**Master of Technology (Mechanical Engineering)**

**(MECM2PUP)**

**Regular**

**Program & Courses Outcomes**

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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: **MECM2PUP** |
| **Program Specific Outcomes:**1: To undertake independent research and development work to solve practical problems.2: To prepare and present a substantial technical report/document.3: To apply knowledge, techniques, skills, and modern tools of mechanical engineering to the solution of engineering problems related to Materials Science, Production, CAD-CAM, Design, and Automation.4: To acquire mastery in various areas of Mechanical Engineering at a level higher than that requiredat the bachelor’s level.5: To understand the state of art need, professional, ethical practices, services to the society and socio-economic relevance while executing the mechanical engineering project. |

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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Materials Technology | **Course Code**: MECM1101T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Develop an understanding of the relationship between structure and properties of metals (ferrous and non-ferrous), ceramics, polymers, and composites.
2. Gain an insight into the role of material composition/microstructures in properties in select materials
3. Assess the performance of materials under different environments and in different applications.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Research Methodology | **Course Code**: MECM1102T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Develop a research orientated approachto understand the fundamentals of research methods, sampling techniques, research designs and techniques of analysis.
2. Identify various sources of information for literature review and data collection.
3. Develop understanding of using parametric and non-parametric hypothesis test.
4. Develop understanding of the ethical dimensions for conducting applied research and writing a technical report.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Mechanical Engineering Lab. | **Course Code**: MECM1103P |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Apply the collaborative and social aspects of research and writing processes.
2. Apply knowledge, techniques, skills and modern tools of mechanical engineering to the solution of engineering problems related to Materials Science, Production, CAD-CAM, Design, and Automation.
3. Be conversant with the emerging areas of Mechanical Engineering through seminars and discussions.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Additive Manufacturing | **Course Code**: MECM1104T |

