CH 353: CHEMICAL ENGINEERING THERMODYNAMICS – I

CREDITS = 5 (L = 4, T=1, P = 0)

1.	**INTRODUCTION**: Scope of thermodynamics; Fundamental quantities; Secondary quantities; Basic concepts – system, property, process, state, state function, state postulate, statement of thermodynamics laws, equilibrium, work, energy, heat, phase rule.	4 Hours
2.	**FIRST LAW OF THERMODYNAMICS AND OTHER BASIC CONCEPTS**: Internal Energy; The first law of thermodynamics; Flow and non-flow processes; Enthalpy; Heat capacity and specific heats; Standard heats of reaction; standard heats of combustion and formation; Effect of temperature of heats of reaction; Laws of thermo chemistry; Heat effects of industrial reactions.	6 Hours
3.	**SECOND LAW OF THERMODYNAMICS**: Statement of the Second law; Heat engine and heat pump; Thermodynamic temperature scale; Carnot cycle and Carnot theorems, Second law limitation and real processes. Concept of entropy; Entropy changes and irreversibility. The third law of thermodynamics.	8 Hours
4.	**VOLUMETRIC PROPERTIES OF PURE FLUIDS:** PVT behavior of fluids; Ideal gas law; Equations of state- van der Waals, RK, SRK, PR EOS; Virial equations; Law of corresponding state; Generalized equations of state; Compressibility charts.	8 Hours
5.	**THERMODYNAMICS PROPERTIES OF FLUIDS:** Relationship among thermodynamic properties; Residual properties; Fugacity and fugacity coefficient; Single-phase and two-phase systems; Generalized property correlations; Thermodynamics diagram and tables.	8 Hours
6.	**COMPRESSION AND REFRIGERATION CYCLE:** Compression and absorption refrigeration cycles- Otto cycle, diesel cycle; Liquefaction of gases.	6 Hours

REFERENCE BOOKS

Title: Introduction to Chemical Engineering Thermodynamics
Author: Smith and Vanness
Publisher: McGraw-Hill Publication

Title: Chemical Engineering Thermodynamics
Author: Y V C Rao
Publisher: University Press

Title: A textbook of Chemical Engineering Thermodynamics
Author: K V Narayanan
Publisher: PHI

TUTORIAL

1. Total 10 to 12 tutorials for problem solving covering course contents of First and second law of thermodynamics, Volumetric properties, Thermodynamic properties and Compression & Refrigeration.

2. Home Assignment