

B.Sc. Semester - 5 (Remedial) (CBCS) Examination
Feb/Mar. -2021 (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) Answer the following question. (04)

- (1) Define: Cyclic process **and** calculate the change in entropy at constant volume, when 3 moles of an ideal gas is heated from 37 °C to 58 °C temperature. ($C_v = 13.2 \text{ Cal.K}^{-1}.\text{mol}^{-1}$).

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

- (1) Derive Gibbs-Helmholtz equation.
- (2) Discuss Carnot Cycle with operations in detail.
- (3) (a) Calculate efficiency of a heat engine in %, working with source temperature 140 °C to sink temperature 50 °C.

(b) Calculate change in Gibbs free energy, when 1.7 moles of an ideal gas are allowed to expand reversibly and isothermally at 299 K from pressure of 1 atmosphere to 0.2 atmosphere ($R=1.987 \text{ Cal.K}^{-1}.\text{mol}^{-1}$).

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

- (1) Discuss the formation of one pair of partially miscible liquids in a ternary system.

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

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



- (2) Discuss the conductometric curve for a mixture of strong acid and weak acid with strong base.
- (3) Explain: Reversible and Irreversible cell with suitable example.

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

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

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

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

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

(1) Derive Clausius-Clayperon equation for a phase in equilibrium.

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

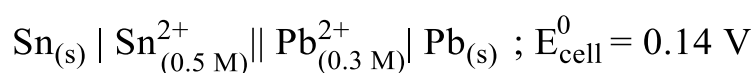
(1) Derive the equation of entropy change for a mixing of ideal gases.

(2) Write Kohlrausch's law and discuss the Effect of dilution on conductance, specific conductance and equivalent conductance.

(3) Explain the principle of Metal ion indicator and Give uses and characteristics of Eriochrome Black-T (EBT) indicator.

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

(1) Calculate free energy change of the reaction occurs in following cell at 298 K temperature.



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

(1) Discuss: Precipitation titration curve of *NaCl* by *AgNO₃*.

(2) Give definition of Transmittance & Absorbance **and** Calculate pH of mixture of 50 ml 0.1 M *NH₄OH* + 50 ml of 0.05 M *HCl*. (**p*K_b* for *NH₄OH* is 4.75**).

(3) Explain in detail about physical significance of entropy.