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| **Course Outcomes:**At the end of this course, the student would be able to:1. Demonstrate the knowledge of Additive Manufacturing and Rapid Prototyping technologies.
2. Identify and select the best Rapid Prototyping technology for a given application/component.
3. Analyze and detect the errors in STL files and implement repair algorithms.
4. Estimate surface roughness, orientation and shrinkage compensation in different layering techniques.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Computer Aided Machine Design | **Course Code**: MECM1105T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Understand the role of computers in manufacturing automation.
2. Develop an experiential learning environment using CAD software tools to design mechanisms and structures for mechanical design evaluation.
3. Develop practical experience in handling 2D drafting & 3D modeling software, design projects with CAE focus.
4. Make 3D models using CAD software.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Finite Element Analysis | **Course Code**: MECM1106T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Demonstrate basic steps involved in FEM.
2. Describe and implement FEM as a numerical tool in engineering design and analysis.
3. Implement numerical methods for solvingproblems concerning mechanics of solids.
4. Solve 1D, 2D and dynamic problems using Finite Element Analysis approach.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Simulation & Modelling | **Course Code**: MECM1107T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Learn different types of simulation techniques.
2. Apply numerical computational techniques-for continuous and discrete models.
3. Conduct simulation of continuous and discrete systems.
4. Simulate the models for the purpose of optimum control by using software.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Mechatronics | **Course Code**: MECM1108T |
| **Course Outcomes:** At the end of this course, the student would be able to:1. Select and use appropriate Transducers & Sensors for automated solutions.
2. Design and implement digital logics using various gates.
3. Program and implement solutions using various Microcontrollers and PLCs.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Gear Design | **Course Code**: MECM1109T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Select appropriate gearing for various applications.
2. Design various gears, viz. toothed gearing, spur, helical, bevel, helical bevel and worm gears.
3. Understand inspection methods for cylindrical gears.
4. Analyze causes of gear failures.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Automotive Design | **Course Code**: MECM1110T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Develop an understanding about various sub-systems of an automobile, viz. driveline, suspension, steering and braking.
2. Evaluate and improve ergonomic design of automobiles.
3. Understand NVH levels in automobiles.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** System Design | **Course Code**: MECM1111T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Understand the principles and tools of systems analysis and design.
2. Develop system design through steps like preliminary and detailed design and design revisions.
3. Carry out effective engineering analysis and make decision towards system design.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** English for research paper writing | **Course Code**: MECM1113T  |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Select suitable title, design structure of paper, write appropriate abstract and conclusion.
2. Develop a lucid writing style that is easy to understand.
3. Ensure good quality of paper right at the time of initial submission.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Disaster Management | **Course Code:** MECM1114T  |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Develop critical understanding of key concepts in disaster risk reduction and humanitarian response.
2. Identify disaster-prone areas in India and categorize them as per their associated disaster phenomenon.
3. Perform disaster risk assessment and participate in disaster mitigation programmes.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Value Education | **Course Code:** MECM1115T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Develop an insight into the Indian vision of humanism.
2. Imbibe good values and work ethics.
3. Get appraised about different religions and faiths.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Stress Management by Yoga | **Course Code:** MECM1116T  |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Identify and understand the signs and symptoms of stress.
2. Improvephysical, mental, emotional and social health.
3. Effectively apply stress management techniques.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Computer Aided Design & Manufacturing | **Course Code**: MECM1201T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Understand the role of computers in the various design processes.
2. Develop hands-on experience in 2D drafting, sketching and 3D modeling of parts based on Boundary representation (B-rep) and Constructive solid geometry (CSG).
3. Write and edit NC part programs.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Industrial Automation & Robotics  | **Course Code**: MECM1202T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Understand the working of various sensors, control elements and actuators used in automation.
2. Make and analyze hydraulic and pneumatic circuits for different tasks.
3. Design industrial automation systems for assembly, packaging, inspection etc.
4. Perform kinematic and dynamic analysis of robotic arms.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Self Study & Seminar | **Course Code**: MECM1203T |
| **Course Outcomes:** At the end of this course, the student would be able to:1. Understand the systematic approach to collect information pertaining to selection of topic related to the latest advancements in the field of Mechanical Engineering/Allied disciplines.
2. Conduct a systematic literature review in the research area of his choice.
3. Compile and present a detailed seminar report on the research topic of his choice, including the background knowledge, literature review and research gaps.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Operations Research | **Course Code**: MECM1204T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Formulate and analyze an engineering optimization problem.
2. Apply optimization techniquesfor making effective business decisions.
3. Select appropriate solution strategyto a given optimization problem.
4. Use softwaretools for solving various optimization problems.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Foundry Technology | **Course Code**: MECM1205T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Design patterns and moulds.
2. Identify various types of casting defects and take steps to mitigate the same.
3. Identify and solve problems in sand casting process of different metals.
4. Understand the requirements and methods for modernization and pollution control in foundries.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Neural Networks & Fuzzy Logic | **Course Code**: MECM1206T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Develop an understanding of different architectures of neural networks.
2. Design the application of neural networks and fuzzy logic controllers.
3. Determine different methods of Defuzification.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |

