

# Automobile Engineering

B.E. Sem. VIII [MECH]

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## EVALUATION SYSTEM

	Time	Marks
<b>Theory Exam</b>	3 Hrs.	100
<b>Practical Exam</b>	–	–
<b>Oral Exam</b>	–	–
<b>Term Work</b>	–	25

## SYLLABUS

### 1. Introduction

Classification of automobiles.

**Clutch :** Details, Requirements of Clutches, Types of Clutches and Clutch materials, Design of clutch, Fluid coupling, Trouble shooting and remedies.

**Transmissions :** Necessity of gear box, Sliding mesh, Constant mesh, Synchromesh and epicyclic gear box, Overdrives and hydrodynamic torque converter, Trouble shooting and remedies.

**Drive line:** Propeller shafts and universal joints: Types and construction, Different types of universal joints and constant velocity joints.

Live axle and differential: Final drive, spiral, bevel, Hypoid and worm drives, Types of live axles, semi, three quarter and full floating axles. Necessity of differential, Conventional and non-slip differential, Trouble shooting and remedies.

### 2. Conventional and non-slip differential, Trouble shooting and remedies.

**Brakes:** Requirement of brake, Classification of brakes, Mechanical, Hydraulic, Pneumatic, Electro and vacuum brakes. Disc brakes, Braking of front wheel, Rear wheel and four wheel brakes, Brake trouble shooting. Introduction to antilock braking system (ABS).

**Steering and Front axles :** Steering geometry, Steering requirements, Steering linkages and steering gears, over steer and under steer, Cornering power, Reversibility of steering gears, Types of front axles and their constructions. Trouble shooting and remedies.

### 3. Suspension

Objects of suspension, Basic requirements, Springs- Leaf and Coil springs, Air suspension and its features, Independent suspension, Forces acting in independent suspension, Sprung and un-sprung mass, Pitching, rolling and bouncing, Shock absorbers.

#### **Wheels and Tyres**

Requirements of wheels and tyres, Constructional features, Types of tyres, Inflation Pressure and its importance, Application to ride and stability, Trouble shooting and remedies.

### 4. Electrical system

**Battery:** Types of battery, Lead-Acid, Alkaline, ZEBRA, Sodium Sulphur and Swing, Ratings, charging, Maintenance and testing of Lead-Acid battery.

**Electronic Ignition System:** Capacitor Discharge Ignition System, Distributor less ignition System, Direct Ignition system. Hall effect pulse generator, Inductive pulse generator, Constant dwell system, Constant energy system.

**Charging System :** Dynamo: Principle of operation, Construction, Working, Regulators, combined current and voltage regulator, etc.

**Alternator :** Principle of operation, Construction, Working, Rectification from AC to DC.

**Starting system:** Requirements, Various torque terms used, Starter motor drives; Bendix, Follo through, Barrel, Rubber compression, Compression Spring, Friction Clutch, Overrunning Clutch, Dyer. Starter motor solenoids and switches, Glow plugs.

## 5. Body Engineering

Importance of Body design, Materials for body construction-Styling forms-Coach and bus body style, layouts of passenger cars, Bus and truck bodies.

Aerodynamic drag- Aerodynamic lifts and pitching moments, Side force, Yawing moments and rolling moments.

**Basic dimensions** : Geometrical relations to drivers seat, Dimensions of foot and pedal control, Passenger seats, Vehicle dimensions and visibility.

Overall Criteria for vehicle comparison.

**Chassis types and structure types** : Open, Semi integral and integral bus structure.

**Frames** : functions and types of frames, Loads on frames, Load distribution of structure, Location of power plant.

## 6. Recent trends in Automobiles

Electronic Control module (ECM), operating modes of ECM ( closed loop and open loop) Inputs required and output signals from ECM, Electronic Spark control, Air Management system, Idle speed control.

Multipoint fuel injection system and single point fuel injection. Electronic fuel injectors. Principle of operation, Construction, working & application of temperature sensors, inductive sensors, Position sensors( rotary, linear), Pressure sensors, Knock sensors, Hot wire and thin film air flow sensors, vortex flow/turbine fluid sensors, Optical sensor, Oxygen sensors, Light sensors, methanol sensors Rain sensor, New developments in the sensor technology.

## References Books :

1. Automotive Mechanics (*William Cruose*)
2. Automotive Mechanics (*Joseph Heitner*)
3. The Automobile Engineering (*T.R.Banga & Nathu Singh*)
4. The Automobile (*Harbans Singh Reyat*)
5. Automobile Engineering (*Kirpal Singh*) Vol I & II
6. Automobile Electrical and Electronics (*Tom Denton*)
7. Vehicle Body Engineering (*J Powlowski*)
8. Computerised Engine Control (*Dick King*)
9. System Approach to Automobile Technology, (*Jack Erjavec*) Cengage Learning
10. Light & Heavy Vehical technology (*M. J. Nunney , Elsevier*)

