

**ENERGY LAB**  
**B.E, V Semester, Mechanical Engineering**  
**[As per Choice Based Credit System (CBCS) scheme]**

<b>Course Code</b>	<b>17MEL58</b>	<b>CIE Marks</b>	<b>40</b>
<b>Number of Lecture Hours/Week</b>	<b>03 ( 1 Hour Instruction+ 2 Hours Laboratory)</b>	<b>SEE Marks</b>	<b>60</b>
<b>Total hours</b>	<b>50</b>	<b>Exam Hours</b>	<b>03</b>

**Credits – 02**

**Course Objectives:**

1. This course will provide a basic understanding of fuel properties and its measurements using various types of measuring devices
2. Energy conversion principles, analysis and understanding of I C Engines will be discussed. Application of these concepts for these machines will be demonstrated. Performance analysis will be carried out using characteristic curves.
3. Exhaust emissions of I C Engines will be measured and compared with the standards.

**PART A**

1. Lab layout, calibration of instruments and standards to be discussed
2. Determination of Flash point and Fire point of lubricating oil using Abel Pensky and Marten's (closed) / Cleveland's (Open Cup) Apparatus.
3. Determination of Calorific value of solid, liquid and gaseous fuels.
4. Determination of Viscosity of a lubricating oil using Redwoods, Saybolt and Torsion Viscometers.
5. Analysis of moisture, volatile matter, ash content and fixed carbon of solid and liquid fuel samples
6. Valve Timing/port opening diagram of an I.C. Engine.

**PART B**

1. Performance Tests on I.C. Engines, Calculations of IP, BP, Thermal efficiency, Volumetric efficiency, Mechanical efficiency, SFC, FP, A:F Ratio, heat balance sheet for
  - a. Four stroke Diesel Engine
  - b. Four stroke Petrol Engine
  - c. Multi Cylinder Diesel/Petrol Engine, (Morse test)
  - d. Two stroke Petrol Engine
  - e. Variable Compression Ratio I.C. Engine.
2. Measurements of Exhaust Emissions of Petrol engine.
3. Measurements of Exhaust Emissions of Diesel engine.

4. Demonstration of  $p\theta$ ,  $pV$  plots using Computerized IC engine test rig

**PART C(Optional)**

1. Visit to Automobile Industry/service stations.
2. CFD Analysis of design, development, performance evaluation and process optimization in I C Engines.

**Course outcomes:**

- Perform experiments to determine the properties of fuels and oils.
- Conduct experiments on engines and draw characteristics.
- Test basic performance parameters of I.C. Engine and implement the knowledge in industry.
- Identify exhaust emission, factors affecting them and report the remedies.
- Determine the energy flow pattern through the I C Engine
- Exhibit his competency towards preventive maintenance of IC engines.

1. E.F.Obert, Internal combustion engines and air pollution intext educational publishers (1973). John Heywood, Internal combustion engine fundamentals, McGraw- Hill (1988) - USA.
2. Colin R Ferguson and Allan T. Kirkpatrick Internal combustion engines Applied Thermodynamics, John Wiley & sons – 2001.
3. Richard stone, Introduction to internal combustion engines, MacMillan (1992) – USA
4. M. L. Mathur And R.P. Sharma A course in internal combustion engines, Dhanpat Rai & sons- India.
5. C. F. Taylor The internal combustion engines in theory and practice, 2 vols. by:, pub.: Wily.
6. C. F. Taylor The internal combustion engines in theory and practice, 2 vols. by:, pub.: Wily.
7. Ganesan, V., Fundamentals of IC Engines, Tata McGraw Hill, 2003
8. Bosch, Automotive hand book, 9<sup>th</sup> edition.

**Scheme of Examination:**

ONE question from part -A: 50 Marks

ONE question from part -B: 30 Marks

Viva –Voice : 20 Marks

Total: 100 Marks