



QP CODE: 25047490



25047490

Reg No :

Name :

M.Sc DEGREE (CSS) EXAMINATION, NOVEMBER 2025

Third Semester

M Sc ANALYTICAL CHEMISTRY

Core Course - CH020301 - SELECTED TOPICS IN PHYSICAL CHEMISTRY

2019 ADMISSION ONWARDS

EF867949

Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

Weight 1 each.

1. What is enthalpy of activation $\Delta H^\ddagger$? Give its significance with respect to deciding the rate of the reaction.
2. What are the two basic conditions in which the steady state approximation can be applied to a chemical reaction?
3. Describe Drude and Nernst's electrostriction model for electrolytes.
4. Explain the term Electrophoretic effect.
5. Explain Debye-Falkenhagen effect.
6. Write a note on the quantitative test for DHLL.
7. Explain foams and different type of foams.
8. Distinguish between excimers and exciplexes.
9. What is a non-equilibrium irreversible process?
10. Define electro osmotic pressure.

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

Weight 2 each.

11. Derive the relationship between the relaxation time, ζ and k_1 and k_2 for the fast reactions, where k_1 and k_2 are rate constants for forward and backward reactions.
12. The enzyme catalyzed conversion of a substance at 25°C has Michaelis constant of 0.05 moles L⁻¹. The reaction rate is 4.5 moles L⁻¹s⁻¹ when substrate concentration is 0.7 moles L⁻¹. what is the maximum velocity of this enzyme catalysis?





13. Distinguish between deposition, dissolution and decomposition potential
14. The EMF of the following cell measured at 25°C is 0.35V. The standard electrode potential of $\text{Cl}^-/\text{AgCl}/\text{Ag}$ is 0.22V. Calculate the mean activity coefficient of 0.01 M HCl. $\text{HCl}, \text{H}_2; \text{Pt} / \text{AgCl(s)}, \text{Ag(s)}$.
15. How can we determine surface area by Langmuir adsorption isotherm?
16. For 1.86×10^{-4} M butanoic acid solution $dg/dc = -0.092 \text{ Nm}^2\text{mol}^{-1}$ at 25°C . (a) Calculate the surface excess by using Gibbs adsorption equation (b) calculate average surface area available for a molecule.
17. Distinguish between E-type and P-type fluorescence.
18. Explain the thermodynamic aspects of glycolysis.

(6×2=12 weightage)

Part C (Essay Type Questions)

Answer any **two** questions.

Weight 5 each.

19. (a) Discuss in detail about the kinetic theory of collisions. (b) Compare the collision theory with transition state theory.
20. Write a note on Over Voltage . Explain the theories Hydrogen Over Voltage.
21. Colloids show different electrokinetic effects. Explain in detail these effects.
22. Write a note on (1) dimerization of anthracene (2) hydrated electrons (3) pulse radiolysis

(2×5=10 weightage)

