School of Engineering

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

Programme Curriculum

BACHELOR 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

Bachelor of Technology
Mechanical Engineering
(Robotics & Automation)

UNDER FACULTY OF ENGINEERING

4 Year Under Graduate Programme sanctioned by AC & BoS

(w.e.f. 2021-2022)

(168 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 Educational Objectives (PEO's) - Mechanical Engineering

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 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 Specific Outcomes (PSO)

Mechanical Engineering - Robotics and Automation

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

1. **PSO-1:** Design and develop robotic systems that are cost effective, environment friendly to solve engineering and societal problems using advanced tools and techniques.

2. **PSO-2:** Model, programme and build an error free, safe, and productive automation systems for various manufacturing processes.

3. **PSO-3:** Apply domain knowledge of robotics and automation to provide solutions in interdisciplinary areas to meet current industrial challenges.

B. Tech. (Mechanical Engineering) – Robotics & Automation
(2021 Regulations)

(Credits: 168)

SEMESTER-I

Course Code	Course Name	Hours/week				Maximum Marks		
		Lecture	Tutorial	Practical	Credits	CA	FE	Total
21BTAS102	Linear Algebra and Calculus	3	1	0	4	40	60	100
21BTCS101	Programming for Problem Solving	2	0	4	4	(40+50P)	60	150
21BTME001	Engineering Graphics	1	0	4	3	40	60	100
21BTIC003	Engineering Workshop	0	0	4	2	50	0	50
21BTAS104	English communication for Engineers	2	0	2	3	40	60	100
21BTUC101	Design Thinking Part I	1	0	2	2	50	-	50
18UCCS102	SHD (Health Practice I)	0	0	2	1			
Total		**9**	**1**	**18**	**19**	**310**	**240**	**550**

SEMESTER-II

Course Code	Course Name	Hours/week				Maximum Marks		
		Lecture	Tutorial	Practical	Credits	CA	FE	Total
21BTAS203	Ordinary Differential Equations and Advanced Calculus	3	1	0	4	40	60	100
21BTCS202	Object Oriented Programming	2	0	2	3	40	60	100
21BTEC001	Basics of Electrical and Electronics Engineering	3	0	2	4	(40+50P)	60	150
21BTAS001	Applied Sciences	4	0	2	5	(40+50P)	60	150
21BTME202	Basic Mechanical Engineering	3	0	2	4	(40+50P)	60	150
21BTUC201	Design Thinking Part II	1	0	2	2	50	-	50
18UCCS201	SHD (Professional English communication for Engineers)	1	0	2	2			
18UCCS202	SHD (Health Practice 2)	0	0	2	1			
Total		**17**	**1**	**14**	**25**	**400**	**300**	**700**

SEMESTER III								
Course Code	**Course Name**	**Hours/week**				**Maximum Marks**		
		Lecture	**Tutorial**	**Practical**	**Credits**	**CA**	**FE**	**Total**
21BTRA301	Thermodynamics	3	0	0	3	40	60	100
21BTRA302	Differential Equations and Transform Techniques	3	1	0	4	40	60	100
21BTRA303	Mechanics of Solid	3	1	0	4	40	60	100
21BTRA304	Manufacturing Processes	3	0	2	4	40	60	100
21BTRA305	Engineering Metallurgy	3	0	2	4	40	60	100
21BTRA311	Thermodynamics Lab	0	0	2	1	40	60	100
21BTRA312	Geometric Modeling Lab	0	0	2	1	25	25	50
21BTRA321	Mini Project-I	0	0	4	2	100	--	100
Total		**15**	**2**	**12**	**23**	**365**	**385**	**750**

SEMESTER IV								
Course Code	**Course Name**	**Hours/week**			**Maximum Marks**			
		Lecture	**Tutorial**	**Practical**	**Credits**	**CA**	**FE**	**Total**
21BTRA401	Applied Thermodynamics	3	0	0	3	40	60	100
21BTRA402	Fluid Mechanics	3	0	0	3	40	60	100
21BTRA403	Advanced Manufacturing Processes and Tooling	3	1	0	4	40	60	100
21BTRA404	Theory of Machines-I	3	0	2	4	40	60	100
21BTRA405	Electrical Machines	3	1	0	4	40	60	100
21BTRA411	Applied Thermodynamics Lab	0	0	2	1	25	50	75
21BTRA412	Fluid Mechanics Lab	0	0	2	1	25	50	75
21BTRA421	Mini Project-II	0	0	4	2	100	--	100
21BTME406	Environmental Studies (Audit Course)	2	0	0	Audit course			
Total		**17**	**2**	**10**	**22**	**350**	**400**	**750**

