



**Part B**

**5 x 6 = 30**

**Answer ALL questions**

**Each answer should not exceed 400 words or two pages**

- 11.a. Evaluate the temperature dependence of Arrhenius equation.  
(or)
- 11.b. Discuss the following i. steric factor ii. transmission coefficient
- 12.a. Summarize the effect of dielectric constant on the rate of reactions in solution.  
(or)
- 12.b. Compare primary and secondary kinetic salt effect.
- 13.a. Derive Langmuir adsorption isotherm.  
(or)
- 13.b. Differentiate chemisorption and physisorption.
- 14.a. Discuss photoelectric effect and Compton effect  
(or)
- 14.b. Describe Eigen values and Eigen functions. List out the postulates of quantum mechanics.
- 15.a. Write the wave function for hydrogen like species. Show that RDF is maximum at  $a_0/Z$ .  
(or)
- 15.b. Explain the first order Perturbation theory.

**Part C**

**5 x 12 = 60**

**Answer ALL questions**

**Each answer should not exceed 800 words or four pages**

- 16.a. Discuss steady state approximation. Derive the mathematical formulation of collision theory.  
(or)
- 16.b. Describe the general characteristics of chain reactions. Derive the kinetics of  $H_2-Br_2$  chain reaction.
- 17.a. Illustrate the relaxations, and top-flow method to study fast reactions.  
(or)
- 17.b. i. Discuss the effect of ionic strength on the rates of reaction between ions in solution. (5)  
ii. Derive Michaelis – Menton equation for enzyme catalysis reaction. (7)
- 18.a. Derive BET adsorption isotherm. Explain its applications.  
(or)
- 18.b. Compare and Contrast the estimation of surface areas of solids by using solution adsorption studies.
- 19.a. Derive Schrodinger wave equation. Explain its significance.  
(or)
- 19.b. Describe the Hermitian properties of operators. Construct the operator for angular momentum.
- 20.a. Construct Schrodinger equation for a particle in a 3D box. Derive its Eigen functions and Eigen values.  
(or)
- 20.b. Discuss the applications of Huckel Molecular Orbital Theory to Butadiene system.

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