

# **AUTOMOBILE ENGINEERING**

## **THEORY - I**

### **ENGINE :**

The Internal Combustion Engine – working principles, four strokes and two strokes cycles of operation. Single and multi cylinder engines. Valve operation – valve timing and valve guides, cylinder arrangements – cylinders – pistons – connecting rods – gudgeon pins – connecting rod big and small end bearings – cam and camshafts, tappets, firing orders, flywheel, crank case – silencers, valve refacing, valve reseating cylinder re-boring methods and Honing method.

### **FUEL SUPPLY AND CARBURETTOR :**

Method of fuel supply – gravity – mechanical and electrical pumps – fuel gauges – effect of fuel mixture. Working principles of carburettor – functions various study of carburetors – Zenith, S.U, solex carburetors function of jets and choke tube. Electronic Ignition system, Magneto Ignition system – Petrol Injection system and working principles. Nozzle tests – pumps calibration – injection timing. Delay period – Electronic spares timing – control. Merit and demerit injection. Electronic ignition system using contact breaker and contactless triggers. Air – injection – PCV Systems – EGR systems – thermal reactors – catalytic converters catalysts – use of unleaded Petrol. Measuring instruments and working method NDIR analysers – Thermal conductivity and Flame ionization detectors – Gas chromatograph – smoke meter.

### **PRINCIPLES OF COMPRESSION IGNITION ENGINES :**

Process of compression cycles operation, fuel pump and nozzle units. Pneumatic and hydraulic governors.

### **LUBRICATION :**

Oil gauge – pressure – wet and dry pump system – splash and forced lubrication systems – oil pumps and filters – carbon deposits – crank case dilution – functions of lubrication oil.

### **COOLING SYSTEM ;**

Air and water cooling - oil cooling systems – Thermosiphonic and pump circulation – Radiators – Water pumps – fans – Thermostats – pressure cooling. Maintenance methods of cooling system – Troubles occurs in the cooling system.

### **AIR – CONDITIONING :**

Location of air conditioning components in a car – working method – Air conditioning maintenance and service- trouble shooting.

### **BATTERY :**

Construction and maintenance of battery – types of test on battery.

### **STARTING AND CHARGING SYSTEM :**

Working method of starting motor – types of starting method – types of test conducted on starter motor and components. Construction details of cut-out regulator – dynamo and alternator – Compare the dynamo and alternator – types of testing on the dynamo alternator components.

### **ALTERNATIVE FUEL :**

Alcohol – gasoline fuel blends – Alcohol ad diesel fuel.

### **ENGINE TESTING AND PERFORMANCE ;**

Decarbonizing of cylinder head – Adjusting valve clearance – Retiming the valve ignition timing – Radiator repair – water pump and impellers – servicing and fitting method - carburettor and ignition faults – Mechanical faults – tracing engine noises – cylinder leakage test – reconditioning engine – maintenance servicing injectors, carburettor – cylinder boning reboring, crank shaft regrinding and vibrate cooling method.

### **VEHICLE POLLUTION :**

Measurement of HC, CO, CO<sub>2</sub>, O<sub>2</sub> Diesel smoke measurement control techniques for SI and CI engine emission – properties of alternative fuels of Alcohols – L.P.G. and C.N.G. relative Merits and Demerits' of various alternative fuels, solar cars.

### **REFERENCE BOOKS :**

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