

B.Sc. Semester - 5 (CBCS) Examination
Oct/Nov - 2021 (NEW 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.

Q. 1 (a) Answer the following question. (04)

(1) Derive the equation: $\Delta G = nRT \ln \frac{V_1}{V_2}$.

Q. 1 (b) Answer any two questions out of three. (10)

- (1) Derive Van't Hoff isotherm equation.
- (2) Calculate the change in entropy of mixing when 66 gm of CO₂ gas and 48 gm O₂ gas are mixed at given temperature ($R=1.987 \text{ Cal}\cdot\text{K}^{-1}\cdot\text{mole}^{-1}$).
- (3) Discuss the entropy change in reversible processes.

Q. 2 (a) Answer the following question. (04)

(1) Discuss precipitation titration of Ba(OH)₂ against MgSO₄.

Q. 2 (b) Answer any two questions out of three. (10)

- (1) Explain Weston standard cell in detail.
- (2) Discuss in brief the formation of one pair of partially miscible liquids in a ternary system.
- (3) Emf of the cell $\text{Cd}_{(s)}/\text{CdCl}_{2(aq)} // \text{AgCl}_{(s)}/\text{Ag}_{(s)}$ at 298 K is 0.874V and at 273 K is 0.893V. Calculate ΔG , ΔH and ΔS at 298 K.

Q. 3 (a) Answer the following question. (04)

(1) Derive the mathematical expression of Lambert-Beer's law.

Q. 3 (b) Answer any two questions out of three. (10)

- (1) Explain: Neutralisation titration curve of strong acid and strong base.
- (2) Explain: Volhard's method for estimation of halides.
- (3) Explain: Iodometry titration with two suitable examples.

Q. 4 (a) Answer the following question. (04)

(1) Discuss: Physical significance of entropy in detail.

Q. 4 (b) Answer any two questions out of three. (10)

(1) Explain in detail: variation in work function with volume and temperature.

(2) What is primary reference electrode? Explain standard hydrogen electrode in detail.

(3) Discuss following types of spectrophotometric titrations.....

(i) Lack of absorbance by product and titrant.

(ii) Lack of absorbance by product and reagent.

Q. 5 (a) Answer the following question. (04)

(1) Discuss: replacement titration curve of salt of weak base with strong base.

Q. 5 (b) Answer any two questions out of three. (10)

(1) Explain in detail: Carnot Cycle with operations.

(2) Write a note on maximum critical solution temperature and minimum critical solution temperature.

(3) What is an indicator? Explain the principle of Ostwald's law based on indicator.
