LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

SECOND SEMESTER – **APRIL 2022**

UCH 5502 – MOLECULAR CELL BIOLOGY

Date: 24-06-2022   Dept. No.   Max. : 100 Marks
Time: 09:00 AM - 12:00 NOON

PART-A

*Answer **ALL** questions.*   (10 x 2 = 20 marks)

1. Define the term component.
2. Write the reduced phase rule equation and mention the terms involved in it.
3. Calculate the osmotic pressure of a 5% solution of sucrose in water at 300 K.
4. What are colligative properties?
5. What is pseudo first-order reaction? Give an example.
6. The time for half change in a first-order decomposition of a substance 'A' is 60 seconds. Calculate the rate constant.
7. What are consecutive reactions? Give an example.
8. How is the ionic strength of the solution related to rate constant of the reaction?
9. What is enzyme catalysis? Give an example.
10. How does pH affect an enzymatic reaction?

PART-B

*Answer any **EIGHT** questions.*   (8 x 5 = 40 marks)

11. State and derive Gibb's Phase rule.
12. Derive Clausius – Clapeyron equation. Mention its applications.
13. Explain the various types of partially miscible liquids with relevant examples.
14. Derive Nernst distribution law.
15. How is the rate constant of the acid-catalyzed hydrolysis reaction of an ester determined?
16. Derive an expression for the rate constant of a second order reaction, $2A \rightarrow$ products.
17. Distinguish between order and molecularity.
18. Explain the mechanism of thermal decomposition of acetaldehyde.
19. Discuss the Lindeman hypothesis of unimolecular reactions.
20. How are Arrhenius parameter (A) and energy of activation (Ea) determined   experimentally?
21. Differentiate homogeneous and heterogeneous catalysis.
22. Discuss on irreversible enzyme inhibitions.

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PART-C

23. Discuss the salient features of phase diagram of water system and identify the triple points by using Gibbs's phase rule.

24. Derive the relation between the depression in freezing point of a solution with the molar mass of the dissolved solute.

25. Draw and explain the positive and negative deviations of the pressure–composition curves for non-ideal solutions.

26. Explain any two methods of determining the order of a reaction.

27. Discuss the collision theory of bimolecular reactions.

28. Derive Michaelis-Menten equation and explain the kinetics of enzyme catalysis.

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