MEPE3014 AUTOMOBILE ENGINEERING (3-0-0)

Course Objectives

The objectives of this course are to:

1. Introduce the basic structure, layout, and classification of automobiles and their subsystems.
2. Explain various automobile systems like fuel, cooling, lubrication, ignition, transmission, suspension, steering, and braking.
3. Develop understanding of the working principles of engine components and performance characteristics.
4. Familiarize students with emerging trends in automotive technologies such as electric vehicles and hybrid systems.
5. Enable troubleshooting and maintenance practices for core automobile systems.

Module - I (06 Hours)

Classification of automobiles, chassis, body, layout types, Sub-systems of automobile Power Unit: Functions and locations power for propulsion, Engine parts-types, construction and functions, multiple cylinder engines. General considerations of engine balance vibration, firing order road performance curves.

Module - II (08 Hours)

Fuel feed systems: fuel feed systems for petrol engines. Fuel pumps, Basic principles of MPFI and CRDI. Multipoint Fuel Injection Systems (MPFI), Common Rail Diesel Injection Systems (CRDI), Cooling system: purpose, types of cooling system, troubles and remedies of cooling system. Lubrication: Types of lubricants, multi viscosity oils, chassis lubrication. Engine lubrication: -types of lubricating systems, crankcase ventilation, and Engine lubrication troubles and remedies.

Module - III (07 Hours)

Transmission system: Construction, transmission, requirements of single plate friction clutch and multiplate clutch, clutch adjustments, clutch troubles and remedies. Gearboxes: Sliding mesh, constant mesh and synchromesh gearbox, function of overdrives, troubleshooting and remedies. Propeller shaft, Hotchkiss drive torque tube drive, differential, Final drive Types of rear axles.

Module - IV (07 Hours)

Braking system: Mechanical, hydraulic brakes, power brakes, airbrakes and vacuum brakes Fault finding and maintenance of brakes, Steering system: -Function, types of linkages, Steering gears, steering gear ratio. Wheel alignment, steering geometry, effects, Introduction of power steering. Suspensions: Types of Rigids, axle and independent suspension system, shock absorbers.

Module - V (08 Hours)

Starter motor drive-Bendix drive, overrunning clutch drive, Solenoid switch, Ignition system: Battery coil and magneto-ignition system, Ignition timing and its effect on engine performance, Ignition advance mechanisms, electronic ignition system. Electric vehicles: History, electrical vehicles and the environment pollution, description of electric vehicle, operational advantages, present EV performance and applications, battery for EV, Battery types of fuel cells, Solar powered vehicles, hybrid vehicles.

Course Outcomes:

CO1 Describe the classification, layout, power unit, and sub-systems of automobiles.

CO2 Explain the working and functions of fuel systems, cooling systems, lubrication, and ignition systems.

CO3 Analyze the construction and operation of transmission systems, gearboxes, and final drives.
CO4 Evaluate the performance, maintenance, and troubleshooting of steering, braking, and suspension systems.
CO5 Illustrate the construction, working, and advantages of electric and hybrid vehicles.

Essential Reading:

1. Jain K.K. and Asthana R.B, “Automobile Engineering” Tata McGraw Hill Publishers, New Delhi, 2002.
2. Kirpal Singh, “Automobile Engineering”, Vol 1 & 2, Seventh Edition, Standard Publishers, New Delhi, 13th Edition 2014.

Supplementary Reading:

1. Joseph Heitner, “Automotive Mechanics,” Second Edition, East-West Press, 1999.
2. Martin W, Stockel and Martin T Stockle , “Automotive Mechanics Fundamentals,” The Good heart - Will Cox Company Inc, USA ,1978. 5. Newton ,Steeds and Garet, “Motor Vehicles”, Butterworth Publishers,1989.