ME 305: BASIC THERMODYNAMICS (3-1-0)

Theory: 100 Sessional: 50 Time: 3hours

System and Continuum:

Intensive and Extensive properties – Thermodynamic state, pressure, energy, work and heat – process and cycle – Macroscopic and Microscopic points of view – Kinetic theory of gases.

Laws of thermodynamics:

Zeroth law – Concept of equilibrium – Principles of thermometry – Fixed points.

First law of thermodynamics and its application to open and closed systems – Concept of internal energy – Steady flow energy equation – Processes of closed systems.

Second law of thermodynamics – Various statements – Carnot cycle – Irreversible and Irreversible processes – Thermodynamic efficiency and temperature scales – Concept of entropy – Entropy changes in various processes.

Properties of steam:

Latent heat – Saturation pressure and temperature – Dryness fraction – Degree of superheat – Total heat; Rankine cycles.

Air standard cycles:

Otto, Diesel – Principles of working and description of two and four stroke SI and CI engines – Representations of processes on T-S and p-v diagrams.

Fuels and Combustions: Classification of fuels; HCV, LCV, Bomb Calorimeter, Boy's gas calorimeter; Combustion of fuels; Minimum air required (by weight and by volume); Conversion of volumetric analysis into weight analysis and vice verse; excess air and Orsat apparatus.

Books:

1. Engineering thermodynamics by P K Nag, Tata McGraw Hill Publication
2. Fundamentals of Thermodynamics by Cengel and Boles, Tata McGraw Hill Publication
3. Fundamentals of Engineering Thermodynamics by E. Rathakrishnan, PHI