4/4 B.Tech. EIGHTH SEMESTER

ME8T3B **AUTOMOBILE ENGINEERING** **Credits: 4**

Lecture:- 4 periods/week **Internal assessment: 30marks**
Tutorial: -- **Semester end examination: 70 marks**

Objectives:

1. List the basic types of automobiles and their classification
2. Recognize the importance of fuel system, cooling system, ignition system and emission control techniques from automobiles
3. Interpret construction, working and functions of electrical, transmission, steering, suspension, braking systems

Learning Outcomes:

At the end of course the students will be able to:

1. Explain basic concepts of Automobile Engineering like components of 4 wheeler automobile and types of Automobile engines.
2. Express the requirements of SI engine and CI engine fuel systems
3. Describe the cooling requirements and function of an ignition system.
4. Discuss the emissions from automobiles and alternative energy resources.
5. Describe the concepts of electrical, transmission system
6. Define steering and suspension and braking system

Pre-Requisite

IC Engines and gas turbines, Heat transfer

UNIT – I
INTRODUCTION:

Components of four wheeler automobile – chassis and body – power unit –power transmission – rear wheel drive, front wheel drive, 4 wheel drive – types of automobile engines, engine construction, turbo charging and super charging – engine lubrication, splash and pressure lubrication systems, oil filters, oil pumps – crank case ventilation – engine service, reboring, decarbonisation, Nitriding of crank shaft..

UNIT – II

FUEL SYSTEM :

S.I. Engine : Fuel supply systems, Mechanical and electrical fuel pump – filters– carburettor – types – air filters – petrol injection.

C.I. Engines : Requirements of diesel injection systems, types of injection systems, fuel pump, nozzle, spray formation, injection timing, testing of fuel pumps.

UNIT – III

COOLING SYSTEM :

Cooling Requirements, Air Cooling, Liquid Cooling, Thermo, water and Forced Circulation System – Radiators – Types – Cooling Fan - water pump, thermostat, evaporating 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.

Unit – IV

EMISSION 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, electrical-their merits and demerits.

UNIT – V

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 – VI

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, construct 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.

UNIT – VII

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 – VIII

SUSPENSION SYSTEM :

Objects of suspension systems – rigid axle suspension system, torsion bar, shock absorber, Independent suspension system.

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

Learning resources

Text books:

1. Automotive Mechanics-Vol.1 & Vol.2, by Kripal sing, Standard Publishers, New Delhi2008.
2. Automobile Engineering, (3 ed edition), by William crouse, TMH Distributors, New Delhi,.
3. Automobile Engineering", (2 nd edition), by P.S. Gill, S.K. Kararia & sons publisher, 2012.

Reference books:

1. Automobile Engineering Theory and Servicing, by James D. Halderman and Chase D. Mitchell, Pearson education inc, 2001.
2. Automobile Engineering, by Newton steeds & Garrett Automotive Mechanics Heitner, Butterworth International, London.