL PROJECT / DISSERTATION PHASE - II	1. Students will be able to use different experimental techniques and will be 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 analysing them
			4. Students will be able to either work in a research environment or in an industrial environment.
			5. 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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