LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **CHEMISTRY**

FIFTH SEMESTER – **APRIL 2023**

UCH 5502 – PHASE EQUILIBRIA AND CHEMICAL KINETICS

Date: 11-05-2023   Dept. No.   Max. : 100 Marks
Time: 01:00 PM - 04:00 PM

PART-A

ANSWER *ALL* QUESTIONS   (10x2=20)

1. State the term component and give examples.

2. What are triple points? Mention the number of degrees of freedom for a system having a triple point.

3. State Nernst distribution law.

4. Write the limitations of Henry's law.

5. What is meant by rate of a reaction?

6. Define a psudo first order reaction.

7. Draw the energy barrier diagram for the reaction $A_2 + B_2 \rightarrow 2AB$ based on transition state theory.

8. What is Arrhenius equation? Mention the terms in it.

9. Write any two properties of catalysts.

10. What is acid-base catalysis? Cite an example.

PART-B

ANSWER ANY *EIGHT* QUESTIONS   (8 X5=40)

11. With a neat phase diagram, discuss the water system.

12. State the reduced phase rule and apply it to any one curve, area and eutectic point of lead-silver system.

13. What is incongruent melting point? Explain using a suitable example with a neat phase diagram.

14. What is Raoult's law? Discuss the positive and negative deviations of Raoult's law.

15. Derive thermodynamically, Nernst distribution law.

16. Explain the effect of temperature on the composition of mixtures of Phenol-water system.

17. Distinguish between order and molecularity with examples.

18. From the following data, show that the decomposition of ammonium nitrate in aqueous solution is first order.

Time(minutes)	10	15	20	15	∞
Volume(cc)	6.25	9.00	11.40	13.65	35.05

19. Describe the Lindemann theory of unimolecular reactions.

20. Write the limitations of Collision theory.

21. Differentiate homogeneous and heterogeneous catalysis with relevant examples.

22. Derive Michaelis-Menten equation for studying the kinetics of enzyme catalysis.

1

PART-C

ANSWER ANY *FOUR* QUESTIONS.   (4 X 10 = 40 MARKS)

23. With a neat phase diagram, discuss the features of ferric chloride-water system.

24. (a) Derive Gibb's Phase rule. (5)

   (b) Explain any two applications of Nernst distribution law. (5)

25. (a) Derive the expression to calculate the molecular mass of a non -volatile solute from depression in freezing point. (6)

(b) Acetone boils at 56.38°C and a solution of 1.41g of an organic solid in 200 g of acetone boils at 56.88°C.If the ebullioscopic constant is 16^oK/mole. Calculate the mass of one mole of the organic solid. (4)

26. (a) Derive an expression for rate constant of a second order reaction, $2A \rightarrow$ Products. (7)

   (b)The half-life of a substance for a first order reaction is 15 minutes. Calculate the rate constant. (3)

27. Explain any four factors affecting the rate of a reaction.

28. Discuss the theories of catalysis in detail.

##############