School of Engineering

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

Programme Curriculum

BACHELOR OF TECHNOLOGY

PATTERN 2021

Mechanical Engineering (Electric Vehicle)

Faculty of Engineering

MIT ART DESIGN & TECHNOLOGY UNIVERSITY, PUNE

MIT SCHOOL OF ENGINEERING PUNE

STRUCTURE & SYLLABUS

FOR

Bachelor of Technology
Mechanical Engineering
(Electric Vehicle)

UNDER FACULTY OF ENGINEERING

4 Year Under Graduate Programme sanctioned by AC & BoS

(w.e.f. 2021-2022)

(160 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 -Electric Vehicles

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

1. **PSO-1:** Design and develop innovative products and services in the field of Automobile specifically with Electric Vehicles.

2. **PSO-2:** Keeps abreast with the latest technology and toolset required for the Electric Vehicle – Battery Management, Conversion, Control and Automation.

3. **PSO-3:** Attain technical skills to satisfy the changing needs of power industry, academia, society and environment.

B. Tech. (Mechanical Engineering) (Electric Vehicle)

(2021 Regulations)

(Credits: 160)

Course Code	Course Name	Hours/week				Maximum Marks		
		Lecture	Tutorial	Practical	Credit	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**
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**	**Credit**	**CA**	**FE**	**Total**
21BTEV301	Thermodynamics	3	0	0	3	40	60	100
21BTEV302	Differential Equations and Transform Techniques	3	1	0	4	40	60	100
21BTEV303	Mechanics of Solid	3	1	0	4	40	60	100
21BTEV304	Manufacturing Processes	3	0	0	3	40	60	100
21BTEV305	Engineering Metallurgy	3	0	0	3	40	60	100
21BTEV311	Thermodynamics Lab	0	0	2	1	40	60	100
21BTEV312	Geometric Modeling Lab	0	0	4	2	25	25	50
21BTEV321	Mini Project-I	0	0	4	2	100	--	100
Total		15	2	10	22	**365**	**385**	**750**
SEMESTER IV								
21BTEV401	Automotive Electricals & Electronics	3	0	0	3	40	60	100
21BTEV402	Vehicle Technology	3	1	0	4	40	60	100
21BTEV403	Electric & Hybrid Vehicles	3	0	0	3	40	60	100
21BTEV404	Alternate Energy Power System	3	1	0	4	40	60	100
21BTEV405	Theory of Machines	3	0	0	3	40	60	100
21BTEV411	Automotive Electricals & Electronics Lab	0	0	2	1	25	50	75
21BTEV412	Theory of Machines Lab	0	0	2	1	25	50	75

SEMESTER III								
21BT 421	EV Mini Project-I / EV Case Study/ EV Desig Thinking	0	0	4	2	100	--	100
Total		15	2	8	21	**350**	**400**	**750**

SEMESTER V								
Course Code	**Course Name**	**Hours/week**				**Maximum Marks**		
		Lecture	**Tutorial**	**Practical**	**Credits**	**CA**	**FE**	**Total**
21BTEV501	EV Thermal Systems	3	1	0	4	40	60	100
21BTEV502	EV Architecture	3	0	0	3	40	60	100
21BTEV503	Design of Machine Elements	3	0	0	3	40	60	100
21BTEV504	Motor, Drives & Control Systems	3	0	0	3	40	60	100
21BTEV505	Energy Storage Systems for EV+ Charging Infrastructure	3	0	0	3	40	60	100
21BTEV511	Design of Machine Elements Lab	0	0	2	1	40	60	100
21BTEV512	Motor, Drives & Control Systems Lab	0	0	2	1	40	60	100
21BTEV521	Mini Project-II	0	0	4	2	100	--	100
Total		15	1	8	20	**380**	**420**	**800**

SEMESTER VI								
21BTEV601	Computational Methods & Data Analytics	3	0	0	3	40	60	100
21BTEV602	Battery Management System	4	0	0	4	40	60	100
21BTEV603	Automotive Mechatronics	3	0	0	3	40	60	100
21BTEV604	Microcontrollers for automotive applications	3	0	0	3	40	60	100
21BTEV6--	Elective-I	3	0	0	3	40	60	100
21BTEV611	Computing System & Technologies Lab	0	0	2	1	40	60	100
21BTEV612	Microcontrollers for automotive appl.Lab	0	0	2	1	40	60	100
21BTEV621	Mini Project IV	0	0	4	2	100	--	100
Total		16	0	8	20	**380**	**420**	**800**

SEMESTER VII								
Course Code	**Course Name**	**Hours/week**				**Maximum Marks**		
		Lecture	**Tutorial**	**Practical**	**Credits**	**CA**	**FE**	**Total**
21BTEV701	Business Economics & Financial Analysis	3	0	0	3	40	60	100
21BTEV702	Modelling and Simulation of EV	3	0	0	3	40	60	100
21BTEV703	Automotive embedded system	3	0	0	3	40	60	100
21BTEV704	Vehicle Dynamics & Aerodynamics	4	0	0	4	40	60	100
21BTEV705	Testing & Certification of EV	3	0	2	4	40	60	100
21BTEV7--	Elective-II	3	0	0	3	40	60	100
21BTEV711	Lab: Modelling and Simulation of EV	0	0	2	1	40	60	100
21BTEV712	Testing & Certification of EV Lab	0	0	2	1	100	--	100
21BTEV721	Project Phase-I	0	0	4	2			
Total		19	0	10	24	**380**	**420**	**800**

SEMESTER VIII								
21BTEV83-	Open Elective	3	0	0	3	40	60	100
21BTEV821	Project Phase-II	0	0	24	12	200	200	400
Total		**3**	**0**	**24**	**15**	**240**	**260**	**500**

ELECTIVES

	Course Code	Course
Elective-I	21BTEV631	Computational Fluid Dynamics
	21BTEV632	CAE and Automation
	21BTEV633	Artificial Intelligence
	18BTME636	Enterprise Resource Planning
Elective-II	21BTEV 731	Automotive Noise, Vibration & Harshness for EV
	21BTEV 732	Automotive Safety and Crashworthiness
	21BTEV 733	Energy Audit and Management
	21BTEV 734	Intelligence & Communications in Smart Grid
	18BTME735	Autonomous & Connected Vehicles
Open Elective	18BTME831	**Open Elective** Entrepreneurship

BoS Chairman

HoD
Mechanical Engg. Dept.

Dean

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