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| **Course Name:** Design of Experiments | **Course Code**: MECM1207T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Understand the statistical design of experiments on the basis of various techniques, viz. full factorial designs with two levels, fractional designs with two levels and response surface designs.
2. Design a system, component, or process to meet the requirements within realistic constraints, such as economic, environmental, social, political, ethical, health, safety, manufacturability, and sustainability.
3. Use techniques, skills and modern engineering tools necessary for engineering practice.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Computer Aided Process Planning | **Course Code**: MECM1208T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Develop an understanding of Computer Aided Process Planning.
2. Understand the importance of various process planning functions in upgrading product development, as well as to have insight of the structure of typical CAPP systems from a holistic perspective.
3. Use CAPP programs for developinga route sheet by following variant and generative approaches.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Industry 4.0 | **Course Code**: MECM1209T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Understand the concepts of Artificial Intelligence and Machine Learning
2. Identify the application areas for Internet of Things.
3. Demonstrate the application of Digital Manufacturing
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Artificial Intelligence | **Course Code**: MECM1210T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Design a knowledge-based system
2. Gain familiarity with the terminology used in Artificial Intelligence.
3. Understand important historical and current trends addressing artificial intelligence.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Business Intelligence | **Course Code**: MECM1211T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Apply the knowledge of business enterprise data management
2. Utilize data management techniques effectively
3. Carry out Multi-Dimensional Data Modelling
4. Demonstrate the skills related to enterprise reporting.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Welding Technology | **Course Code**: MECM2101T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Gain familiarity with the fundamental principles of joining technology.
2. Identify the selection of appropriate welding process for joining operations.
3. Recommend an appropriate material as electrode of filler material for the parent metals to be joined.
4. Understand the advancements in welding techniques.
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| **Program Name:** Master of Technology-Regular (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Non-Traditional Machining Processes | **Course Code**: MECM2102T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Categorize different material removal, joining processes as per the requirements of materials being used to manufacture end product.
2. Select material processing technique with the aim of cost reduction, reducing material wastage & machining time.
3. Identify the process parameters affecting the product quality in various advanced machining of metals/ non-metals, ceramics and composites.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Project | **Course Code**: MECM2103T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Undertake a detailed literature review in the research area of his choice/allocated by the concerned project advisor.
2. Identify the research gaps in the assigned research area.
3. Frame the research objectives in the research area identified.
4. Compile and defend a detailed project report.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Management of Production Systems | **Course Code**: MECM2104T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Develop an understanding of principles of management and decision-making approaches.
2. Understand the importance of plant design in production system transportation.
3. Develop and use Programme Evaluation and Review Techniques
4. Understand the functions of PPC, quality, inspection and value engineering.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Computer Aided Manufacturing | **Course Code**: MECM2105T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Understand the fundamental concepts of numeric control, CNC and DNC.
2. Write and edit NC part programs.
3. Understand of concepts of Flexible Manufacturing Systems andComputer Integrated Manufacturing Systems.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Facilities Planning & Design | **Course Code**: MECM2106T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Analyze material movement and design plant layout.
2. Use software tools for plant layout design.
3. Perform qualitative and quantitative analysis of process and plant layout.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Total Quality Management | **Course Code**: MECM2107T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Understand the importance of quality control in an industry
2. Use various techniques for quality control and assurance.
3. Deploy various quality policies to assure quality products as well as lean manufacturing techniques.
4. Suggest implementable solutions in the context of an industry.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Product Design & Development | **Course Code**: MECM2108T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Understand the concept of product planning, design and development.
2. Develop sensitisation for the aspects of manufacturability and assembly, while designing a product.
3. Become aware of the legal issues concerning safety standards, patents and copyrights.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Machine Tool Design | **Course Code**: MECM2109T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Analyze constructions and kinematic schemata of different types of machine tools.
2. Construct ray diagrams and speed spectrum diagrams for speed and feed boxes.
3. Develop conceptual design, manufacturing framework and systematic analysis of design problems for machine tools.
4. Apply the design procedures on different types of machine tools and/or machine tool components.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Vibration Analysis | **Course Code**: MECM2110T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Perform Fourier analysis on any periodic functions or recorded data.
2. Analyze the behavior of single DoF system under free or forced vibrations and determine the effectiveness of vibration isolation elements.
3. Work-out the response analysis of multi DoF systems excited by any complex periodic function.
4. Estimate first natural frequency of a multi DoF system and critical speeds of vertical and horizontal shafts.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Advanced Engineering Mathematics | **Course Code**: MECM2111T |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Apply advanced mathematical techniques to engineering problems.
2. Understand different solution strategies and performance criterion for applied optimization problems.
3. Perform detailed classification of advanced mathematical techniques like tensor analysis, integral transforms, Z-transforms, conformal mappingand calculus of variations for engineering applications.
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| **Program Name:** Master of Technology (Mechanical Engineering) | **Program Code**: MECM2PUP |
| **Course Name:** Dissertation | **Course Code:** MECM2201P |
| **Course Outcomes:**At the end of this course, the student would be able to:1. Plan an independent and sustained critical investigation of a chosen research topic relevant to mechanical engineering, environment and society.
2. Engage in systematic discovery and critical review of appropriate and relevant information sources
3. Communicate research concepts and contexts clearly and effectively both in writing as well as verbally.
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