School of Engineering

MIT-ADT UNIVERSITY
PUNE, INDIA
A Leap Towards World Class Education

Programme Curriculum

MASTER OF TECHNOLOGY

PATTERN 2021

Mechanical Engineering (Robotics & Automation)

Faculty of Engineering

MIT ART DESIGN & TECHNOLOGY UNIVERSITY, PUNE

MIT SCHOOL OF ENGINEERING PUNE

STRUCTURE & SYLLABUS

FOR

Master of Technology

Mechanical Engineering

(Robotics & Automation)

UNDER FACULTY OF ENGINEERING

2 Year Post Graduate Programme sanctioned by AC & BoS

(w.e.f. 2021-2022)

(74 CREDITS)

Department of Mechanical Engineering

VISION

To develop globally competent multi-faceted Mechanical Engineers by nurturing moral and ethical values.

MISSION

1. To provide a conducive academic environment through effective teaching-learning and research culture.
2. To develop world-class mechanical engineers to cater diverse needs of the society by imparting application oriented engineering knowledge and providing academia-industry interaction.
3. To emphasize the importance of ethics and morals by creating awareness and persistent practices.

Program Outcomes as defined by NBA (PO)

Engineering Graduates will be able to:

1. **PO1 - Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **PO2 - Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **PO3 - Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **PO4 - Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **PO5 - Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **PO6 - The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **PO7 - Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **PO8 - Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **PO9 - Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **PO10 - Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **PO11 - 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.
12. **PO12 - 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 technological change.

Program Educational Objectives (PEO's)

Mechanical Engineering (Robotics and Automation)

1. **PEO-1:** Graduates of the program will become competent Engineers suitable for core industries and higher education.
2. **PEO-2:** Graduates of the program will acquire the necessary foundation for development of mathematical analytical abilities.
3. **PEO-3:** Graduates of the program will acquire the knowledge and skills to provide sustainable solutions to social problems through Innovations and Entrepreneurship.
4. **PEO-4:** Graduates of the program will learn managerial, financial and ethical practices such as, project and financial management skills, multidisciplinary approach and soft skills.
5. **PEO-5:** Graduates of the program will cater to the need of growing demands of market through lifelong learning approach.

Program Specific Outcomes (PSO)

Mechanical Engineering (Robotics and Automation)

The program is expected to deliver at the time of graduation:

1. **PSO-1:** Design and innovate advanced robotic systems that are sustainable, cost-effective, and capable of addressing complex engineering and societal challenges using cutting-edge technologies.
2. **PSO-2:** Develop and implement reliable, safe, and intelligent automation solutions for diverse manufacturing and service industries, ensuring optimization, adaptability, and adherence to ethical and professional standards.
3. **PSO-3:** Integrate advanced domain knowledge with emerging technologies like AI, IoT, and Industry 4.0 to solve interdisciplinary industrial problems and drive innovation.

M. Tech.Mechanical Engineering (Robotics and Automation)

(2021-22 Regulations)

SEMESTER-I

Course Code	Course Name	Hours/week				Maximum Marks		
		Lecture	Tutorial	Practical	Credits	CA	FE	Total
21MTMT106	Advanced Engineering Mathematics	3	1	0	4	40	60	100
21MTRA102	Principles of Robotics	3	0	0	3	40	60	100
21MTRA103	Automatic Control System	3	0	0	3	40	60	100
21MTRA104	Research Methodology	3	0	0	3	40	60	100
21MTRA131	Elective -I	3	0	0	3	40	60	100
21MTRA132	Elective - II	3	0	0	3	40	60	100
21MTRA111	Laboratory Practice-I	0	0	6	3	40	60	100
Total		**18**	**1**	**6**	**22**	**280**	**420**	**700**

SEMESTER-II

Course Code	Course Name	Hours/week				Maximum Marks		
		Lecture	Tutorial	Practical	Credits	CA	FE	Total
21MTRA201	Industrial Hydraulics & Pneumatics	3	0	0	3	40	60	100
21MTRA202	Industrial Automation	3	0	0	3	40	60	100
21MTRA203	Artificial Intelligence	3	0	0	3	40	60	100
21MTRA204	Applied Economics and Financial Management	2	0	0	2	40	60	100
21MTRA231	Elective-III	3	0	0	3	40	60	100
21MTRA232	Elective- IV	3	0	0	3	40	60	100
21MTRA211	Laboratory Practice-II	0	0	6	3	40	60**	100
21MTRA221	Technical Seminar-I	0	0	4	2	40	60**	100
Total		**17**	**0**	**10**	**22**	**320**	**480**	**800**

SEMESTER-III

Course Code	Course Name	Hours/week				Maximum Marks		
		Lecture	Tutorial	Practical	Credits	CA	FE	Total
21MTRA321	Technical Seminar-II	0	0	4	2	40	60**	100
21MTRA322	Project Phase-I	0	0	24	12	40	60**	100
Total		**0**	**0**	**28**	**14**	**80**	**120**	**200**

SEMESTER-IV

Course Code	Course Name	Hours/week				Maximum Marks		
		Lecture	Tutorial	Practical	Credits	CA	FE	Total
21MTRA421	Project Phase-II	0	0	32	16	100	200	300
Total		**0**	**0**	**32**	**16**	**100**	**200**	**300**

ELECTIVE-I

Course Code	Subject Name
21MTRA131	Automated Manufacturing Systems
21MTRA132	Robot Drives and Actuators
21MTRA133	Process Instrumentation and Control
21MTRA134	Product Design and Process Planning

ELECTIVE-II

Course Code	Subject Name
21MTRA135	Automotive Electronics
21MTRA136	Mobile Robotics
21MTRA137	Wireless Sensors Networks
21MTRA138	Computer Aided Engineering

ELECTIVE-III

Course Code	Subject Name
21MTRA231	Flexible Manufacturing System
21MTRA232	Robotic Vision Systems
21MTRA233	Industrial Networking
21MTRA234	Advanced Optimization Techniques

ELECTIVE-IV

Course Code	Subject Name
21MTRA235	Mechatronics System Design
21MTRA236	Collaborative Robotics
21MTRA237	Rapid Prototyping
21MTRA238	Industrial IOT and Automation

BoS Chairman
HoD
Mechanical Engg. Dept.

Dean
DEAN- Engineering
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