



M. Tech. Admissions 2023 Mechanical Engineering

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M. Tech. in Mechanical Engineering (CAD/CAM)

The CAD/CAM Program involves an integration of Computer-Aided Design (CAD) and Computer –Aided Manufacturing using a wide range of computer-based tools that assist engineers in their design and manufacturing activities. It involves a synergistic use of theoretical concept and modern software tools. The capabilities of modern CAD systems include design & development of components in minimum lead time, ease of design modification and versioning, automatic generation of standard components of design, validation/verification of designs against specifications and design rules, simulation of designs, finite element analysis, automated design of assemblies, etc. The developed CAD models result in real-time process simulation and Computerized Numerically Controlled (CNC) manufacturing for faster and efficient production. The course content aims at developing the necessary analytical and technical competence among the engineers and is tailored to prepare post graduates ready to take up developmental and research activities related to CAD/CAM.

Course Structure

Semester-I <ul style="list-style-type: none"> • Analysis of Manufacturing Processes • Computer Aided Design • Advanced Machine Design • Advanced Theory of Machines • Industrial Automation • Computer Aided Engineering Laboratory • Design and Dynamics Laboratory 	Semester-II <ul style="list-style-type: none"> • Computer Aided Manufacturing • Department Elective-I • Department Elective-II • Department Elective-III • Research Methodology & IPR • Minor Project • Communication Skills and Technical Writing
Semester-III <ul style="list-style-type: none"> • Major Project Part-I (full time) 	Semester-IV <ul style="list-style-type: none"> • Major Project Part-II (full time)

M. Tech. in Mechanical Engineering (Design Engineering)

M. Tech. in (Design Engineering) program is designed to enable an engineering graduate to develop specific capabilities in design, synthesis and analysis of a wide variety of mechanical engineering systems. The program focuses on developing design methodologies which involve high degree of research orientation supplemented with practical insights. Besides core courses (which are mandatory), a variety of electives are also offered to suit the taste of each individual student so that he/she can specialize in a particular area of Design Engineering. The course structure is prepared with a pedagogy involving various core design streams namely Fundamentals of Materials and Selection in Design, Application of Fatigue, creep and fracture mechanics for mechanical design, Pressure Vessel Design, Computational and Numerical Techniques in Design, Vibration and condition monitoring and Optimization techniques in Real-time applications. The Mechanical Engineering (Design) post graduate shall be ready to solve real time design challenges be it in industries or research organizations, industries and academia.

Course Structure

Semester-I <ul style="list-style-type: none"> Advanced Mechanics of Solids Kinematics and Dynamics of Machines Robotics and Automation Advanced Mechanical Design Applied Computational Methods Design Laboratory-I 	Semester-II <ul style="list-style-type: none"> Finite Element and Mesh Free Methods Applied Mechanical Vibrations Department Elective-I Department Elective-II Department Elective-III Research Methodology & IPR Minor Project
Semester-III <ul style="list-style-type: none"> Major Project Part-I (full time) 	Semester-IV <ul style="list-style-type: none"> Major Project Part-II (full time)

Project Areas

Students of M.Tech. CAD/CAM and M.Tech. Design may take projects in following domains to be industry ready.

- Stress Analysis
- Design and Development of deployable structures
- Design and development of systems for space applications
- Computational Damage Mechanics
- Robotics and Automation
- Pressure Vessel and Piping Design
- Condition Monitoring of Mechanical Equipment
- Applied Numerical Methods
- Advanced Materials
- Design and development of textile engineering systems
- Finite Element Analysis and Design Optimization of Machines
- Design & optimization of various Manufacturing Processes.
- Fatigue and Fracture Analysis of Engineering Components
- Kinematic Analysis and Synthesis
- Dynamic Analysis
- Vibration Analysis

Placement and Internship Opportunities for M.Tech. Students

The students of previous batches of M.Tech. students have found opportunities to work on the live projects with the industry like Siemens, Philips, Milacron, Schindler, Alstom, Tata Motors, etc. Moreover, the students found opportunities for research at IITs/reputed foreign universities including TU Berlin, etc. The alumnus was placed in leading industries including INOX, L&T, Tata, Hitachi, Xylem, CEAT Tyres, Jacobs, Arcelor Mittal Nippon Steel, Infosys, Aeroil, TLT Engineers etc.

Salient Features of the Department

The computational facilities in the Department includes various software such as- ANSYS, CREO, MathCAD, AutoCAD, Autodesk, NX7, Hyper works, Automation Studio, CATIA, SLT for vibration analysis, Dynaform, HTRI, Machine Design Online, Minitab, Solid works, EES, and Tec plot. The hardware facilities in the Department include dedicated Workstations and GPU based Cluster for high-speed computing. Moreover, the department have well equipped laboratories/research & Testing facilities in the areas of:

- Centre of Excellence in Robotics and Automation
- Kinematics and Dynamics
- Material Technology and Metallurgy
- CAD/CAM Centre
- Dynamics of Machines
- Manufacturing Technology
- 3D printing
- Centre for Advanced Instrumentation Centre
- National Laboratory for Testing of Thermal Insulations

Research and Consultancy Activities

- The Department offers consultancy and testing services to various industries in areas related to Mechanical Engineering. Some of the projects undertaken by the Department include –
- Redesign of Heat Setting Chambers for Stenter Machine,
- Design of Transportation System for Stenter Machine,
- Thermal Insulation Properties Evaluation, Materials of Construction for Ammonia / Urea Plant,
- 3D Geometric Modelling using Solid Works,
- Finite Element Analysis of Gate Valve,
- Finite Element Analysis of Ball Valve, Vibration Analysis of spindles of ring frame, etc.
- The Department has undertaken various externally funded research projects sponsored by ISRO, DST, Kluster Calico, Inspiron

Centre of Excellence in Robotics and Automation

Automation systems are widely used in many industrial jobs, ranging from spray painting to welding to handling heavy components. Industrial robots can produce high-quality goods for the consumers, generate a higher return on investment for the investors, and bring safety to the workplace. An increased use of industrial robots will lead to more jobs in service, healthcare, education, manufacturing industries and the entertainment industries. The repetitive jobs in factories will be dominated by the industrial robots, but the jobs that require creativity will be enjoyed more by humans. In order to cater to the need of automation industries there is a requirement of continuous research and up-gradation in the field of robotics and automation. The Centre for Robotics and Automation facilitates the researchers by providing an environment to develop and upgrade the robotic technology. The research and development in the said field would provide innovative solutions to many automation companies. The Centre aims to provide an interdisciplinary environment and bring together the research groups involved in robotics, control engineering, embedded systems, industrial automation, artificial intelligence, computer coding, machine learning and other related technologies. The state-of-the-art facilities at the Centre would play a vital role in the advancement of robotics and automation field. It also aims to facilitate the need to create industry-ready manpower by imparting training.

