

B.Sc. Semester - 5 (CBCS) Examination
December -2020 (NEW COURSE)
Physical and Analytical Chemistry (Core)

Time: 1:30 Hours

Marks: 42

Instructions:

1. Figures to the right indicate marks.
 2. There are five questions in the question paper.
 3. Answer any three of the following questions.
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Q. 1 (A) State the limitations of First Law of Thermodynamics and write the statements of Second Law of thermodynamics. (04)

Q.1 (B) Answer any two questions. (10)

- (1) Derive the equation for efficiency of heat engine and write Carnot theorem.
- (2) Explain the physical significance of entropy.
- (3) Discuss the variation of work function and free energy.

Q. 2 (A) Describe two pair of partially miscible liquid system. (04)

Q. 2 (B) Answer any two questions. (10)

- (1) Explain the precipitation titration by conductometry.
- (2) Describe the titrations of strong acid against weak base and weak acid against strong base by conductometry..
- (3) Explain method to determine solubility of sparingly soluble salt by emf.

Q. 3 (A) Explain Velcher's Law. (04)

Q. 3 (B) Answer any two questions. (10)

- (1) Discuss spectrophotometric titrations.
- (2) Explain Ostwald theory of indicator.
- (3) Describe the indicators of redox titration.

Q.4 (A) When 1 mole of ice at 0°C temperature and 1 atm. pressure is transformed / converted into vapour at 100°C, calculate the change in entropy of ice. (Heat of Fusion of ice at 0°C is 1436 cal/mole, Specific Heat of Water = 1cal deg⁻¹ gm⁻¹, Heat of vaporization at 100°C is 9720 cal/mole) (04)

Q. 4 (B) Answer any two questions. (10)

- (1) Derive vant Hoff equation and state its applications.
- (2) Discuss reversible and irreversible cell.
- (3) Explain various types of EDTA titration.

Q. 5 (A) A saturated solution of silver chloride **AgCl** has a conductance $2.28 \times 10^{-6} \text{ S cm}^{-1}$ at 25°C. (04)
The conductance of the water used to prepare this solution is $0.116 \times 10^{-6} \text{ S cm}^{-1}$. The limiting ionic conductivities of the two ions are $\lambda_{\text{Ag}^+} = 61.9 \text{ S cm}^2 \text{ mol}^{-1}$ and $\lambda_{\text{Cl}^-} = 76.3 \text{ S cm}^2 \text{ mol}^{-1}$. Calculate the molar solubility of AgCl.

Q. 5 (B) Answer any two questions. (10)

- (1) If ΔG° for the decomposition of CaCO_3 is 130.2 kJ / mole, calculate pressure of CO_2 gas at 700 K temperature ($R = 1.987 \text{ cal K}^{-1} \text{ mol}^{-1}$)
- (2) Explain various types of reversible electrodes.
- (3) Describe Volhard method to determine the end point of precipitation titrations.
