

B.Sc. - II (CBCS Pattern) Semester-III  
**USCCHT06 - Chemistry Paper-II : Physical Chemistry**

P. Pages : 2

Time : Three Hours



**GUG/W/24/11601**

Max. Marks : 50

- Notes :
1. All five questions are compulsory and carry equal marks.
  2. Draw diagrams wherever necessary.
  3. Use of calculator is permitted.

1. a) What is one component system? Draw labelled phase diagram of water system and discuss its main features. 5

b) State and explain Nernst Distribution law. Discuss its application and limitations. 5

**OR**

c) State and explain Henry's law. 2½

d) Write note on steam distillation. 2½

e) State phase rule. Explain each term involved in it. 2½

f) Define azeotropes. Describe the types of azeotropes with suitable example. 2½

2. a) State the need for second law of thermodynamics. Derive an expression for entropy. 5

b) State and explain Gibbs free energy (G). Explain the variation of Gibbs free energy with temperature. 5

**OR**

c) What are partial molar quantities? Write expression for chemical potential. 2½

d) Define Helmholtz free energy and explain its physical significance. 2½

e) Describe the relation between standard free energy change and equilibrium constant. 2½

f) Discuss entropy as criteria of spontaneity and equilibrium. 2½

3. a) What are first order reaction? Derive an expression for rate constant of first order reactions. 5

b) What is catalysis? Explain homogeneous and heterogeneous catalysis with one example of each. 5

**OR**

- c) State the postulate of transition state theory. 2½
- d) Discuss effect of temperature on rate of reaction. 2½
- e) Show that the half-life period of first order reaction is independent of initial concentration of reactant species. 2½
- f) What is autocatalysis? Explain with suitable examples. 2½
- 4. a) Define depression of freezing point? Explain how molecular mass is determine from depression of freezing point. 5
- b) What is magnetic susceptibility? Describe Gouy's method far its measurement. 5

**OR**

- c) State Roult's law of lowering of vapour pressure. How can it be used to determine the molecular weight of non-volatile soulute in solution. 2½
- d) What are colligative properties? Define 2½
  - i) Molarity
  - ii) Mole fraction.
- e) Calculate Magnetic moment of a complex if number of unpaired electrons in complex is fire. 2½
- f) Explain diamagnetism and paramagnetism with suitable examples. 2½
- 5. Attempt **any ten** (each carry **1** mark). 10
  - i) What is eutectic mixture?
  - ii) Define lower and upper consolute temperature.
  - iii) What is meant by triple point of water system?
  - iv) Define standard free energy.
  - v) Define chemical potential.
  - vi) Define entropy of fusion.
  - vii) What is unit of first order rate constant?
  - viii) Define enzyme catalysis.
  - ix) Define energy of activation.
  - x) Define magnetic moment.
  - xi) What is ebullioscopic constant?
  - xii) Calculate the normality of solution if 4g NaOH is dissolved in 500ml of solution.

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