

B.Sc. Semester - 5 (CBCS) Examination

Oct/Nov. - 2021(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.

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

- (1) Discuss in detail: Entropy change in reversible process.

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

- (1) Give limitations of first law of thermodynamics and different statements of second law of thermodynamics.
- (2) Derive the equation for entropy change of mixing of ideal gases.
- (3) Derive the equation $\Delta S_T = 2.303nR \log \frac{V_2}{V_1}$.

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

- (1) Discuss in detail free energy and its significance.

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

- (1) Derive the Gibbs-Helmholtz equation.
- (2) Discuss in brief the formation of three pair of partially miscible liquids in a ternary system.
- (3) Discuss Van't Hoff isochors.

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

- (1) Write Cell reactions and Nernst equation at 298 K temperature and 1 bar pressure for following electrochemical cells.



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

- (1) Derive the mathematical expression of Lambert-Beer's law.
- (2) What is reference electrode? Explain silver-silver chloride electrode in detail.
- (3) (i) Discuss the deviation from Lambert-Beer's law.
(ii) Represent the cell of following half cells and calculate standard cell potential at 298K.

$$E_{\text{Cl}_2/2\text{Cl}^-}^0 = +1.36 \text{ V} \quad \& \quad E_{\text{Cu}^{+2}/\text{Cu}}^0 = +0.34 \text{ V}$$

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

- (1) Discuss the conductometric titration curve of weak acid with strong base.

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

- (1) Describe the replacement titration curve of salt of weak acid with HCl.
- (2) Give structure, characteristics and uses of EBT and Calcon indicators.
- (3) Discuss: Precipitation titration curve of NaCl by AgNO₃.

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

- (1) Write a note on (i) starch (ii) diphenyl amine indicators.

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

- (1) Explain: Iodimetry titration with two examples in detail.
- (2) Explain: Mohr's method for precipitation titration.
- (3) Explain: Neutralisation titration curve of strong acid and strong base.
