Section C

6. (a) Explain the Construction and Working of an Electrochemical Cell. **3**

(b) Differentiate between Electrochemical cell and Electrolytic Cell. **3**

7. (a) Define Electrochemical Series ? What are its important applications ? **3**

(b) What are Concentration Cell ? Derive an Expression for EMF of Electrode Concentration Cell without transference. **3**

Section D

8. (a) Can a solution of 1 M $CuSO_4$ be stored in a vessel made of Nickel metal ? Given that : **3**

$E^{\circ}_{Ni/Ni^{2t}} = 0.25V$

$E^{\circ}_{Cu/Cu^{2t}} = -0.34V$

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B.Sc. EXAMINATION, 2026

(Fourth Semester)

(Re-appear Only)

CHEMISTRY

Paper-XII, CH-205

Physical Chemistry

Time : 3 Hours] [*Maximum Marks : 32*

Before answering the question-paper, candidates must ensure that they have been supplied with correct and complete question-paper. No complaint, in this regard will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting *two* questions from each Section. Q. No. **1** is compulsory.

Compulsory Question

1. (a) Define the term activity and activity coefficient. **2**

(b) Justify the statement, "Entropy of Universe is increasing". **2**

(c) Define Reversible and irreversible Cell giving Example. **2**

(d) State Nernst Heat Theorem. What are its limitations ? **2**

Section A

2. (a) What was the necessity of Introducing 2nd law of Thermodynamics ? Explain. **3**

(b) Show that for a Reversible process $\Delta S_{system} + \Delta_{surrounding} = 0$ & for an irreversible process $\Delta S_{system} + \Delta S_{surrounding} > 0$. **3**

3. (a) Explain the term Entropy, Show that Entropy is a state function. **3**

(b) Derive the following Relationship : **3**

(i) $\left(\frac{\partial A}{\partial V}\right)_T = - P$

(ii) $\left(\frac{\partial A}{\partial T}\right)_V = - S$

Section B

4. (a) Derive the Gibbs – Helmholtz Equation in the form as below : **3**

$$\left[\frac{\partial(\Delta G/T)}{\partial T}\right]_P = \frac{-\Delta H}{T^2}$$

(b) What is Residual Entropy ? What is its origin ? How can it be calculated ? **3**

5. (a) What is Carnot Cycle ? Calculate the efficiency of a Carnot engine working between temperature T_1 & T_2 ? **3**

(b) Derive an Expression for the Molar Entropy Change of mixing of two Ideal gases. **3**

(b) What are buffer Solution ? Explain buffer action in acidic buffer and Basic Buffer Solution. **3**

9. (a) What is Liquid Junction potential ? Explain. **3**

(b) What is quinhydrone Electrode ? Show that it behave as reversible H^+ Ion Electrode ? **3**

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