

AMAE-04 AUTOMOTIVE ENGINES

UNIT-1 CONSTRUCTION AND OPERATION

- 1.1 Constructional details of spark ignition (SI) and compression ignition (CI) engines.
- 1.2 Working principles. Two stroke SI and CI engines – construction and working.
- 1.3 Comparison of SI and CI engines and four stroke and two stroke engines.
- 1.4 Engine classification, firing order. Otto, diesel and dual cycles.

UNIT-2 FUEL SYSTEMS

- 2.1 Air fuel ratio requirements of SI engines,
- 2.2 Air fuel ratio and emissions, working of a simple fixed venturi carburetor, Constant vacuum carburetor.
- 2.3 Diesel fuel injection systems-Jerk pumps, distributor pumps, pintle and multihole nozzles, Unit injector and common rail injection systems.
- 2.4 Injection pump calibration. Need for a governor for diesel engines.
- 2.5 Description of a simple diesel engine governor.

UNIT-3 COMBUSTION AND COMBUSTION CHAMBERS

- 3.1 Introduction to combustion in SI and diesel engines and stages of combustion.
- 3.2 Dependence of ignition timing on load and speed. Knock in SI and CI engines.
- 3.3 Combustion chambers for SI and CI engines.
- 3.4 Direct and indirect injection combustion chambers for CI engines.
- 3.5 Importance of Swirl, squish and turbulence. Factors controlling combustion chamber design.

UNIT-4 SUPERCHARGING, TURBOCHARGING AND ENGINE TESTING

- 4.1 Supercharging and Turbocharging,
- 4.2 Different methods of turbocharging, Intercooling, Turbocharger controls including, waster gate, variable geometry, variable nozzle types.
- 4.3 Dynamometers, Indicated thermal, brake thermal and volumetric efficiencies.
- 4.4 Measurement of friction, Cylinder pressure measurement.
- 4.5 Engine performance maps, Engine testing standards.

UNIT-5 COOLING AND LUBRICATION SYSTEMS

- 5.1 Need for cooling, types of cooling systems- air and liquid cooling systems.
- 5.2 Thermo syphon and forced circulation and pressurized cooling systems.
- 5.3 Properties of coolants. Requirements of lubrication systems.
- 5.4 Types-mist, pressure feed, dry and wet sump systems. Properties of lubricants.

References Books:

1. Heisler, "Advanced Engine Technology" SAE Publication, 1995
2. Edward F. Obert "Internal Combustion Engines" 3 Edition, 1970
3. Gupta. H.N. "Fundamentals of Internal Combustion" Engines, reprint, PHI Learning Pvt. Ltd. 2006