

1. Preamble

This course provides an introduction to vehicle structure, engine, power transmission system, steering system, brakes and suspension; it also provides an introduction to engine emissions and their control and offers various alternative fuels that can be used in automobiles

2. Pre-requisite

NIL

3. Link to other courses

Automotive Engines, Automotive Chassis, Automotive Transmission,

4. Course Educational Objective

Students undergoing this course are expected

- Describe the concept of chassis and various subsystems of automobile.
- Explain about fundamental principles, construction and working of different subsystems of engines used in automobiles
- Analyse various types of emissions and suggest ways to reduce them

5. Course Outcome

Upon the successful completion of the course, students will be able to

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Explain the vehicle construction and engines in automobiles.	K2
CO2	Understand the fuel injection, ignition systems and starting systems.	K2
CO3	Describe the transmission and cooling systems.	K2
CO4	Illustrate the steering systems, braking systems and suspension systems.	K2
CO5	Describe the IC engine emissions and alternative fuels and their conversion kits used in automobile.	K2

6. Correlation of COs with Programme Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H			H	H		H				M	
CO2	H			H	H		H				M	
CO3	H			H	H		H				M	
CO4	H			H	H		H				M	
CO5	H			H	H		H				M	

H- Strong; M-Medium; L-Low

8. Course Contents**UNIT I Vehicle Structure and Engines**

L-9

Introduction: General Classification of Automobiles, Layout of Chassis, Types of Drives of Automobile. Chassis and Body – Body Parts, Functions, Material and Vehicle Construction.

Engines – Types of Engines, Components, Functions and Materials, Working Principle, Comparison of Four Stroke and Two Stroke Engines.

UNIT II Engine Auxiliary Systems **L-9**

Carburetor–Working Principle- Electronic Fuel injection System – Mono-Point and Multi - Point injection Systems – Battery Coil and Magneto Ignition Systems, Electronic Ignition Systems. Construction, Operation and Maintenance of Lead Acid Battery - Principle and Construction of Starter Motor, Working of Different Starter Drive Units. Supercharging and Turbo Charging.

UNIT III Transmission and Cooling Systems **L-9**

Clutch – Types and Construction – Gear Boxes, Manual and Automatic –Flywheel-Torque Converters– Propeller Shaft – Slip Joint – Universal Joints – Differential and Rear Axle – Hotchkiss Drive. Need for Cooling System, Types of Cooling System: Air Cooling System, Liquid Cooling System, Forced Circulation System, Pressure Cooling System.

UNIT IV Steering, Brakes and Suspension **L-9**

Wheels and Tyres - Steering Geometry – Power Steering – Types of Front Axle – Classification of Brakes, Drum Brakes and Disc Brakes, Constructional Details, Theory of Braking, Parking Brake, Braking Material, Hydraulic System, Vacuum Assisted System, Air Brake System, Antilock Braking System. Need of Suspension System, Types of Suspension, Suspension Springs, Constructional Details and Characteristics of Leaf, Coil and Torsion Bar Springs, independent Suspension, Rubber Suspension, Pneumatic Suspension, Shock Absorbers.

UNIT V Emission, Emission Control and Alternative Fuels **L-9**

Mechanism of HC, NO_x and CO Formation in Four Stroke and Two Stroke SI Engines, Smoke and Particulate Emissions in CI Engines, NO_x Formation and Control. Noise Pollution from Automobiles, Measurement and Standards. Design of Engine, Optimum Selection of Operating Variables for Control of Emissions, Catalytic Converters, Catalysts. Fuel Modifications -Use of Natural Gas, LPG, Biodiesel, Gasohol and Hydrogen in Automobiles - Electric and Hybrid Vehicles, Fuel Cells.

TOTAL = 45 periods

8. Text Books

1. Ganesan, V., Internal Combustion Engines, Tata McGraw-Hill, New Delhi, 2012.
2. Kirpal Singh, Automobile Engineering- Vol. I and II, Standard Publishers, New Delhi, 2011.
3. Ramalingam. K .K, Automobile Engineering, Scitech publications,2011.

9. References

1. Kamaraju Ramakrishna, Automobile Engineering, PHI Learning pvt. Ltd., New delhi-2012.
2. Mathur M.L. and Sharma. ‘A Course in Internal Combustion Engines’, R.P. Dhanpat Rai Publications, 2009.
3. K. M. Gupta, Automobile Engineering- Vol I and II, Umesh Publications, 2007
4. G B S Narang, Automobile Engineering, Khanna publishers, New Delhi, 2005.
5. Crouse, W.H., and Anglin, D.L., Automotive Mechanics, Tata McGraw Hill, New Delhi, 2005.