

Branch Name:	Mechanical Engineering
Program Code:	ET101
Course Name:	Automobile Engineering
Course Code:	2ET1010701T
Pre-requisite Course:	Internal Combustion Engine, Applied Thermodynamics

Course Objectives:

1. To understand the construction and working of automobile systems including engine, transmission, steering, suspension, braking and electrical systems. To understand the importance of dimensional analysis.
2. To gain knowledge of automotive electrical and electronic systems such as battery, starting, charging, ignition and modern vehicle electronics.
3. To introduce emission control techniques and modern automotive technologies including hybrid and electric vehicles.
4. To develop the ability to analyze automobile performance, safety and efficiency in real-world applications.

Teaching and Examination Scheme:

Teaching and Examination Scheme:														
Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)									
					Theory (Marks)				Practical (Marks)				Total (Marks)	
	SEE		CCA		SEE		CCA							
	L	T	P	Total	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.		
3	3	-	-	3	24	60	16	40	-	-	-	-	100	

Course Contents:

Sr. No	Topic	Total Hours	Weightage (%)
1	Introduction: History of automobiles; Classification of automobiles; Power plant classification; Engine terminology; Types of cycles; Working principle of an IC engine; Advanced classification of engines and multi cylinder engines; Engine balance and firing order	04	20
2	Fuel System, Ignition System and Electrical system: Spark Ignition engines – fuel tank, fuel filter, fuel pump, air filter, carburetor, direct injection of petrol engines; Compression Ignition engines –fuel injection (air and solid), pressure charging, super charging and turbo charging; Ignition systems– components, battery ignition, magneto ignition, electronic ignition and ignition timing; Main electrical circuits – generating & starting circuit, lighting, indicating devices	07	20
3	Lubricating System and Cooling System: Functions & properties of lubricants, methods of lubrication; Oil filters, oil pumps, oil coolers; Characteristics of an effective cooling system; types of cooling systems; Radiator, thermostat, air cooling & water cooling.	04	10
4	Chassis & Transmission: Parts of automobile body; Automobile frames – functions, constructions, sub frames, materials and defects; Transmission – axles, clutches, propeller shafts, differential, gear boxes, automatic transmission, electronic transmission control, functions and types of front and rear axles, types and functions of clutches, Hotchkiss drive torque tube drive, traction control.	08	15

5	Steering, Braking and Suspension: Steering mechanism, steering gear box types, wheel geometry; Brakes – principle, functions, types, construction, operation and parking brake; Suspension - types of spring shock absorbers, objectives and types of suspension system, rear axle suspension, electronic control and proactive suspension system.	08	15
6	Automotive Air Conditioning: Ventilation, heating, air condition, refrigerant, compressor and evaporator.	04	10
7	Wheels and Tyres: Wheel quality, assembly, types of wheels, wheel rims. Construction of tyres and tyre specifications.	02	05
8	Recent Trends: E-vehicles , Fuel Cell based energy storage and its analysis, Satellite-based navigation; Automated steering; Environment effect and mitigation.	04	05

Reference Books:

1. A.K. Babu, S.C. Sharma, Automobile Mechanics, Khanna Publication, 2019
2. Kirpal Singh, Automobile Engineering Vol-I & II, Standard Publishers, New Delhi, 2020
3. Domkundwar, Anand V, and V. M. Domkundwar. "Internal combustion engines." Dhanpat Rai & Co (P) Ltd, 2018
4. Heywood, John B. "Internal Combustion Engine Fundamental." Tata McGraw Hill Education Private Limited, 2018
5. Narang, G. B. S. Automobile Engineering. Khanna Publishers, 2015.
6. May, Ed, and William Harry Crouse. Automotive mechanics. McGraw-Hill, 2017.

E-Resources:

1. <https://nptel.ac.in/courses/107106088>

Course Learning Outcomes (CLO):

CLO	Description	Bloom's Taxonomy Level
CLO1	Explain and classify automobile components, IC engine terminology, engine cycles, multi-cylinder engines, engine balance and firing order.	2 Understanding
CLO2	Describe and compare fuel supply systems of SI and CI engines, ignition systems, supercharging/turbocharging, and automotive electrical circuits.	2 Understanding 4 Analyze
CLO3	Explain the working and evaluate lubrication, cooling and automotive air-conditioning systems and their components.	2 Understanding 5 Evaluating
CLO4	Illustrate and analyze automobile chassis construction, clutch, gearbox, propeller shaft, differential, axles and modern transmission control systems.	3 Applying 4 Analyze
CLO5	Analyze the working principles of steering geometry, braking systems, suspension systems, wheels and tyres for vehicle stability and safety.	4 Analyze
CLO6	Discuss and interpret modern automotive technologies such as electric vehicles, satellite navigation, automated steering and environmental impact mitigation.	2 Understanding 4 Analyze

Mapping of CLOs with POs & PSOs:

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CLO1	M	H	M	-	-	L	-	-	-	-	-	-	M	-
CLO2	M	H	H	H	-	-	-	-	-	-	-	-	M	-
CLO3	M	M	M	L	-	L	-	-	L	L	-	-	M	-
CLO4	-	-	M	M	M	L	M	-	M	-	-	M	-	M
CLO5	-	-	M	M	M	-	-	-	L	-	-	L	-	M
CLO6	-	M	M	M	-	-	-	-	-	-	L	-	-	M

H: High, M: Medium, L: Low