- **Department Name :-Mechanical Engineering Department**

- **PG Program Name :- M. Tech. CAD/CAM/CAE**

- **Vision :-**

  To transform the department into center of excellence by synergizing teaching, learning and research to produce globally competent, innovative and entrepreneurial Mechanical Engineers**.**

- **Mission** :-

  1. To develop state of the art facilities to stimulate faculty, staff and students to create, analyze, apply and disseminate knowledge.
  2. To build the competency to transform students into globally competent mechanical engineers by imparting quality education.
  3. To collaborate with research organizations, reputed educational   institutions industries and alumni for excellence in teaching, research and   consultancy   practices .

Sr. No.	Program Outcomes
1.	Apply subject knowledge to build mathematical model and solve engineering problems especially in the areas of design & manufacturing
2.	Design, analyze and interpret data of complex engineering problems using experimental & design tools.
3.	Contribute to scientific knowledge through design and development of a system, component, or process to meet desired needs within realistic constraints.
4.	Contribute positively towards common goals through collaborative and multi-disciplinary work
5.	Identify, formulate, and suggest alternate solutions to the critical engineering problems.
6.	Acquire professional and intellectual integrity, professional code of conduct, ethics of research and understanding of responsibility to contribute for sustainable development of society
7.	Communicate effectively and confidently regarding complex engineering activities with scientific community and also society.
8.	Apply domain knowledge necessary to understand the impact of engineering solution in a global and societal context.
9.	Engross in lifelong learning with a high level of enthusiasm and commitment
10.	Attend contemporary issues through independent and reflective learning.
11.	Select and learn modern engineering and IT tools to solve complex engineering problems
12.	Lead and motivate a team for accomplishment of task and emerge as an entrepreneur
13.	Demonstrate the knowledge of engineering and management principles and apply these to manage the projects and its financial aspects.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
1	I	SHP 513	Advanced Mathematical Methods in Engineering	CO_1. Evaluate Fourier Series and Fourier Transforms for given function and apply it to solve the partial differential equations in Engineering problems. CO_2. Apply the specific method of solution of partial differential equations for solving the given problems. CO_3. Formulate and solve a boundary value problem (Partial differential equation, boundary and initial conditions). CO_4. Use the relevant method for solving the simultaneous linear equations and compute the Eigen values. CO_5. Estimate numerically the solution of given algebraic equation. CO_6. Analyze the variance and explain the different research designs
2	I	MCC1013	Advanced Mechanics of Solids	CO_1: Describe and estimate critical parameters needed in design of components based on stress approach and apply it to solve real field problems in the field of solid mechanics. CO_2: Describe and estimate critical parameters needed in design of component based on strain approach and apply it to solve real field problems in the field of solid mechanics. CO_3: Select appropriate theories of failure and apply it to design the engineering components. CO_4: Use first order and higher order deformation theory to analyze plate problem CO_5: Design a component considering plasticity effect. CO_6: Design a component based on fracture mechanics approach.
3	I	MCC1023	Computer Aided Manufacturing	CO_1. Explain principle of operation of CNC machine tools CO_2. Recognize modern cutting tools CO_3. Develop CNC programs for components to be manufactured on CNC machining centers. CO_4.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				Develop CNC programs for components to be manufactured on CNC turning centers. CO_5. Develop part programs using computer assisted part programming CO_6. Form the part families using production flow analysis CO_7. Perform quantitative analysis of flexible manufacturing systems (FMS)
4	I	Program Elective (PE-I) MCC1033	Product Lifecycle Management	CO_1. Understand & explain the concept of PLM & its need. CO_2. Set the PLM Vision & Develop PLM strategy. CO_3. Plan for Integrated Product Development Process. CO_4. Perform Product Structure Modeling with relationship. CO_5. Create Product Data. CO_6. Know the recent development in PLM & case study suitable PLM software.
5	I	MCC1043	Enterprise Resource Planning	CO_1. Identify various business functions, business processes and business activities carried out within functional areas of organizations. CO_2. Relate Enterprise resource planning (ERP) with various other technologies like data warehousing, data mining, SCM, CRM etc. CO_3. Discuss the manufacturing perspective of ERP System. CO_4. Select an appropriate business module from a ERP package for a given application. CO_5. Describe the risks and benefits associated with the ERP system. CO_6. Select suitable ERP Package & implement it.
6	I	MCC1053	Nano Technology	CO_1. Select nanomodified materials for latest engineering applications. CO_2. Synthesize nanofillers for reinforcement. CO_3. Prepare and characterize polymer- nanotubes based nanocomposite by using different techniques. CO_4.Develop nanocomposite for respective mechanical or electronics or

