QP CODE: 25022456

M.Sc DEGREE (CSS) SPECIAL REAPPEARANCE EXAMINATION, APRIL 2025

Third Semester

M.Sc CHEMISTRY

CORE - CH010301 - CHEMICAL KINETICS, SURFACE CHEMISTRY AND CRYSTALLOGRAPHY

2019 ADMISSION ONWARDS

D76EBE14

Time: 3 Hours

Part A (Short Answer Questions)

Answer any eight questions.

Weight 1 each.

- 1. What is free energy of activation ΔG^{\ddagger} ? Give its significance with respect to deciding the rate of the reaction.
- 2. Explain steady state approximation using an example.
- 3. With the help of an example, explain secondary salt effect.
- 4. Give the salient features of oscillating reactions.
- 5. What you meant by anionic surfactant? Write two examples.
- 6. What are the main applications of LEED in surface studies?
- 7. Write a note on flash desorption.
- 8. Write a short note about streaming potential.
- 9. What is space group?
- 10. Explain the different types of liquid crystals with examples.

(8×1=8 weightage)

Part B (Short Essay/Problems)

Answer any six questions.

Weight 2 each.

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- 11. Compare transition state and collision theories.
- 12. Explain prototropic mechanism of acid-base catalysis.



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- 13. What is Gibbs equation? Explain.
- 14. Explain the applications of Auger electron spectroscopy and Photo electron spectroscopy in surface studies.
- 15. What are macromolecules? Explain the determination of molecular mass using number average method.
- 16. Deduce the structure of NaCl by powder crystal method.
- 17. An enzyme catalyzed reaction at 298K has Michealis constant of 0.055 molL⁻¹. At a substrate concentration of 0.5 molL⁻¹, the reaction rate is found to be 5.25 mol L⁻¹ s⁻¹. Calculate the maximum velocity?
- 18. . 0.106 mg of stearic acid ($M = 284 \text{ g mol}^{-1}$) is found to cover 500 cm² of water surface at the point where surface pressure just begins to rise sharply. Estimate the cross sectional area "a", per stearic acid molecule and thickness "t", of the surface film of stearic acid on water. Density of stearic acid = 0.85 g cm⁻³

(6×2=12 weightage)

Part C (Essay Type Questions)

Answer any **two** questions. Weight **5** each.

- 19. What are chain reactions? Arrive at the rate constant for the photochemical reaction of H_2 -Cl₂.
- 20. Discuss the mechanisms of cationic and anionic polymerization.
- 21. Explain the principle of Surface Enhanced Raman Scattering. What are the applications of SERS in surface chemistry?
- 22. Highlight the salient features of powder crystal method and rotating crystal method. Which one is better and why?

(2×5=10 weightage)