

B.Sc. Semester - 5 (CBCS) Examination
Oct/Nov - 2022 (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)

Explain work function and its physical significance in detail.

Q.1(B) **Answer the following questions. (Any two)** (10)

- A. Discuss the entropy change in reversible processes.
- B. Explain Carnot cycle with operations in detail.
- C. (i) Three moles of an ideal gas expand isothermally from 1 Lit. to 7 Lit. at 300 K temperature. Calculate the change in free energy of gas. ($R = 1.987 \text{ Cal} \cdot \text{K}^{-1} \cdot \text{Mole}^{-1}$)
- (ii) At constant volume, two moles of an ideal gas are heated from 35 °C to 65 °C temperature, find the value of change in entropy. ($C_v = 13.2 \text{ Cal} \cdot \text{K}^{-1} \cdot \text{Mole}^{-1}$)

Q.2(A) **Answer the following question.** (04)

Discuss in brief the formation of one pair of partially miscible liquids in a ternary system.

Q.2(B) **Answer the following questions. (Any two)** (10)

- A. Explain in detail: Weston standard cell.
- B. Discuss the conductometric titration curve of weak acid with weak base.
- C. (i) Define (a) Conductance (b) Molar conductance (c) Specific resistance
- (ii) Construct the cell by using following potential values and find the standard cell potential at 298 K.

$$E_{\text{Sn}^{+2}/\text{Sn}}^0 = -0.136 \text{ V} \quad \& \quad E_{\text{Cu}^{+2}/\text{Cu}}^0 = +0.34 \text{ V}$$

Q.3(A) **Answer the following question.** (04)

Give statement of Grotthus – Draper 's Law and discuss the spectrophotometric titration when lack of absorbance by product.

Q.3(B) **Answer the following questions. (Any two)** (10)

A. Explain: Neutralisation titration curve of strong acid and weak base in detail.

B. Define: Internal redox indicator and write a note on *o*-Phenanthroline and Diphenylamine indicators.

C. Write a note on Mohr's method for precipitation titration.

Q.4(A) **Answer the following question.** (04)

Derive the equation: $\Delta G = nRT \ln \frac{P_2}{P_1}$.

Q.4(B) **Answer the following questions. (Any two)** (10)

A. Derive the equation for entropy change of mixing of ideal gases.

B. Discuss the shape of precipitation titration curve of $\text{Ba}(\text{OH})_2$ with MgSO_4 by conductometry.

C. Explain: Principle of metal ion indicator and give structure, characteristics and applications of Calcon indicator.

Q.5(A) **Answer the following question.** (04)

Explain: Iodimetry titration with two examples.

Q.5(B) **Answer the following questions. (Any two)** (10)

A. Derive the equation: $\Delta S_T = 2.303 nR \log \frac{V_2}{V_1}$.

B. (i) Write a note on lower critical solution temperature.

(ii) Write a note on Irreversible cell by giving suitable example.

C. Define: Transmittance and derive mathematical expression of Lambert's law.