SEMESTER-V

Course Code	Course Name	Hours/week				Maximum Marks		
		Lecture	Tutorial	Practical	Credits	CA	FE	Total
21BTRA501	Heat Transfer	3	0	2	4	40	60	100
21BTRA502	Computational Methods & Data Analytics	3	0	2	4	40	60	100
21BTRA503	Machine Design	3	0	2	4	40	60	100
21BTRA504	Microcontrollers in Robotics	3	0	0	3	40	60	100
21BTRA505	Mechatronics	3	0	0	3	40	60	100
21BTRA511	Microcontroller Lab	0	0	2	1	40	60	100
21BTRA512	Mechatronics Lab	0	0	2	1	40	60	100
21BTRA521	Mini Project III	0	0	4	2	100	--	100
Total		**15**	**0**	**14**	**22**	**380**	**420**	**800**

SEMESTER-VI

Course Code	Course Name	Hours/week				Maximum Marks		
		Lecture	Tutorial	Practical	Credits	CA	FE	Total
21BTRA601	Financial Management	3	0	0	3	40	60	100
21BTRA602	Hydraulics and Pneumatics	3	0	0	3	40	60	100
21BTRA603	Mechanical & Electronic Measurements	3	0	2	4	40	60	100
21BTRA604	Basics of Robotics	3	0	0	3	40	60	100
21BTRA63X	Elective I	3	1	0	4	40	60	100
21BTRA611	Hydraulics and Pneumatics Lab	0	0	2	1	40	60	100
21BTRA612	Robotics Lab	0	0	2	1	40	60	100
21BTRA621	Mini Project IV	0	0	4	2	100	--	100
Total		**15**	**1**	**10**	**21**	**380**	**420**	**800**

SEMESTER VII

Course Code	Course Name	Hours/week				Maximum Marks		
		Lecture	Tutorial	Practical	Credits	CA	FE	Total
21BTRA701	Heating Ventilation & Air conditioning	3	0	0	3	40	60	100
21BTRA702	Drives & Actuators	3	0	0	3	40	60	100
21BTRA703	Industrial Automation	3	0	0	3	40	60	100
21BTRA73X	Elective-II	3	1	0	4	40	60	100
21BTRA73X	Elective-III	3	1	0	4	40	60	100
21BTRA711	Drives & Actuators Lab	0	0	2	1	40	60	100
21BTRA712	Industrial Automation Lab	0	0	2	1	40	60	100
21BTRA721	Project Phase-I	0	0	4	2	100	--	100
Total		**15**	**1**	**10**	**21**	**380**	**420**	**800**

SEMESTER VIII

Course Code	Course Name	Hours/week				Maximum Marks		
		Lecture	Tutorial	Practical	Credits	CA	FE	Total
21BTRA8___	Open Elective	3	0	0	3	40	60	100
21BTRA821	Project Phase-II	0	0	24	12	200	200	400
Total		**3**	**0**	**24**	**15**	**240**	**260**	**500**

LIST OF ELECTIVES

Elective	Course Name	
Elective-I	21BTRA631	Artificial Intelligence
	21BTRA632	Power Electronics
	21BTRA633	Power Plant Instrumentation
	21BTRA634	Operations Research
Elective-II	21BTRA731	Machine Learning
	21BTRA732	Robotic Vision System
	21BTRA733	Mechatronics System Design
	21BTRA734	Management Information System
Elective-III	21BTRA735	Internet of Things
	21BTRA736	Mobile Robotics
	21BTRA737	Computer Integrated Manufacturing
	21BTRA738	Supply Chain Management
Open Elective	21BTRA831	**Open Elective** Autotronics Entrepreneurship Digital Manufacturing Organizational Behavior

BoS Chairman

HoD
Mechanical Engg. Dept.

Dean

DEAN- Engineering
MIT School of Engineering
MIT ADT UNIVERSITY, Pune