AU/IP/ME-3005 THERMODYNAMICS

Objectives : To develop ability and gain insight into the process of problem-solving, with emphasis on thermodynamics .Specially in following manner:
Apply conservation principles (mass and energy) to evaluate the performance of simple engineering systems and cycles, · Evaluate thermodynamic properties of simple homogeneous substances, · Analyze processes and cycles using the second law of thermodynamics to determine maximum efficiency and performance, · Discuss the physical relevance of the numerical values for the solutions to specific engineering problems and the physical relevance of the problems in general, and · Critically evaluate the validity of the numerical solutions for specific engineering problems.

Outcomes : At the completion of this course, students should be able to
1. find values of thermodynamic properties in tables;
2. draw thermodynamic processes on pressure-temperature, pressure-volume, or temperature-volume diagrams;
3. use compressibility charts;
4. calculate expansion or compression work in a closed system;
5. use conservation of mass to determine the change in mass of a system

Basic Concepts & Laws of Thermodynamics : Basic concepts: Property, Equilibrium, State, Process, Cycle, Zeroth law of thermodynamics, Heat and work transfer. First law of thermodynamics- first law applied to various systems steady flow process, limitations of first law of thermodynamics.
Second law of thermodynamics, heat engine, heat reservoir, Refrigerator, heat pump, Carnot's cycle, statements of second law Reversible and irreversible processes, consequence of second law, Clausious
Inequality , Entropy, T-S diagrams, Available & Unavailable energy Availability Concept .

Properties of Steam : Pure Substance, Phase, Phase-transformations, formation of steam, properties of steam, PVT surface, HS,TS,PV,PH,TV diagram, processes of vapor measurement of dryness fraction, Use of steam tables and Mollier chart.

Air standard cycles: Carnot, Otto, Diesel, Dual cycles and their comparison, Brayton cycle, Non reactive gas mixture, PVT relationship, mixture of ideal gases, properties of mixture of ideal gases, internal energy, Enthalpy and specific heat of gas mixtures.

Fuels & combustion : Actual & theoretical Combustion processes , Enthalpy of formation & enthalpy of reaction, first law analysis of reacting systems, Adiabatic flame temperature , Basic concept of Third Law of thermodynamics .
Steam Tables Mollier Charts & tables connected to reactive systems are allowed in Examination hall .

EVALUATION

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

References:

1. P.K.Nag; Engineering Thermodynamics; Mc Graw Hills Fifth Edition
2 Cengel Y; Thermodynamics; MC Graw Hills ,Eight Edition
3 Kross & Potter Thermodynamics for Engineers CENGAGE Learning
4 Moran, Shapiro ,Boettner Principles of Engineering Thermodynamics Wiley student edition
5 P Chattopadhya , Engineering Thermodynamics Second Edition,OXFORD University Press
5 Zemansky Heat & Thermodynamics , Eight Edition , Mc Graw Hills India Education
6. Achuthan M; Engineering Thermodynamics by, PHI India.
7 R Yadav Applied Thermodynamics , Central Publishing house Allahabad.