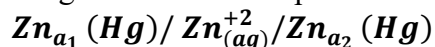


B.Sc. Semester - 6 (CBCS) Examination**March/April-2025 (NEW COURSE)****Physical and Analytical Chemistry (Core (New))****Time: 2:30 Hours****Marks: 70****Instructions:**

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

- Que-1(A) Answer the following question. (04)**
 1) Derive the equation to determine activity coefficient by solubility product method.
- Que-1(B) Answer any two questions out of three. (10)**
 1) Derive the equation to determine absolute of entropy of a gas.
 2) Write a statement of Henry's law and derive its mathematical form with the help of chemical potential.
 3) Write the difference between thermal and photochemical reaction.
- Que-2(A) Answer the following question. (04)**
 1) What is LJP? How can it eliminate?
- Que-2(B) Answer any two questions out of three. (10)**
 1) Derive the equation to determine the cell potential of electrolytic concentration cell without transference.
 2) Explain p^H metric titration of weak acid vs strong base using hydrogen electrode as indicator and Calomel electrode as a reference electrode.
 3) How can we identify and separate NO_2^- , NO_3^- and Br^- from mixture during laboratory.
- Que-3(A) Answer the following question. (04)**
 1) Explain accuracy and precision with suitable examples.
- Que-3(B) Answer any two questions out of three. (10)**
 1) Results obtained for the normality of a solution are 0.1014, 0.1020, 0.1009, and 0.1016. Apply Q-test with 90% confidence and determine whether 0.1020 and 0.1009 result should be rejected or accepted? ($Q_{\text{Tab}} = 0.76$)
 2) Explain circular paper chromatography in detail.
 3) Write principle of TLC. Why TLC is superior chromatographic technique than others?
- Que-4(A) Answer the following question. (04)**
 1) Derive Gibbs-Duhem equation.
- Que-4(B) Answer any two questions out of three. (10)**
 1) Calculate the mean ionic activity coefficient for cation and anions of aqueous solution of 0.04 M CaCl_2 at 25°C temperature.
 2) Derive the equation to determine the dissociation constant of CH_3COOH by emf method.
 3) Write a note on ion exchange chromatography in detail.
- Que-5(A) Answer the following question. (04)**
 1) Explain charcoal cavity and cobalt nitrate test with necessary equations.
- Que-5(B) Answer any two questions out of three. (10)**
 1) What is error? Give the methods to minimise the determinate errors.
 2) Explain Nernst heat theorem in detail.
 3) Find emf of the following cell at 298K temperature



Where, $a_1 = 9.6 \times 10^{-2} \text{ M}$ and $a_2 = 3.3 \times 10^{-2} \text{ M}$
