II Year II Semester	**L**	**T**	**P**	**C**
17ME403	**3**	**1**	**0**	**3**

THERMAL ENGINEERING – I

UNIT-I

Objectives: To make the student learn and understand the reasons and affects of various losses that occur in the actual engine operation.

Actual Cycles and their Analysis: Introduction, Comparison of Air Standard and Actual Cycles, Time Loss Factor, Heat Loss Factor, Exhaust Blowdown-Loss due to Gas exchange process, Volumetric Efficiency. Loss due to Rubbing Friction, Actual and Fuel-Air Cycles of CI Engines.

UNIT - II

Objectives: To familiarize the student with the various engine systems along with their function and necessity.

I. C. ENGINES: Classification - Working principles, Valve and Port Timing Diagrams, - Engine systems -Fuel, Carburettor, Fuel Injection System, Ignition, Cooling and Lubrication, principle of wankle engine, principles of supercharging and turbo charging.

UNIT - III

Objectives: To learn about normal combustion phenomenon and knocking in S.I. and C.I. Engines and to find the several engine operating parameters that affect the smooth engine operation.

Combustion in S.I. Engines : Normal Combustion and abnormal combustion - Importance of flame speed and effect of engine variables - Types of Abnormal combustion, pre-ignition and knocking (explanation of) - Fuel requirements and fuel rating, anti-knock additives - combustion chamber - requirements, types.

Combustion in C.I. Engines: Four stages of combustion - Delay period and its importance - Effect of engine variables - Diesel Knock- Need for air movement, suction, compression and combustion induced turbulence -open and divided combustion chambers and nozzles used - fuel requirements and fuel rating.

UNIT - IV

Objectives: To make the student learn to perform testing on S.I and C.I Engines for the calculations of performance and emission parameters.

Measurement, Testing and Performance: Parameters of performance - measurement of cylinder pressure, fuel consumption, air intake, exhaust gas composition, Brake power - Determination of frictional losses and indicated power - Performance test - Heat balance sheet and chart.

UNIT - V

Objectives: To make students learn about different types of compressors and to calculate power and efficiency of reciprocating compressors.

COMPRESSORS - Classification -positive displacement and roto dynamic machinery - Power producing and power absorbing machines, fan, blower and compressor - positive displacement and dynamic types - reciprocating and rotary types.

Reciprocating: Principle of operation, work required, Isothermal efficiency, volumetric efficiency and effect of clearance, multi stage compression, under cooling, saving of work, minimum work condition for two stage compression.

UNIT VI

Objectives: To make students learn mechanical details, and to calculate power and efficiency of rotary compressors

Rotary (Positive displacement type) : Roots Blower, vane sealed compressor, Lysholm compressor -mechanical details and principle of working - efficiency considerations.

Dynamic Compressors: Centrifugal compressors: Mechanical details and principle of operation - velocity and pressure variation. Energy transfer-impeller blade shape-losses, slip factor, power input factor, pressure coefficient and adiabatic coefficient - velocity diagrams - power.

Axial Flow Compressors: Mechanical details and principle of operation - velocity triangles and energy transfer per stage degree of reaction, work done factor - isentropic efficiency- pressure rise calculations - Polytrophic efficiency.

Text Books:

1. I.C. Engines / V. Ganesan- TMH
2. Heat engines, Vasandani& Kumar publications Thermal

References:

1. Thermal Engineering / RK Rajput/ Lakshmi Publications
2. IC Engines - M.L.Mathur&R.P.Sharma - DhanpathRai& Sons.
3. I.C.Engines-AppliedThermosciences-C.R.Ferguson&A.T.Kirkpatrick-2ndEdition-Wiley Publ
4. I.C. Engines - J.B.Heywood /McGrawHIll.
5. Thermal Engineering - R.S.Khurmi&J.S.Gupta- S.chandPubl
6. Thermal Engineering / PL Ballaney, Khanna Publishers