

MME3051: Automobile Engineering

Programme: B. Tech. (ME)
Course: Program Elective

Year: III
Credits: 3

Semester: V sem., Odd
Hours: 30 (L)+ 10x2 (P)

Course Context and Overview (100 words):

Automobile engineering is playing very important role in transport and allied sectors contributing in the progress of the country. The major objective of the course is to provide the students with basic and applied knowledge of the automobile systems and components. This will help the students to develop the skills in understanding the basic principles, mechanisms, design concepts and real life applications of different automotive systems and components. The competition among the automobile manufactures has resulted in many innovations that are being adopted and they are included. The further detailed objectives are as following:

1. To understand the basic types of automotive vehicles with overview of their components
2. To understand basic prime movers including engines, and motor drives
3. To study and analyze automotive chassis.
4. To study and analyze automotive drive trains.
5. To explain working of various sub-systems of the automotive vehicle e.g. Ignition system, lighting, safety systems etc.
6. To study and demonstrate the heating, ventilation and air-conditioning systems of the automotive vehicle

Prerequisite Courses: Nil

Course outcomes (COs):

On completion of this course, the students will have the ability to:
CO1 Identify and distinguish different types of the automobile vehicles with study of their major components/parts
CO2 Assemble and disassemble different types of automotive engines
CO3 Demonstrate and analyze various chassis systems e.g. suspension system, steering system etc.
CO4 Demonstrate and analyze various automotive drive systems e.g. clutches, transmission system etc.
CO5 Demonstrate and analyze various automotive sub-systems e.g. ignition system, lighting system etc.
CO6 Describe and demonstrate Heating, ventilation and air-conditioning (HVAC) system of automobile

Course Topics:

Topics	Lecture Hours	
1. Introduction to automobile engineering		
1.1 Definition and History	1	4
1.2 Types and classification of an Automobile vehicle e.g. Engine/electric/hybrid, two wheeler and four wheeler.	2	
1.3 Basic Components and structure of automobile vehicle.	1	
UNIT - II		
2. Introduction to prime movers for automotive vehicles:		
2.1 Two and four stroke engines, SI and CI engines	2	3
2.2 Prime movers for Hybrid vehicles	1	
UNIT-III		
3. Automotive Chassis:		
3.1 Types Of Body and Frame	1	7
3.2 Suspension System	2	
3.3 Steering system, Steering Geometry	2	
3.4 Brakes, Antilock Braking System	1	
3.5 Tires and Wheels	1	
UNIT – IV		
4. Automobile Systems and Components:		
4.1 Security systems e.g. Air Bag	2	6
4.2 Turbocharger system	1	
4.3 Sensors and Actuators used in Modern Vehicles	1	
4.4 Electrical and Electronics Systems – Battery, Starting and Charging System, Battery and Electronics Ignition systems, Lighting	2	
UNIT-V		
5. Automotive Drive Trains		
5.1 Clutches – Operation and Service	2	7
5.2 Manual Transmission type of Gear Boxes	2	
5.3 Drive shaft, Universal Joint, Differentials and Drive axles.	1	
5.4 Automated Manual Transmission System, Torque Converter	2	
UNIT-VI		
6. Automotive HVAC		
6.1 Ventilation and Heating	2	3
6.2 Air conditioning	1	

Textbook references (IEEE format):**Text Book:**

1. Crouse W. H, and Anglin D. L. *Automotive Mechanics*, McGraw Hill, Tenth Edition
2. Singh Kripal, *Automobile Engineering*, Standard Publisher, Vol. 1
3. Gupta S. K., *A text book of Automobile Engineering*, S Chand and Company Limited

Reference books:

1. Singh Kripal, *Automobile Engineering*, Standard Publisher, Vol. 2
2. Heywood John B, *Internal combustion Engines Fundamentals*, McGraw Hill, Latest Edition.
3. Kohli, P. L., *Automotive Electrical Equipment's*, McGraw Hill, Latest Edition

Additional Resources (NPTEL, MIT Video Lectures, Web resources etc.):**Evaluation Methods:**

Item	Weightage
Lab Assignment	35
Mid term	25
End term Examination	40

List of Experiments: (2 Hrs each)

1. To Study of an Automobile with overview of various components.
2. Dismantling and Assembly of 4 stroke multi cylinder diesel and petrol engine and study the various components of engine.
3. To Study the various components and function of Turbocharger and Air Bag on its actual model.
4. Identify charging, starting, ignition, and accessory-circuit components, and their functions.
5. Study the various components and function of clutch and Differential on its actual model.
6. Dismantling and Assembly of Synchromesh Gear Box and study the various components Of Synchromesh Gear Box.
7. Dismantling and Assembly of Torque Converter and AMT Gear Box and study its various components.
8. To study constructional details, working principles and operation of an Automotive Steering Systems, Suspension Systems and Brake systems.
9. Study sensors and actuators used in modern vehicle on Maruti Van test rig.
10. Simulation of power train in AVL cruise and study the vehicle performance.

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