R – 1272

Reg. No. : ....

Name : ....

Sixth Semester B.Sc. Degree Examination, April 2023

First Degree Programme Under CBCSS

Chemistry

Core Course XII

CH 1643 : PHYSICAL CHEMISTRY III

(2020 Admission)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions. Answer in **one** word to maximum **two** sentences. **Each** question carries **1** mark.

1. What is meant by well-behaved wave function?

2. Explain the term micelle.

3. Which type of adsorption involves weak van der Waals forces?

4. What is mean by a complex reaction?

5. Give an example for enzyme catalysis.

6. Define the term K_p.

7. Explain the term 'solubility product'.

8. State phase rule.

9. Give an example for chemiluminescence.

10. Define Raoult's law.

<div align="right">(10 × 1 = 10 Marks)</div>

SECTION – B

Short answer type. Answer any **eight** questions. **Each** question carries **2** marks.

11. Explain the term 'Hermitian operator'.

12. Give the BET equation and specify the terms.

13. State and explain Hardy-Schulze rule.

14. Explain the term order of a reaction.

15. Mention two factors that affect the rates of reaction.

16. All four phases of sulphur cannot coexist in equilibrium under any condition. Why?

17. Mention any two applications of buffer solutions.

18. Explain the term 'degeneracy'.

19. Distinguish between the terms 'triple point' and eutectic point' in phase studies.

20. Comment on the observed quantum yield of the hydrogen-chlorine reaction.

21. What is meant by photosensitization reaction? Give an example.

22. What is meant by steady state approximation?

<div align="right">(8 × 2 = 16 Marks)</div>

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SECTION – C

Short Essay type. Answer **any six** questions. **Each** question carries **4** marks.

23. State and explain the postulates of quantum mechanics.

24. Derive the Henderson's equation for the p^H of an acidic buffer.

25. Discuss the effects of solvents on ionic strength.

26. Give Arrhenius equation and account for the influence of temperature on the reaction rate on the basis of this equation.

27. Briefly explain any two purification methods of colloids.

28. Briefly discuss the postulates of Langmuir's adsorption theory.

29. Explain the terms upper CST and lower CST

30. Discuss the phase diagram of the lead-silver system.

31. Derive the distribution law from thermodynamics

(6 × 4 = 24 Marks)

SECTION – D

Answer **any two** questions. **Each** question carries **15** marks.

32. (a) State Le Chatelier principle and apply it to the equilibrium in the Haber process for the manufacture of NH_3 **7**

    (b) Write note on (i) Fluorescence (ii) Phosphorescence.   **8**

33. Setup the Schrodinger wave equation for a particle in a one dimensional box, solve it and get expression for the energy of electron. Explain the term zero-point energy. Briefly explain one application of the particle-in-a-box model.

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34. (a) Derive the integrated rate equation for first order reaction.　　　　8

　　(b) For the first order reaction, it takes 5 minutes for the initial concentration of 0.6 mol dm^{-3} to become 0.2 mol dm^{-3}. What is the rate constant of the reaction?　　7

35. What are colloidal solutions? Discuss briefly the different classifications of colloidal systems.

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