M. Tech. MECHATRONICS

DEPARTMENT OF MECHANICAL ENGINEERING

NATIONAL INSTITUTE OF TECHNICAL TEACHERS TRAINING AND RESEARCH
Institution Deemed to be University under Distinct Category, A Centrally Funded Technical Institute
Ministry of Education, Government of India, Taramani, Chennai - 600 113.
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NITTTR, CHENNAI

The National Institute of Technical Teachers' Training and Research, Chennai is a premier institution established in 1964 under the Ministry of Education, Government of India, dedicated to enhancing the quality of technical education in the country. It has been granted the "Institution Deemed to be University" status by the Ministry recently. This recognition acknowledges our 60 years of commitment to providing quality education and training, marking a significant milestone in our journey towards excellence in technical education and research.

Established to improve the standards of technical education, NITTTR offers a range of programs and services tailored to the needs of educators and institutions in the technical education sector. At the core of NITTTR's mission is the training and professional development of technical teachers. Through its various training programs, workshops, and courses, NITTTR equips educators with the necessary skills and knowledge to excel in their roles. These programs cover diverse topics such as curriculum development, teaching methodologies, educational technology, and quality assurance, ensuring that educators stay updated with the latest trends and practices in the field.

In addition to training, NITTTR also conducts research and consultancy activities aimed at improving the overall ecosystem of technical education. The institutions engages in cutting-edge research to address key challenges and opportunities in the field, contributing to the advancement of knowledge and innovation. Moreover, NITTTR offers consultancy services to technical institutions seeking guidance on various aspects such as infrastructure development, curriculum design, and pedagogical practices.

NITTTR's commitment to excellence in technical education extends beyond its training and research initiatives. The institution actively promotes collaboration and networking among professionals in the technical education sector, fostering a community of practice where ideas and best practices are shared and exchanged. NITTTR plays a pivotal role in shaping the future of technical education in India. By providing high-quality training, conducting impactful research, and offering expert consultancy services, NITTTR continues to make significant contributions towards the enhancement of technical education standards and the development of a skilled workforce for the nation's growth and prosperity.

DEPARTMENT OF MECHANICAL ENGINEERING

The Department of Mechanical Engineering was established in 1964 to provide academic leadership in content updating courses in existing and emerging technology areas through short-term and long-term duration programmes. The Department of Mechanical Engineering was started by meeting the requirements of industry 2.0 and has transformed to meet the requirements of industry 4.0 through promoting innovations, research and development in Mechanical engineering and to provide world class human resources in cutting edge technologies and instrutional development areas. The department is also focussing on offering quality short term and long term need based training programmes and workshops to technical and vocational teachers of tecnical education system, constantly expanding the horizons of the department to reflect changing technologies, establishing national and international networking with technical institutions and industries for improving professionalism and promoting research and undertake research studies for system improvement.

Faculty members are having research experiences in the domain of Solar Energy, Machining of Composites, Robot Vision in Assembly Automation, Design of Unmanned Aerial Vehicle and additive manufacturing. Three patents have granted during tha year 2023-2024. Department faculty and research scholars are engaged in working on research projects funded by various central government agencies. Following are the ongoing projects.

- Devising point-of-care diagnostic microchip biosensor for early diagnosis of cardiovascular disease (Sponsored by DST – CII – GITA (Indo – Taiwan)
- UAV Based In-situ Measurements and Hyper spectral Analysis for Water Quality Mapping and Developing Remediation Strategies (Sponsored by SERB - EQUITY)
- Fabrication of Solid Propellants using slurry based 3D Printing and experimental investigations on minimizing curing time using various heat sources (Sponsored by DRDO – ARMREB - HEM)

M. Tech. MECHATRONICS

The M. Tech in Mechatronics programme is distinguished by its salient features that make it an appealing choice for students interested in the intersection of mechanical engineering, electronics, computer technology, and control systems to develop a comprehensive understanding of intelligent mechanical systems. It is aimed at equipping students with the skills needed to design, analyze, and operate the automated machinery and systems.

One of the main attractions of a Mechatronics programme is its interdisciplinary nature, which blends aspects of various engineering disciplines. This provides a holistic education that prepares students to tackle complex engineering problems involving multiple technical fields. The programme encourages innovation and creative problem-solving by integrating the latest technologies and methodologies in areas such as robotics, automation, and artificial intelligence.

Mechatronics heavily relies on practical experience. Laboratories and workshops equipped with the latest technology are a staple of the course, allowing students to apply theory to real-world systems and scenarios. The curriculum is often designed in collaboration with industry professionals, ensuring that the skills and knowledge imparted are relevant and up-to-date. This includes training in popular industry tools and software. The research component allows students to specialize in a particular area of mechatronics, contributing to academic and industry knowledge.

Courses typically cover advanced topics in technology such as IoT (Internet of Things), machine learning applications in automation, and robotics, keeping students at the forefront of technology trends. Students are often encouraged to consider global engineering challenges and the ethical implications of technology, preparing them to make decisions that are socially responsible and sustainable.

