

B.Sc. Semester - 6 (CBCS) Examination
March/April-2024 (NEW COURSE)
Physical and Analytical Chemistry (Core (New))

Time: 2:30 Hours

Marks: 70

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate marks.

- Que-1(A) Answer the following question. (04)**
 (1) Calculate μ and $f_{\pm}$ for aqueous solution of 0.03M copper (II) nitrate (Ionisation has been 100%). ($A=0.509$)
- Que-1(B) Answer any two questions out of three. (10)**
 (1) Explain the determination of absolute entropy of solid by third law of thermodynamics.
 (2) Define: Partial molar properties & Describe Nernst's distribution law with its equation.
 (3) Explain the photochemical reaction of decomposition of HI with mechanism.
- Que-2(A) Answer the following question. (04)**
 (1) Write a note on Charcoal cavity test with principle.
- Que-2(B) Answer any two questions out of three. (10)**
 (1) Discuss: Argentometric titration of $\text{AgNO}_3 \rightarrow \text{NaCl}$ by potentiometry.
 (2) Derive the emf equation of concentration cell without transference.
 (3) Explain weak acid – strong base titration curve by P^{H} metry.
- Que-3(A) Answer the following question. (04)**
 (1) Explain principle & working method for Ion-exchange chromatography.
- Que-3(B) Answer any two questions out of three. (10)**
 (1) Explain any three rules for determination of significant figures with proper examples.
 (2) (i) Explain separation of green leaf pigment by Column chromatography.
 (ii) Define (a) Elution (b) Chromatogram
 (3) (i) Define: Mean value & Median with equation.
 (ii) What is R_f value? List any four factors affecting on it.
- Que-4(A) Answer the following question. (04)**
 (1) For chemical reaction $\text{A} \rightleftharpoons \text{B}$, the value of $\Delta H^\circ = -18.2 \text{ Kcal/mole}$ and $\Delta S^\circ = -12.8 \text{ cal/K} \cdot \text{mole}$ at 300 K. Calculate equilibrium constant (K) for the reaction. ($R = 1.987 \text{ cal/K} \cdot \text{mole}$)
- Que-4(B) Answer any two questions out of three. (10)**
 (1) Describe the method of determination of activity co-efficient by solubility method.
 (2) Explain method of separation of CO_3^{2-} , SO_3^{2-} and S^{2-} ions in presence of each other in qualitative analysis.
 (3) Write a note on student T-test in detail.
- Que-5(A) Answer the following question. (04)**
 (1) At 298 K, emf of following cell is 0.0295 V. Find the valency of Hg ion.

$$\text{Hg} / \frac{\text{N}}{20} \text{ mercurous nitrate in } 0.01 \text{ M HNO}_3 \text{ (a1)} // \frac{\text{N}}{2} \text{ mercurous nitrate in } 0.01 \text{ M HNO}_3 \text{ (a2)} / \text{Hg}$$
- Que-5(B) Answer any two questions out of three. (10)**
 (1) Derive the equation $\log \gamma_{\pm} = -A|Z_+Z_-|\sqrt{\mu}$ for activity of electrolytes.
 (2) Write a note on electrode concentration cells with proper examples.
 (3) (i) Explain selection of carrier gas for GLC.
 (ii) Give any five uses of TLC.
