

ME732PE: AUTOMOBILE ENGINEERING (PROFESSIONAL ELECTIVE – III)**B.Tech. IV Year, I Sem.**

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Course Objectives: The Objective of this course is to provide the student to

- Elaborate the Systems of Automobile, Components of Engine, fuel & Lubrication system and its requirements
- Explain the significance and features of Cooling, Ignition and Electrical Systems
- Illustrate the working of transmission system and Suspension systems and its components
- Elaborate the function of each accessory of steering and braking system and their role for effective performance of automobile
- Discuss the particulates of combustion in CI and SI engines, reasons for formation of particulates and methods adopted to control the pollution

Course Outcomes: At the end of the course, the student will be able to

- Illustrate the function of each and every system of an automobiles including fuel system and injection approaches
- Explain the Cooling, ignition and electrical system of the Automobile
- Describe each component of transmission system of an automobile viz clutch, gear box, propeller shaft and differential and suspension system and the effect of the same on tyre performance and other components of an automobile
- Analyze the geometry of the steering mechanism and braking system
- Demonstrate about emission standards, emission control techniques and electrical systems. Student can identify thrust areas for carrying their dissertation in future.

UNIT – I:

Introduction: Layout of automobile – introduction chassis and body components. Types of Automobile engines. – Power unit – Introduction to engine lubrication – engine servicing

Fuel System: S.I. Engine: Fuel supply systems, Mechanical and electrical fuel pump – filters – carburetor – types – air filters – petrol injection. Introduction to MPFI and GDI Systems.

C.I. Engines: Requirements of diesel injection systems, types of injection systems, DI Systems IDI systems. Fuel pump, nozzle, spray formation, injection timing, testing of fuel pumps. Introduction to CRDI and TDI Systems.

UNIT – II:

Cooling System: Cooling Requirements, Air Cooling, Liquid Cooling, Thermo, water and Forced Circulation System – Radiators – Types – Cooling Fan - water pump, thermostat, evaporative cooling – pressure sealed cooling – antifreeze solutions.

Ignition System: Function of an ignition system, battery ignition system, constructional features of storage, battery, auto transformer, contact breaker points, condenser, and spark plug – Magneto coil ignition system, electronic ignition system using contact breaker, electronic ignition using contact triggers – spark advance and retard mechanism.

Electrical System: Charging circuit, generator, current – voltage regulator – starting system, bendix drive mechanism solenoid switch, lighting systems, Horn, wiper, fuel gauge – oil pressure gauge, engine temperature indicator etc.

UNIT – III:

Transmission System: Clutches, principle, types, cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel – gear boxes, types, sliding mesh, constant mesh, synchro mesh gear boxes, epicyclic gear box, over drive torque converter. Propeller shaft – Hotch – Kiss drive, Torque tube drive, universal joint, differential rear axles – types – wheels and tyres.

Suspension System: Objects of suspension systems – rigid axle suspension system, torsion bar, shock absorber, independent suspension system.

UNIT – IV:

Braking System: Mechanical brake system, Hydraulic brake system, Master cylinder, wheel cylinder tandem master cylinder Requirement of brake fluid, Pneumatic and vacuum brakes.

Steering System: Steering geometry – camber, castor, king pin rake, combined angle toein, center point steering. Types of steering mechanism – Ackerman steering mechanism, Davis steering mechanism, steering gears – types, steering linkages.

UNIT – V:

Emissions from Automobiles – Pollution standards National and international – Pollution Control – Techniques – Multipoint fuel injection for SI Engines. Common rail diesel injection Energy alternatives – Solar, Photo-voltaic, hydrogen, Biomass, alcohols, LPG, CNG, liquid Fuels, and gaseous fuels, Hydrogen as a fuel for IC Engines. - Their merits and demerits. Standard Vehicle maintenance practice.

TEXT BOOKS:

1. Automobile Engineering / William H Crouse
2. A Text Book Automobile Engineering–Manzoor, Nawazish Mehdi & Yosuf Ali, Frontline Publications.

REFERENCE BOOKS:

1. A Text Book of Automobile Engineering by R K Rajput. Laxmi Publications.
2. Automotive Mechanics / Heitner
3. Automotive Engineering / Newton Steeds & Garrett
4. Automotive Engines / Srinivasan.
5. A Text Book of Automobile Engineering By Khalil U Siddiqui New Age International