

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

P. Pages : 2

Time : Three Hours



**GUG/S/25/11601**

Max. Marks : 50

- Notes :
1. All the five questions are compulsory and carry equal marks.
  2. Draw diagram and give chemical reaction whenever required.
  3. Use of calculator is permitted.

1. A) Draw the phase diagram for water system. Discuss the application of the phase rule to this system. 5
- B) State and explain Nernst Distribution law. Discuss phenol- water system with suitable diagram. 5

**OR**

- C) State phase rule and explain the term involved in it. 2½
- D) State and explain Raoult's law of ideal solution. 2½
- E) Described lead-silver system using phase diagram. 2½
- F) Write a note on steam distillation. 2½
2. A) Derive an expression for entropy change for an ideal gas under isothermal process. 5
- B) Derive integrated form the Vant Hoff's equation. 5

For Reaction  $\text{N}_2\text{O}_4 \longrightarrow 2\text{NO}_2$   $\Delta H = 81.086 \text{ KJ}$

If the equilibrium constant is 0.18 at 298K. Calculate the equilibrium constant at 340K  
( $R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$ )

**OR**

- C) Define Gibbs Free Energy and explain its physical significance. 2½
- D) Derive Gibbs Helmholtz equation. 2½
- E) Discuss entropy as criteria of spontaneity and equilibrium. 2½
- F) Write a note of partial molar quantities. 2½
3. A) Obtain an expression for specific rate constant of second order reaction if initial concentration of both the reactant species are equal. 5
- B) Explain homogeneous and heterogeneous catalysis with example. State the characteristics properties of catalyst. 5

**OR**

- C) Derive an expression for rate constant of first order reaction. 2½

- D) The rate constant of reaction is  $1.2 \times 10^{-3} \text{ sec}^{-1}$  at  $30^\circ\text{C}$  and  $2.2 \times 10^{-3} \text{ sec}^{-1}$  at  $40^\circ\text{C}$ . Calculate the energy of activation of the reaction ( $R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$ ). 2½
- E) State the postulate of transition state theory. 2½
- F) Give the industrial application of Catalyst. 2½
4. A) What are colligative properties? Explain molecular mass determine from depression of freezing point. 5
- B) What do you mean by magnetic susceptibility. Discuss the application of magnetic susceptibility measurement in 5
- 1) The study of coordination compounds.
  - 2) The calculation of number of unpaired electrons in a molecules.

**OR**

- C) What is Osmotic pressure? How is it measured experimentally by Berkeley and Hartley's method. 2½
- D) 12 gm of substance dissolved in 100gm of water raised its boiling point by  $0.99^\circ\text{C}$ . Calculate the molecular weight of the substance. The molal elevation constant for water is  $0.55^\circ\text{C} / \text{molal}$ . 2½
- E) Define degree of dissociation and obtain the relation between degree of dissociation and Van't Hoff's factor. 2½
- F) How the magnetic moment of paramagnetic substance can be determined? 2½
5. Attempt **any ten**. 1x10
- 1) Define Degree of freedom.
  - 2) State Henry's Law and give any one limitation.
  - 3) Define Upper Consolute temperature.
  - 4) Define entropy of Fusion.
  - 5) Define Chemical Potential.
  - 6) What do you mean by standard free energy?
  - 7) What is zero order reaction?
  - 8) Define molecularity and order of reaction.
  - 9) What is enzyme catalysis reaction?
  - 10) Define normality and molality
  - 11) What is ebullioscopic constant?
  - 12) Define paramagnetic and ferromagnetic substance.

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