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				biomechanics engineering application
7	I	MCC1063	Sustainable Manufacturing	CO_1. Illustrate appropriate business responses to environmental problems. CO_2. Provide technical inputs for energy saves and energy recycling measures. CO_3. Develop a knowledge base in selecting and incorporating appropriate conversion technology in management of waste and pollutants. CO_4. Acquire skills to work as responsible partners in the ongoing efforts for sustainable development.
8	I	Program Elective (PE-II) MCC1113	Design for Manufacturing, Assembly & Reliability.	CO_1. Recognize the importance of selection of proper manufacturing process and its influence on new product development process and understand the interrelationship between product design and production methods for improving product performance during stage of design itself. CO_2. Identify the factors contributing reduction in assembly time and understand to incorporate assembly & disassembly guidelines in product design. CO_3. Utilize reliability concepts, failure analysis tools and techniques and accelerated life test methods for improving product life cycle. CO_4 Understand the factors controlling cost and time required for the product maintenance and utilize this information for design for maintenance.
9	I	MCC1123	Rapid Manufacturing Techniques	CO_1. Identify suitable time compression techniques for rapid product development. CO_2. Model complex engineering products and develop process plans for rapid production. CO_3. Analyze and select a rapid manufacturing technology for a

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				given component. CO_4. Identify the errors during generation of STL files and minimize them. CO_5. Optimize FDM process parameters to improve the quality of the parts.
10	I	MCC1133	Analysis and Control of Manufacturing Systems	CO_1. Describe the types of manufacturing systems and explain forecasting techniques used to estimate demand that manufacturing system has to respond. CO_2. Discuss the methods of controlling the inventory levels consistent with demand forecast. CO_3. Plan and control the material requirement in the manufacturing system CO_4. Decide and plan for the sequencing and scheduling of the jobs on machines. CO_5. Describe the changing environment of discrete part production CO_6. Analyze the given manufacturing system using modern simulation tools.
11	I	MCC1143	Computer Aided Design of Mechanical Systems	CO_1. Understand phases of design and computer programming language for design. CO_2. Design & write computer program for design of shaft. CO_3. Design & write computer program for design of gears. CO_4. Design & write computer program for design of gear boxes. CO_5. Design & write computer program for design of brakes & clutches. CO_6. Do integrated design of systems and develop computer program for the same.
12	I	SHP 551	Technical Communication	CO_1. Acquire skills required for good oral and written communication CO_2. Demonstrate improved writing and reading skills CO_3. Ensure the good quality of oral and written communication
13	I	MCC1193	Automation and Simulation Lab	CO_1. Design & simulate electrohydraulic, electro pneumatic& PLC circuits. CO_2. To virtually test all types of

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				systems.
14	I	MCC1203	Computer Aided Manufacturing Lab	CO_1. Develop sketches using suitable CAD software CO_2. Develop part models using suitable CAD software CO_3. Develop Assembly model using suitable CAD software CO_4. Develop 2D drawings using suitable CAD software CO_5. Generate tool path and part program for plain milling operation. CO_6. Generate tool path and part program for pocket milling operation. CO_7. Generate tool path and part program for contour milling operation. CO_8. Generate tool path and part program for turning operation
1	II	MCC2013	Advanced Finite Element Analysis	C0_1. Explain finite element formulation and select appropriate method like Galerkin, ayleigh Ritz methods to solve engineering problems C0_2. Select proper element and justify how behavior of finite element model is closer to real field problem C0_3. Construct Global stiffness matrix, Global load vector and solves structural problems after imposing boundary conditions. C0_4. Construct Global stiffness matrix, Global load vector and solves thermal problems after imposing boundary conditions. C0_5. Analyze the structural and heat transfer problems through dynamic analysis .
2	II	MCC2023	Computer Aided Design	CO_1. Plan for hardware & software requirement for CAD. CO_2. Understand parametric representation of analytic & synthetic curves. CO_3. Understand parametric representation of analytic surfaces. CO_4. Know the different techniques of solid representation. CO_5. Perform geometric transformations.

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				CO_6. Create CAD data suitable for exchanging between different CAD software
3	II	Program Elective (PE-III) MCC2033	Advanced Industrial Automation and Robotics	CO_1. Explain manufacturing automation and Advanced Automation Functions CO_2. Do quantitative analysis of transfer lines CO_3. Do quantitative analysis of automated assembly lines. CO_4. Analyze forward and reverse kinematics of robot. CO_5. Develop robot programs using lead through and textual programming techniques. CO_6. Perform economic analysis of robot
4	II	MCC2043	Non-Linear Finite Element Analysis	CO_1. Use numerical integration to obtain stiffness matrix and load vectors CO_2. Select appropriate element as per the physics of the problem CO_3. Discuss several approximate methods of solving non-linear equation CO_4. Design the component considering material non-linearity in to account CO_5. Analyze the mechanical component by incorporating geometrical non-linearity CO_6. Recognize the importance of contact analysis
5	II	MCC2053	Design for Optimization	CO_1. Identify and apply mathematical models in optimization method. CO_2. Recognize the suitable method of optimization in non linear programming with and without constraints. CO_3. Apply optimization method for static applications like shafts and springs. CO_4. Apply optimization method for dynamic applications like linkage mechanism. CO_5. Create genetic algorithm to optimize various design parameters
6	II	MCC2063	Sheet Metal Modeling and Manufacturing	CO_1. Explain principle of working of mechanical, hydraulic and pneumatic presses. CO_2. Analyze plastic deformation of metal in press

