

B.Sc. Semester - 5 (CBCS) Examination

Oct/Nov. - 2023(Old Course)

PHYSICAL AND ANALYTICAL CHEMISTRY (CORE)

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)
 ❖ Derive the equation of entropy change for mixing of ideal gases.
- Que-1(B) Answer any two questions out of three. (10)
 1. Give limitations of first law of thermodynamics and write four statements of second law of thermodynamics.
 2. Write a note on entropy change in reversible processes.
 3. If temperature of one mole of an ideal gas increases from 230 K to 287 K, expansion of an ideal gas occurs from volume 5 lit. to 12 lit. Calculate the entropy change during the process.
 $(C_v = \frac{3}{2}R)(R = 1.987 \text{ Cal} \cdot K^{-1} \text{ mol}^{-1})$
- Que-2(A) Answer the following question. (04)
 ❖ Discuss the effect of pressure on
 (a) Melting Point of Ice
 (b) Melting Point of Paraffin wax by Clausius-Clapeyron equation.
- Que-2(B) Answer any two questions out of three. (10)
 1. Derive the equation: $\Delta G = nRT \ln \frac{P_2}{P_1}$.
 2. Discuss the formation of three pairs of partially miscible liquids in a ternary system.
 3. Derive Van't Hoff isotherm equation.
- Que-3(A) Answer the following question. (04)
 ❖ Write a note on Weston standard cell.
- Que-3(B) Answer any two questions out of three. (10)
 1. Discuss in detail about Silver-Silver chloride Electrode.
 2. (a) Derive mathematical expression of Beer's Law.
 (b) Write only the statement of Grothus-Draper's Law & Lambert's Law.
 3. Write detailed Cell reactions for following electrochemical cells.
 (a) $\text{Sn}_{(s)} / \text{Sn}_{(aq)}^{+2} \parallel \text{Cu}_{(aq)}^{+2} / \text{Cu}_{(s)}$ (b) $\text{Al}_{(s)} / \text{Al}_{(aq)}^{+3} \parallel \text{Ag}_{(aq)}^{+} / \text{Ag}_{(s)}$
- Que-4(A) Answer the following question. (04)
 ❖ Discuss: Conductometric titration curve for Weak acid with Strong base.
- Que-4(B) Answer any two questions out of three. (10)
 1. Discuss: Replacement titration of Salt of Weak base (NH_4Cl) with Strong base (NaOH) by Conductometry.
 2. Write a note on: (a) Back Titration And (b) Substitution Titration in case of EDTA Titration.
 3. Discuss: Precipitation titration curve of $\text{Ba}(\text{OH})_2$ by MgSO_4 by Conductometry.
- Que-5(A) Answer the following question. (04)
 ❖ Write a detailed note on Primary and Secondary standards in Volumetric Analysis.
- Que-5(B) Answer any two questions out of three. (10)
 1. Explain: Neutralisation titration curve of strong acid against strong base by Volumetric Analysis.
 2. Discuss in detail: Iodometry titration with two examples.
 3. Explain: Fajan's adsorption method in Precipitation Titration.
