School of Engineering

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

Programme Curriculum

MASTER OF TECHNOLOGY

PATTERN 2021

Mechanical Engineering (Electric Vehicles)

Faculty of Engineering

MIT ART DESIGN & TECHNOLOGY UNIVERSITY, PUNE

MIT SCHOOL OF ENGINEERING PUNE

STRUCTURE & SYLLABUS

FOR

Master of Technology

Mechanical Engineering

(Electric Vehicles)

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 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:** Apply domain knowledge of EV in interdisciplinary areas to meet current and upcoming industrial challenges.

2. **PSO-2:** Ability to design & analyze systems & its components for Vehicle Performance.

3. **PSO-3:** Ability to apply and solve the problems in the diverse field of EVs like BMS, BTMS, E-Powertrain.

M. Tech - Mechanical Engineeing(Electric Vehicles)
(2021Regulations)

SEMESTER-I								
Course Code	**Course Name**	**Hours/Week**				**Maximum Marks**		
		L	**T**	**P**	**C**	**CA**	**FE**	**Total**
21MTEV101	Computational Methods and Optimization	3	0	0	3	40	60	100
21MTEV102	Automotive Technology	4	0	0	4	40	60	100
21MTEV103	Power Electronics and Controls	3	0	0	3	40	60	100
21MTEV104	Artificial Intelligence and Machine Learning	3	0	0	3	40	60	100
21MTEV105	Energy Storage systems and Management	4	0	0	4	40	60	100
21MTEV106	IC Engine and Electric Motors	3	0	0	3	40	60	100
21MTEV107	Fundamentals of Python	0	0	2	Audit			
21MTEV111	Lab Practice – I	0	0	4	2	40	60	100
Total		**20**	**0**	**10**	**24**	**280**	**420**	**700**

SEMESTER-II								
Course Code	**Course Name**	**Hours/Week**				**Maximum Marks**		
		L	**T**	**P**	**C**	**CA**	**FE**	**Total**
21MTEV201	Modelling & Simulation of xEV	2	0	2	3	40	60	100
21MTEV202	Advancements in EV technology	3	0	0	3	40	60	100
21MTEV203	Introduction to Connected & Autonomous Vehicle.	3	0	0	3	40	60	100
21MTEV204	Vehicle Design for E-Powertrain	4	0	0	4	40	60	100
21MTEV205	Vehicle Dynamics &	4	0	0	4	40	60	100

	Aerodynamics							
21MTEV206	Electric vehicle Testing	3	0	0	3	40	60	100
21MTEV207	Fundamentals of MATLAB	0	0	2	Audit			
21MTEV211	Lab Practice – II	0	0	4	2	40	60	100
21MTEV221	Technical Seminar – I	0	0	4	2	40	60	100
		18	**0**	**12**	**24**	**280**	**420**	**700**

SEMESTER-III								
Course Code	**Course Name**	**Hours/Week**				**Maximum Marks**		
		L	**T**	**P**	**C**	**CA**	**FE**	**Total**
21MTEV221	Technical Seminar-II	0	0	4	2	40	60	100
20MTEV331	Research Project - I	0	0	24	12	100	100	200
Total		**0**	**0**	**28**	**14**	**140**	**160**	**300**

SEMESTER-IV								
Course Code	**Course Name**	**Hours/Week**				**Maximum Marks**		
		L	**T**	**P**	**C**	**CA**	**FE**	**Total**
20MTEV431	Research Project - II	0	0	26	13	100	200	300
	Total	**0**	**0**	**26**	**13**	**100**	**200**	**300**
	Total Credits (Semester I to IV)							**74**

Lab Practice I & II:

The laboratory work will be based on the completion of assignments confined to the courses of that semester.

SEMINAR:

The student shall deliver the seminar on a topic approved by authorities. **Seminar I:**

shall be on the state-of-the-art topic of the student's own choice approved by the authority. The student shall submit the seminar report in the standard format, duly certified for satisfactory completion of the work by the concerned Guide and head of the department/institute.

The seminar shall be on the topic relevant to the latest trends in the field of the concerned branch, preferably on the topic of specialization based on the electives selected by him/her approved by the authority. The student shall submit the seminar report in the standard format, duly certified for satisfactory completion of the work by the concerned Guide and head of the department/institute.

Seminar II: shall be an extension of the **seminar I.** The student shall submit the seminar report in the standard format, duly certified for satisfactory completion of the work by the concerned Guide and head of the department/institute.

PROJECT WORK:

The project work shall be based on the knowledge acquired by the student during the coursework and preferably it should meet and contribute towards the needs of society. The project aims to provide an opportunity of designing and building complete systems or subsystems based on the area where the student likes to acquire specialized skills.

Project Work Stage – I

Project work Stage – I is an integral part of the project Work. In this, the student shall complete the partial work of the project that will consist of the problem statement, literature review, project overview, scheme of implementation (UML/ERD/block diagram/ PERT chart, etc.), and Layout & Design of the Set-up. The candidate shall deliver a presentation as a part of the progress report of Project work Stage-I, on the advancement in Technology about the selected dissertation topic.

The student shall submit the progress report of Project Work Stage-I in standard format duly certified for satisfactory completion of the work by the concerned guide and head of the department/Institute.

Project Work Stage - II

In Project Work Stage – II, the student shall complete the balance part of the project that will consist of fabrication of set up required for the project, conducting experiments and taking results, analysis & validation of results and conclusions.

The student shall prepare the final report of Project work in standard format duly certified for satisfactory completion of the work by the concerned guide and head of the department/Institute.

Note: Institute must submit the list of candidates, guide, and project details (title, area, problem definition, and abstract - indicating objectives and scope, sponsorship details, if any) to the university within the month of commencement of the third semester. The guide must be an approved/qualified teacher of the institute. A guide can guide at the most 8 students per year.

Research Project – I

a. The student shall present the status of research work consent with the guide and in

front of departmental MRPC (Masters Research Progress Committee) in the mid of the third semester.

b. A student shall submit two weeks before the end of the third semester, a written report of work done by him/ her in the prescribed Proforma to the Guide who shall forward it to the RRC with his/her remarks for consideration by the RRC. The report should indicate the progress achieved and cover the following points:

i. Thesis proposal status

ii. Progress made during the period of the report

iii. Publications/reports, if any

iv. Problems/difficulty, if any

v. Plans for future work

Research Project – II

The Pre-Synopsis Research Progress Seminar will be before submission of the thesis to departmental MRPC (Masters Research Progress Committee).

4. Dissertation

a. The final dissertation examination shall be taken by a panel of examiners consists of Supervisors, External Examiner from the relevant field, and Chairman of RRC. b. The result will be declared only after acceptance or publication of full-length research paper at least in peer-reviewed Journal under SCIE/Scopus (Mandatory).

BoS Chairman

HoD
Mechanical Engg. Dept.

Dean

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