

CH 356: CHEMICAL ENGINEERING THERMODYNAMICS – II

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

1. **SOLUTION THERMODYNAMICS:** Ideal solution; property relationship for system of variable compositions; Partial molar properties; Fugacity and Fugacity coefficient of solutions; activity and activity coefficients; Property changes on mixing; Excess properties; Excess Gibbs free energy models- Margules, Redlich Kister, Whol's equation, Wilson and NRTL equation, UNIQUAC and UNIFAC model. 8 Hours
2. **PHASE EQUILIBRIUM:** Criterion of equilibrium and Gibb's - Duhem equation; Basic equation of vapor liquid equilibrium; Phase rule; Single and Multicomponent phase equilibria; High Pressure vapor liquid equilibrium; Reduction of VLE data; Thermodynamic consistency test of VLE data, azeotrope. 10 Hours
3. **CHEMICAL REACTION EQUILIBRIUM:** Introduction to chemical reaction equilibrium, Application of equilibrium criterion to chemical reaction, Standard Gibbs free energy change and equilibrium constants; Equilibrium constant and its variation with temperature and pressure; Gibbs' phase rule and Duhem's theorem for reacting system; Relation of equilibrium constant to the composition for homogeneous and heterogeneous reactions, Equilibrium for multiple reactions. 10 Hours
4. Introduction to irreversible thermodynamics. 6 Hours
5. Thermodynamic analysis of the processes. 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 Solution Thermodynamics, Phase Equilibrium, Chemical Reaction Equilibrium And Thermodynamic Analysis Of The Processes.
2. Home Assignment