TB156200A   Reg. No……………………………

                                                   Name……………………………..

B. Sc. DEGREE (C.B.C.S.S) EXAMINATION, MARCH 2018
(2015 Admission Regular)
SEMESTER VI – CORE (CHEMISTRY)
CH6B13TB - CHEMICAL THERMODYNAMICS

Time: Three Hours   **Maximam Marks: 60**

PART A

I. Answer all questions. Each question carries 1 mark.

1. A system that can exchange neither matter nor energy with surroundings is called a......................

2. The............. of the universe always increases in the course of every spontaneous change.

3. Gibb's energy change is related to enthalpy change and entropy change as ……………

4. Binary mixtures of n-hexane and n-heptane obey …………… law over the entire range of concentration

5. Define Gold number.   **(5X1=5)**

PART B

II. Answer any five questions. Each question carries 2 marks.

6. Write a brief note on dialysis.

7. The Henry's law constant for a solution of acetone in chloroform is 150 torr when the solution is at 308 K. Calculate the value of vapour pressure of acetone when its mole fraction is 0.14.

8. Mention two applications of Gibbs – Helmholtz equation.

9. Explain the term spontaneous process.

10. Define efficiency of a heat engine.

11. Classify the following terms into intensive and extensive properties: (a) Entropy; (b) Viscosity; (c) Heat Capacity; (d) Surface tension.

12. What are macroscopic properties? Give two examples.

13. What is meant by a state function? Give an example.   **(5X2=10)**

PART C

III. Answer any five questions. Each question carries 5 marks.

14. One mole of a gas expands isothermally at 27°C from 100 atm to 1 atm pressure. Calculate the work done if the process is carried out,
    I. In a single stage
    II. In two stages when the intermediate pressure is 50 atm.

15. Given that V is a function of T and P, show that dV is an exact differential for an ideal gas.

16. Derive Gibbs Duhem equation. Using this relation justify that "In a binary solution the change in μ of one component affects the value of μ of the other component."

17. What is meant by spontaneous process? Explain the criteria for spontaneity and equilibrium in terms of Gibbs energy change.

18. State Raoult's law of relative lowering of vapour pressure. Show how the law can be utilized in determining the molar mass of the solute.
19. State Henry's law and explain three of its applications.
20. Give an account of the various methods employed for the purification of colloidal solution.
21. What are emulsions? How can you identify them? Also give the applications and harmful effects of emulsion. **(5X5=25)**

PART D

IV. Answer any two questions. Each question carries 10 marks.

22. a) Derive the equation for work done and heat transferred during reversible isothermal expansion of an ideal gas.
    b) Calculate the work involved in compressing 1 mole of an ideal gas at 25^0C from 1 atm to 10 atm when (i) external pressure of the gas is constant at 10 atm and (ii) external pressure of the gas is slightly in excess of the gas pressure through the compression.
23. Describe Carnot's cycle and derive the expression for the efficiency of a heat engine.
24. (a) Show that for a reversible reaction, $G^0 = -RT \ln K_p$.
    (b) Derive the relation between (i)K_p and K_x (ii) K_c and K_x
25. What are ideal and non-ideal solutions? Discuss briefly the deviation of real solutions from their ideal behaviour **(2X10=20)**

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