R09

Code No: C5101

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech I - Semester Examinations, March/April 2011
ADVANCED CHEMICAL ENGINEERING THERMODYNAMICS
(CHEMICAL ENGINEERING)

Time: 3hours   **Max. Marks: 60**

Answer any five questions
All questions carry equal marks
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1. a) What are the basic postulates of thermodynamics? Explain.
   b) Derive the Maxwell relations from first principles.   [6+6]

2. a) What is phase rule and give its significance in thermodynamics?
   b) Determine the number of degrees of freedom of the following:
      i) A system of two miscible non-reacting species which exists as an azeotrope in Vapour/liquid equilibrium.
      ii) A liquid solution of alcohol in water in equilibrium with its vapour.   [12]

3. What is grand canonical ensemble and discuss the difference between canonical & grand canonical ensemble?   [12]

4. Discuss about different types of intermolecular forces that exist between the molecules of a mixture   [12]

5. Describe about SLE and VLLE with neat diagrams   [12]

6. The following isomerization reaction occurs in the *liquid* phase:
   $$A \rightarrow B$$

   where A and B are miscible liquids for which: $G^E/RT = 0.1 x_A x_B$

   If, $\Delta G^0{}_{298} = -1000 J/mol$, what is the equilibrium composition of the mixture at 298.15 K ? How much error ideal solution?   [12]

7. Discuss the following
   a) Lattice models   b) molecular theory of activity coefficients.   [6+6]

8. Define exergy? Discuss about exergy analysis of any process and give its importance.   [12]

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