Chaitanya Bharathi Institute of Technology (A)
Department of Mechanical Engineering
M.E. (CAD/CAM)

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.

Program Outcomes Of M.E.

PO 1: An ability to independently carry out research /investigation and development work to solve practical problems

PO 2: An ability to write and present a substantial technical report/document

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

PO 4: Ethics: apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice

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

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

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.

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Chaitanya Bharathi Institute of Technology (A)

Department of Mechanical Engineering

Course Outcomes Statements for M.E. (CAD/CAM) - R20

Admitted year: 2022 **Year of graduation: 2024**

S.No.	Semester	AY	Course details			Course Outcomes Statements
			Course code		Name of the Course	
1	1	2022-23	CORE	20ME C101	COMPUTER AIDED MODELING AND DESIGN	1Understand 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	1	2022-23		20ME C102	COMPUTER INTEGRATED MANUFACTURING	1. Select the necessary computing tools for development of product 2. 3. 4. 5. Use appropriate database systems for manufacturing a product and store the same for future use Use modern manufacturing techniques and tools including principles of networking Apply the concepts of lean manufacturing and agile manufacturing Apply the latest technology of manufacturing systems and software for the development of a product
3	1	2022-23	PE - 1	20MEE103	OPTIMIZATION TECHNIQUES	1. Formulate a linear programming problems (LPP) 2. 3. 4. 5. Build and solve Transportation Models and Assignment Models. Apply project management techniques like CPM and PERT to plan and execute project successfully Apply queing and inventory concepts in industrial applications Apply sequencing models and game theory in industries

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4	I	2022-23	PE - II	20ME E104	AUTOMATION	1. Conceptualize and design automated flow lines. 2. 3. 4. 5. Implement line balancing concepts in production and assembly lines Understandand developautomatedmaterialhandlingsystemsuitable for plant operations. Design, implement and use and appropriate automated inspection facility. Design and develop an automated production system for manufacturing a product using futuristic technologies
5	I	2022-23	Mandatory Course	20ME M103	RESEARCH METHODOLOGY AND IPR	1. Define research problem, review and asses 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 Collect the data by various methods: observation, interview, questionnaires Analyze problem by statistical techniques: ANOVA, F-test, Chi-square Understand apply for patent and copyrights
6	I	2022-23	Audit Course	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.
7	I	2022-23	Lab Courses	20ME C104	INTEGRATED DESIGN AND MANUFACTURING LAB	1. Generate complex components in the part module and assemble them by using suitable constraints. 2. Generate engineering drawing and apply size, form and 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 Gain confidence to operate the 3d printing machine

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8		2022-23		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 suchexcitations 2. Measure damping in the system using logarithmic decrement and half powermethod.3 Obtain the frequency and mode shapes for beam using continuous systems. Understand basic concept of acoustics, source of models, and measuring of noise. Understand vibration and noise measuring instruments.
9	II	2022-23	CORE	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 Analyze 2D structural problems using CST element and analyze the axi-symmetric problems with triangular elements.3. Write shape functions for 4 node quadrilateral, isoparametric elements and apply numerical integration and Gaussian quadrature to solve theproblems.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 FEAsoftware ANSYS for engineering solutions
10	II	2022-23		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 or 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

11	II	2022-23	PE - III	20ME E107	MECHANICS OF COMPOSITE MATERIALS	1. Understand different types of composites, advantages, disadvantages applications and their fabrication methods. 2. Characterize a UD lamina using micromechanics. 3. Analyze a given laminate for strains and stress using Classical Lamination Theory. 4. Decide the failure of a UD lamina according to different criterion. 5. Design simple composite beams and plates.
12	II	2022-23	PE - IV	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
13		2022-23		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 .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.
14	II	2022-23	Labs	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
15	II	2022-23		20ME C206	COMPUTATIONAL FLUID DYNAMICS LAB	1. Analyze laminar flow problems in plates and pipes 2. Solve steady and unsteady flow past a cylinder3. Perform analysis for free and forced convection.4. Evaluate the effect of angle of attack and velocity on NACA aerofiol.5. Simulate compressible flow in a nozzle, premixed combustion

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16	II	2022-23	MPS	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
17	III	2023-24	PE V	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
18	III	2023-24	OE	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
19	III	2023-24		20ME C110	INDUSTRIAL PROJECT / DISSERTATION PHASE - I	1. The Project work will preferably be a problem with research potential and should involve scientific research, design, generation/collection and analysis of data, determining solution and must preferably bring out the individual contribution. 2. Seminar should be based on the area in which the candidate has undertaken the dissertation work. 3. The CIE shall include reviews and the preparation of report consisting of a detailed problem statement and a literature review. 4. The preliminary results (if available) of the problem may also be discussed in the report. 5. The work has to be presented in front of the committee consists of Head, Chairperson-BoS, Supervisor and Project coordinator. 6. The candidate has to be in regular contact with his supervisor and the topic of dissertation must be mutually decided by the guide and student.

