# AT6301 AUTOMOTIVE ENGINES

## DETAILED SYLLABUS

### UNIT I CONSTRUCTION AND OPERATION

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

### UNIT II FUEL SYSTEMS

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

### UNIT III COMBUSTION AND COMBUSTION CHAMBERS

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

### UNIT IV SUPERCHARGING, TURBOCHARGING AND ENGINE TESTING

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

## UNIT V COOLING AND LUBRICATION SYSTEMS

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

## TEXT BOOKS

1. Ganesan V., "Internal Combustion Engines", Tata McGraw Hill, 2007.

2. Ramalingam K.K., “Internal Combustion Engines”, Sci-Tech Publications, 2005.

3. Devaradjane. Dr. G., Dr. M. Kumaresan, "Automobile Engineering", AMK Publishers, 2013.

## REFERENCES

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.

4. Mathur and Sharma "Fundamental Combustion Engines" Dhanpat Rai and Sons, 2002.

5. John B. Heywood, “Fundamentals of Internal Combustion Engines”, 1988.

## OBJECTIVES

To understand the basic principles of engines used for automobiles and different systems.