

**Code No: C5101****JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****M.Tech I - Semester Examinations, April/May-2012****ADVANCED CHEMICAL ENGINEERING THERMODYNAMICS****(CHEMICAL ENGINEERING)****Time: 3hours****Max. Marks: 60****Answer any five questions  
All questions carry equal marks**

- - -

1. Derive Maxwell relations from first principles.
- 2.a) Define the term 'equilibrium' and give its importance in thermodynamics.  
b) Derive phase rule for non-reacting systems.
3. Describe about 'micro canonical ensemble'.
4. Write about the following
  - a) Molecular theory of corresponding states
  - b) Molecular simulation.
5. Describe about VLLE and LLE with neat phase diagrams.
6. The following reaction reaches equilibrium at 773 K and 2 bar:  
$$4\text{HCl (g)} + \text{O}_2 \text{(g)} \rightarrow 2\text{H}_2\text{O (g)} + 2\text{Cl}_2 \text{(g)}$$

If the system initially contains 5mol HCl for each mole of oxygen, what is the composition of the system at equilibrium? Assume ideal gases.
7. Discuss the following
  - a) Lattice models
  - b) Exergy analysis of a process.
8. Write short notes on the following
  - a) Classical mechanics
  - b) Quantum mechanics
  - c) Potential energy functions.

\* \* \* \* \*