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				working operations CO_3. Design press tools for cutting and forming press working operations
7	II	Program Elective (PE-IV) MCC2103	Computer aided product development	CO_1. Establish role of design, production and marketing function in product development process. CO_2. Estimate use of computer aided techniques for product development process CO_3. Develop product modeling and analyze developing product. CO_4. Estimate frameworks & architectures of product
8	II	MCC2113	Additive Manufacturing	CO_1. Describe the Importance of AM technologies in Manufacturing. CO_2: Explain generalized process chain of AM. CO_3. Classify and select additive manufacturing processes for a given application. CO_4. Design for manufacture for AM and carry out Process Analysis CO_5. Identify the Different methods for Post-processing of AM parts CO_6. Suggest the Applications of AM in Automobile, Aerospace, and Bio-medical etc
9	II	MCC2123	Process Equipment Design	CO_1. Design process equipment and modify the design of existing equipment to new process conditions or new required capacity. CO_2. Build a bridge between theoretical and practical concepts used for designing the equipment in any process industry. CO_3. Create understanding of equipment design. CO_4. Review the importance of design concepts in process industry.
10	II	MCC2133	Design for Internet of Things	CO_1. Understand the vision of IoT from a global context. CO_2. Determine the Market perspective of IoT. CO_3. Use of Devices, Gateways and Data Management in IoT. CO_4. Build state of the art architecture in IoT. CO_5. Understand the

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				design constraints in the real world. CO_6. Apply of IoT in Industrial and Commercial Building Automation.
11	II	MCC2173	Research Methodology & IPR	1. Formulate a research problem. 2. Analyze research related information. 3. Prepare and present research proposal/paper by following research ethics. 4. Make effective use of computers and computing tools to search information, analyze information and prepare report. 5. Describe nature and processes involved in development of intellectual property rights
12	II	MCC2183	CAD Lab-I	CO_1. List different graphics functions in C program. CO_2. Prepare flow chart for drawing line, rectangle, circle or arc. CO_3. Execute program of line & circle by using algorithms. CO_4. Apply algorithms for creating 2D model for given sketch. CO_5. Create animation program for a given component
13	II	MCC2193	Design and Analysis LAB	CO_1. To apply and simulate structural and heat transfer real field problems (linear) and suggest modifications for optimal results. CO_2. To write their own MATLAB codes and validate the results with standard problems. CO_3. Use experimental mechanics techniques and compare with FEA results CO_4. To apply and simulate structural and heat transfer real field problems with nonlinearity taken in to account. CO_5 To apply and solve issues related to fracture mechanics through computational techniques
14	II	MCC2203	Industry Internship	CO_1. Identify the real applications and practices of courses studied, at industry level CO_2. Recognize various modeling, analysis and validation techniques adopted at industries CO_3. Demonstrate the issues at

Sr. No.	Semester	Course Code	Course Name	Course Outcome
				design, manufacturing and assembly levels CO_4.Summarize and present technical data in report format.
15	II	MCC2213	Mini Project	CO_1. Identify the real field problem related to area of CAD-CAM. CO_2. Study different techniques used to analyze real field problem. CO_3. Write a mini project report confirming to the prescribed standards.
1	III	MCC3013	MOOC Course	CO_1. Explain the importance of the course in connection with selected research area CO_2. Justify the new learning through demonstration of obtained results in dissertation work.
2	III	MCC3023	Dissertation Stage-I	CO_1. Explain the contributions of various researchers in the field of CAD/CAM after carrying out literature survey from reputed journals CO_2. Recognize the gap in the research and define a problem statement CO_3. Explain significance and applicability of problem statement CO_4. Summarize and present technical data in report format
3	III	MCC3033/ MCC3043	Dissertation Stage-II	CO_1. Outline the work plan for problem statement CO_2. Identify the proper modeling and analysis tool CO_3. Reproduce the preliminary results of problem statement CO_4. Summarize and present technical data in report format
1	IV	MCC4013	Dissertation Stage-III	CO_1. Explain the issues related to method adopted in solving the problem CO_2. Select proper technique in solving the problem CO_3. Compare the results with available literature
2	IV	MCC4023/ MCC4033	Dissertation Stage-IV	CO_1. Design new methodology to address the problem CO_2. Justify the results obtained from new methodology CO_3. Write technical report and defend work.