Code No: NR310802 **NR**

III B.Tech I Semester Supplementary Examinations, November 2005
CHEMICAL ENGINEERING THERMODYNAMICS-II
(Chemical Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. A Carnot engine with η =0.6 drives a Carnot refrigerator with COP=5. Determine the energy absorbed from the cold body by the refrigerator for each kJ energy absorbed from the source by the engine. [16]

2. A heat pump driven by a 1-kW electric motor provides heating for a building whose interior is to be kept at 20^{o}C. On a day when the outside temperature is 0^{o}C and energy is lost through the walls and roof through at a rate of 60000 kJ/h, would the heat pump suffice? [16]

3. (a) Define the terms giving a suitable example of each of them : System, Closed System, Open System, Extensive Property, Intensive Property and Partial Molar Property. [6]

   (b) For a system of definite composition, show that
   $n_1 d\bar{G}_1 + n_2 d\bar{G}_1 + \ldots\ldots\ldots\ldots + n_1 d\bar{G}_1 + \ldots\ldots\ldots\ldots = 0$

   (c) Explain the physical significance of partial molar property. [4]

4. (a) Show that if Raoult's Law is applicable to one of the constituents of a liquid mixture, at all compositions, it must be equally applicable to the other constituent. [6]

   (b) Discuss the deviations of nonideal solutions from ideal behaviour (Points ; Raoults Law, nature of constituents, positive and negative deviations, absorption and evolution of heat). [10]

5. (a) Discuss the Phase behavior for Vapor / Liquid sysems. [10]

   (b) Discuss about Retrograde Condensation. [6]

6. What do you understand by equilibrium and stability? Discuss by giving suitable example. [16]

7. (a) Explain criterion of phase equilibrium. [8]

   (b) Deduce the Clayperon equation using the criteria of equilibrium. [8]

8. Show that the variation of chemical potential of a pure substance is given by $d\mu = [RT\, d\, 1n\, f]_T$. Hence deduce the fugacity of a pure substance. [16]

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