

(FOR THE CANDIDATES ADMITTED

23UCY613

DURING THE ACADEMIC YEAR 2023-2024 ONLY)

REG.NO. :

N.G.M.COLLEGE (AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS: MAY 2026

B.SC CHEMISTRY

MAXIMUM MARKS: 75

SEMESTER -VI

TIME: 3 HOURS

PART - III

CHEMICAL KINETICS AND QUANTUM MECHANICS

SECTION – A

(10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.

(K1)

1. The rate law expresses: _____

- a) How the rate depends on temperature
- b) How the rate depends on the concentration of reactants
- c) The half-life of a reaction
- d) The molecularity of a reaction

2. In steady-state approximation, the concentration of intermediates is: _____

- a) Increasing b) Decreasing c) Nearly constant d) Zero

3. In enzyme-catalyzed reactions, V_{max} represents: _____

- a) Maximum substrate concentration b) Maximum rate of reaction
- c) Michaelis constant d) Half-life

4. A heterogeneous catalyst is characterized by: _____

- a) Same phase as reactants b) Different phase from reactants
- c) Being soluble in the reaction medium d) Being consumed during the reaction

5. The Hamiltonian operator represents: _____

- a) Momentum b) Energy c) Position d) Spin

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES

(K2)

6. What do you mean by pseudounimolecular reaction?

7. What is activation energy?

8. What is Langmuir adsorption isotherm?

9. Define Grothus–Draper law.

10. What describes the state of a system?

SECTION – B

(5 X 5 = 25 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.

(K3)

11. a) Differentiate order and molecularity and explain.

(OR)

b) Explain the factors that affect the rate of the reaction.

12. a) Discuss the effect of temperature on rate of the reaction.

(OR)

- b) Compare and contrast ARRT and CT.

13. a) Summarize the effect of pH on the enzyme catalysis reaction.

(OR)

- b) Define and explain chemisorptions and physisorption.

14. a) A monochromatic radiation is incident on a solution of 0.05 M concentration of absorbing substance. The intensity of radiation is decreased to $\frac{1}{4}$ th of the initial value after passing through 10 cm length of solution. Calculate molar extinction coefficient of the substance.

(OR)

- b) Write a note on photosensitization and quenching.

15. a) What do you mean by real and complex functions?

(OR)

- b) Explain the Hamiltonian operator.

SECTION – C

(5 X 8 = 40 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.(K4 (Or) K5)

16. a) Interpret the rate expression for the first order reaction.

(OR)

- b) Illustrate and explain the method of measuring reaction kinetics using volumetric method.

17. a) Elaborate the method of determination of order of the reaction by integral rate expression.

(OR)

- b) Derive an expression for the Lindemann theory of unimolecular reactions.

18. a) Derive the Michaelis–Menten equation for a simple enzyme-catalyzed reaction and explain the significance of K_m and V_{max} .

(OR)

- b) Explain Freundlich adsorption isotherm and give corresponding equation.

19. a) Illustrate and explain Jablonski diagram and various terms involved in it.

(OR)

- b) Discuss the kinetics of H_2 and Br_2 reactions.

20. a) Summarize the postulates of quantum mechanics.

(OR)

- b) Explain the Eigen functions and Eigen values with suitable examples.
