Question Bank (I scheme)

Name of Course: Chemical Engineering Thermodynamics(CET)
Subject code: 22406

Semester :IVProgramme: Chemical

Unit test II

Unit 3: Thermodynamic quantity(07marks)

FOUR marks question

1. Explain P-H diagram
2. Explain H-T diagram
3. Explain T –S diagram

Unit4:Second law of thermodynamics(14marks)

TWO marks question

4. Give the statement of Third law of thermodynamics
5. Give the relation between first and second law of thermodynamics
6. State Clausius inequality. Give the mathematical expression
7. State Gibb's paradox for mixing.
8. Give the equation to calculate the change in entropy of a chemical reaction.
9. State the feasibility of a reaction based on entropy

FOUR marks question

10. Give the statement of second law of thermodynamics
11. Derive the entropy change of an ideal gas in terms of pressure and temperature
12. Give the equation for entropy change during vaporization. Evaluate the entropy of evaporation of dry saturated steam at 500kPa.Latent heat of vaporization is 2106kJ/kg. Saturation temperature of steam is 425K.
13. 10 kg of water at 375K is mixed adiabatically with 35 kg of water at 250K. Evaluate the change in entropy. Assume specific heat of water at 4.2kJ/kg K and is independent of temperature.
14. List the steps and give the equation to calculate the entropy of a vapour at temperature T.

Unit 5: Chemical Equilibria(14marks)

TWO marks question

15. Define Gibb's free energy change.
16. State Le-Chatelier's principle.

17. Define chemical potential
18. Define law of mass action.

FOUR marks question

19. Derive Van't Hoff equation
20. Based on Van't Hoff equation, explain why temperature increase is not desirable for exothermic reaction.
21. Derive the relation between conversion and thermodynamic equilibrium constant for second order reversible reaction.
22. Show that $\Delta G = -RT \ln K$.
23. Derive the relation between Kp and Ky.
24. Calculate the equilibrium constant K_p for ammonia synthesis at a total pressure of 30atm and temperature 400^oC. % of ammonia at equilibrium is 10.09
25. In an experiment at 500K, the equilibrium concentration of ammonia, hydrogen and nitrogen are0.105,1.5 and 1.1 mol/l respectively. Calculate K_c for the reaction $N_2 + 3H_2 \leftrightarrow 2NH_3$.