Exam.Code:1029
Sub. Code: 7854

M. Tech. (Material Science and Technology)
First Semester
MST-104: Thermodynamics

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt _five_ questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

I. Write brief notes on:-

a) Homogeneous and heterogeneous equilibria

b) Pressure dependence of equilibrium constant

c) Clausius-Clapeyron equation

d) 2nd order phase transition

e) Ternary phase diagram

(5x2)

UNIT – I

II. Derive the polynomial expressions for excess Gibbs energy of mixing for a binary solution. Derive the relationship between Gibbs free energy and entropy and explain its significance. (10)

III. What are partial molar quantities? Explain. Derive the Gibbs-Duhem equation. (10)

IV. What is a stoichiometric coefficient? Explain how extent of a chemical reaction is expressed. Write the equation explaining the relationship of extent of a reaction with Gibbs energy? Explain the significance with a specific example. (10)

UNIT – II

V. What are phase equilibrium and phase stability? Explain. Explain the energetics of refrigeration process. Briefly explain the zone refining method. (10)

VI. What is a peritectic transformation? Briefly explain the significance of Ellingham diagram. Which technique can be used to measure the phase transition temperature? Explain. (10)

VII. What is a freezing mixture? What is adiabatic demagnetization? Explain Gibbs phase rule. (10)

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