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20	IV	2023-24		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/equipments 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. 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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Course Outcomes Statements for M.E. (CAD/CAM) - R23

Admitted year: 2023 **Sem: I and II**

S.No.	Semester	AY	Course details			Course Outcomes Statements
			Course code		Name of the Course	
1	1	2023-24	CORE	23MEC101	COMPUTER AIDED MODELING AND DESIGN	1Understand 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

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2	I	2023-24		23MEC102	DIGITAL MANUFACTURING	1. Understand the concept of digital manufacturing, technology and its potential in modern manufacturing process. 2. Recognize the role of cyber physical systems in digital manufacturing 3. Compare and select the subtractive and additive manufacturing processes for a given application. 4. Analyze the role of product life cycle and database management systems in manufacturing systems. 5. Understand the concepts of reverse engineering, digital thread and digital twins.
3	I	2023-24	PE - I	20MEE103	OPTIMIZATION TECHNIQUES	1. Formulate a linear programming problem (LPP) and Integer Programming 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 Nonlinear programming 5. Apply queuing, sequencing models and game theory in industries
4	I	2023-24		20MEE104	COMPUTER INTEGRATED MANUFACTURING	1. Select the modern tools and techniques for development of a product. 2. Use appropriate database systems for manufacturing a product and store the same for future use. 3. Apply the latest technology of manufacturing systems and software for the development of a product. 4. Use modern manufacturing techniques and tools including principles of networking. 5. Apply the concepts of lean manufacturing and Agile manufacturing.
5	I	2023-24	Mandatory Course	23MEM103	RESEARCH METHODOLOGY AND IPR	1. Define research problem, review and asses 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, and Chi-square. 5. Understand apply for patent and copyrights.
6	I	2023-24	Audit Course	23EGA101	ENGLISH FOR RESEARCH PAPER WRITING	1. Improve work performance and efficiency, illustrate the nuances of research paper writing and draw conclusions on professional usefulness. 2. Classify different types of research papers and organize the format and citation of sources. 3. Explore various formats of APA, MLA and IEEE and set up for writing a research paper. 4. Draft paragraphs and write theme based thesis statements in a scientific manner. 5. Develop an original research paper while acquiring the knowledge of how and where to publish their papers.

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7	I	2023-24	Lab Courses	23MEC103	ADVANCED COMPUTER AIDED DESIGN LAB	1. Generate complex components in the part module and 2. Assembly of the components using suitable constraints. 3. Generate engineering drawings. 4. Apply size, form and positional tolerance on the drawing 5. Apply surface modeling techniques using CAD
8				23MEC104	DIGITAL MANUFACTURING LAB	1. Compare different Additive and subtractive manufacturing process and select a process for a particular application 2. Perform preprocessing and post processing for 3D printing. 3. Create 3D model by reverse Engineering. 4. Generate tool path data for a given component 5. Perform DFA analysis for a simple assembly.
9	II	2023-24	CORE	23MEC105	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.
10	II	2023-24		23MEC106	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 or 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
11	II	2023-24		23MEC107	MECHANICS OF COMPOSITE MATERIALS	1. Understand different types of composites, advantages, disadvantages applications and their fabrication methods. 2. Characterize a UD lamina using micromechanics. 3. Analyze a given laminate for strains and stress using Classical Lamination Theory. 4. Decide the failure of a UD lamina according to different criterion. 5. Design simple composite beams and plates

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12	II	2023-24	PE II	23MEE107	SMART MATERIALS AND STRUCTURES	1. Understand basics of smart materials. 2. Analyze direct and reverse effect of piezo. 3. Understand and Evaluate Principles of piezo, Magnetostrictive materials, SMA. 4. Analyze design of piezoelectric materials. 5. Understand High-Band Width, Low Strain Smart Sensors and Intelligent Devices
13	II	2023-24		23MEE111	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
14	II	2023-24	Labs	23MEC108	COMPUTER AIDED ENGINEERING LAB	1. Apply basics of Theory of Elasticity to continuum problems. 2. Analyze 1D, 2D and 3D structures for linear static analysis. 3. Analyze the buckling phenomena of the structures. 4. Estimate fracture toughness of the cracked components. 5. Analyze fluid flow problems.
15	II	2023-24		23MEC109	COMPUTER AIDED MECHANICAL DESIGN AND ANALYSIS LAB	1. Understand main features of the MATLAB syntax and various commands used. 2. Use the MATLAB GUI effectively. 3. Translate mathematical methods to MATLAB code. 4. Formulate and solve systems of linear equations by Gaussian elimination. 5. Write simple programs in MATLAB to solve scientific and mathematical problems. Tabulate results and represent data visually.
16	II	2023-24	MPS	23MEC110	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

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