

## **Energy Conversion**

### **Objectives :**

On completion of this course, the students are expected to understand the fundamental principle, operation, performance of IC Engines, auxiliary systems, combustion of SI & CI engines, various fuels used and engine emissions.

### **Outcomes :**

Acquire the knowledge of engine components and fuel air cycles

. Understand the working of engine auxiliary systems. Understand the combustion aspects of SI Engines

Understand the combustion aspects of CI Engines.

Internal Combustion Engine: S.I. and C.I. engines of two and four stroke cycles, real cycle analysis of SI and CI engines, determination of engine dimensions, speed, fuel consumption, output, mean effective pressure, efficiency, factors effecting volumetric efficiency, heat balance, performance characteristics of SI and CI engines, cylinder arrangement, firing order, power balance for multi-cylinder engines .

Combustion in SI engines: Flame development and propagation ,Pressure-Crank Angle diagram

, Stages of Combustion ignition lag, effect of air density, temperature, engine speed, turbulence and ignition timings, physical and chemical aspects , abnormal Combustion , effect of engine and fuel variables on abnormal combustion , pre-ignition, its causes and remedy, salient features of various type combustion chambers.

Combustion in C.I. Engines: Times base indicator diagrams and their study, various stages of combustion, delay period, diesel knock, knock inhibitors, salient features of various types of combustion chambers .

I.C. Engine System: Fuels, ignition systems, cooling, exhaust/scavenging and lubrication system.

Fuel metering in SI engine: Fuel injection in SI engine (MPFI, TBI,CRDI ), Theory of carburetion, Solex Carburetor, simple problems on carburetion. Fuel metering in CI engines: Fuel injection in CI engine ,Working Principle of fuel pump & fuel injectors , types of nozzles , simple numerical problems . Cooling & lubrication of SI & CI Engines

Supercharging & Turbo charging : Methods of supercharging,& turbo charging Effects of super charging and turbo charging . Engine Modifications for supercharging, supercharging of two stroke engines. micro processor controlled supercharging .

### **EVALUATION**

Evaluation will be continuous an integral part of the class as well through external assessment.

### **References:**

1. J.B. Heywood. Internal combustion Engines , Wiley
2. Ganeshan V; Internal Combustion engines; TMH
3. Mathur M L & Sharma RP; A. Course in IC engines; Dhanpat Rai
4. R Yadav , Internal Combustion Engines
5. Halderman JD and Mitchell CD; Automotive Engines theory and servicing; Pearson
6. Dom Kundwar; Internal Combustion Engines ; Dhanpat Rai Publications
7. Taylor GF; Internal Combustion Engines Theory & Practice; MIT Press
8. Richard Stone; Introduction to IC Engines; Society of Automotive Engr (Palgrave Mc Millan)

### **List of Experiments :**

1. Determination of Valve timing diagram
2. Load test on Petrol Engine
3. Heat Balance of SI engine
4. Heat Balance of CI Engine
5. Study of Battery Ignition system and Electronic Ignition System
6. Study of Diesel fuel pump
7. Study of Diesel fuel injectors
8. Study of a Carburetors
9. Study of Fuel Injection system in SI Engine
10. Study of lubricating system in CI Engine