Graduates of this programme have the flexibility to pursue careers in various sectors including automotive, aerospace, manufacturing, robotics, and even emerging fields like renewable energy and smart technologies. The programme usually involves a lot of teamwork, reflecting the collaborative nature of the field. Students often work in teams on projects, mirroring the multidisciplinary team environments they will experience in their careers.

Being a specialized field, mechatronics programme often provide strong networking opportunities through industry partnerships, and professional associations. M. Tech in Mechatronics a comprehensive and dynamic programme suitable for students and professionals eager to thrive in technologically advanced and interdisciplinary environments and preparing graduates for a dynamic and evolving career landscape.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOS)

- Graduates of the programme will design and develop solutions or to perform research in the domain of Mechatronics.
- Graduates of the programme will be proficient mechatronic engineer in automating systems through the integration of hardware and software to mechanical design, manufacturing and allied fields.
- Graduates of the programme will effectively review and document the knowledge developed by scholarly predecessors and critically assess the relevant technological issues.
- Graduates of the programme will formulate relevant research problems, conduct experimental and/or analytical study with modern mathematical scientific methods and use of software tools in interdisciplinary domain of Mechatronics.
- Graduates of the programme will design and validate technological solutions to defined problems and communicate clearly and effectively for the practical application of their work.

PROGRAMME OUTCOMES (POS)

At the end of the programme, graduates will be able to

- Independently carry out research/investigation and development work to solve industrial problems through cost-effective automation solutions.
- Write and present a substantial technical report/document effectively on design, development and maintenance of mechatronic systems in industries.
- Establish, implement, and maintain continuous improvement of mechatronic system on procedures and practices for emerging industrial requirements.
- Select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling for unified mechatronic systems and their intelligence.

Conduct investigation, analyze the root cause and generate corrective and preventive measures in addressing societal, health, safety, legal and cultural issues in developing and maintaining a mechatronic solution for various engineering systems.

Recognize the need for multidisciplinary culture, and have the preparation and ability to engage in life-long learning independently, with a high level of enthusiasm and commitment to improve knowledge and competence continuously

CORE COURSES

- Sensors and Actuators
- Control System Design
- Industrial Automation
- Mechatronics System Design
- Industrial Robotics and Control
- Machine Vision Systems
- Intelligence in Systems
- Smart Embedded Systems
- Sensors and Actuators Laboratory
- Industrial Automation Laboratory
- Industrial Robotics and Embedded systems Laboratory
- Machine Vision and Intelligence Laboratory

ELECTIVE COURSES

- Computer Aided Inspection
- Green Manufacturing
- Digital Manufacturing
- Computer Aided Production and Automation of Plants
- Internet of Things for Manufacturing
- Intelligent Product Design
- Design of Machine Elements and Product Development
- Multi-Body Dynamics
- Mobile Robotics
- Unmanned Aerial Vehicle
- Modeling and Analysis of Electromechanical Systems
- Human Industrial Safety and Hygiene
- Computer Vision
- Haptics and Augmented Reality
- Industrial Instrumentation and Control
- Automotive Electronics
- Biomechatronics
- Micro and Nano Systems

AREAS FOR SHORT-TERM TRAINING PROGRAMS

- Advances in Materials & Manufacturing
- Advances in Mechanical Engineering
- AI /ML in Robotic Applications
- AI and ML in Drone Applications
- CNC Machines & Programming
- Computer Aided Design / Parametric Modelling
- Computer Integrated Manufacturing
- Digital Transformation in Manufacturing
- Emerging Trends In Additive Manufacturing
- Emerging trends in Mechatronics
- Energy and Environmental Management
- Geometric Dimensioning and Tolerancing
- Green Energy Technology
- In- Service Training for Mechanical Engineering Teachers
- Industrial Training in Automobile Technology
- Industrial Training in Mechanical Engineering
- Industrial Training on Drone Technology
- Industrial Training on Manufacturing of Material Handling Equipments
- Industry 4.0 – Concepts & Applications
- IoT and Image Processing for UAV Applications
- Nanotechnology & Applications
- Non Traditional Machining
- Present and Future Trends in Unmanned Aerial Vehicles
- Product Design and Assembly
- Project Management Skills
- Python Programming
- Recent Development in Mechanical Engineering
- Recent trends in Industrial Automation
- Recent Trends in Metal Additive Manufacturing
- Refresher course on Automobile Technology, Energy and HVAC
- Refresher course on Energy, Thermal and Refrigeration and Air-conditioning
- Refrigeration and Air conditioning
- Renewable Energy Sources

FACILITIES OF DEPARTMENT OF MECHANICAL ENGINEERING

Solar Thermal
Training System

Solar
Power Meter

Solar Module
Analyzer

Solar Water
Pump Test Rig

Solar Power
Inverter

Stereolithography
3D Printer

Fused Deposition Modeling
(FDM) 3D Printer

EDM Drilling Machine

THE DIRECTOR

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