

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2024
(Regular/Improvement/Supplementary)

CHEMISTRY
FCHE1C04 – THERMODYNAMICS, KINETICS AND CATALYSIS

Time: 3 Hours**Maximum Weightage: 30****Section A: Short answer. Answer any *eight* questions. Each carries *one* weightage.**

1. Explain Nernst heat theorem.
2. Why the study of thermodynamic excess functions is important?
3. Define fluxes and forces with reference to irreversible processes.
4. Give your understanding on streaming potential.
5. Write the importance of residual entropy in thermodynamics of a system.
6. Illustrate autocatalysis with an example.
7. Discuss primary kinetic salt effect.
8. Give an application of phase transfer catalysis with a brief explanation.
9. Draw a typical adsorption isotherm and explain.
10. Define Michaelis - Menten constant.
11. What is cage effect?
12. Differentiate between adsorption isotherm and adsorption isobar.

(8 × 1 = 8 weightage)

Section B: Short essay questions. Answer any *four* questions. Each carries *three* weightage.

13. Derive BET Adsorption isotherm.
14. Explain thermo molecular pressure difference and thermo mechanical effect.
15. Derive an expression for determining the surface area of adsorbent using Langmuir unimolecular theory of adsorption.
16. Show that absolute zero of temperature is unattainable.
17. Derive an expression for entropy production in a one component system due to heat flow.
18. Discuss Lindemanns theory of unimolecular reactions.
19. Explain how shape of PES governs the efficiencies of reactive collisions.

(4 × 3 = 12 weightage)

(P.T.O.)

Section C: Essay questions. Answer any *two* questions. Each carries *five* weightage.

20. Explain Rice-Herzfeld mechanism with thermal decomposition of acetaldehyde and ethane.
21. Discuss Onsager reciprocal relations and their applications.
22. Give a detailed account on the activated complex theory with the help of statistical mechanics.
23. Explain Langmuir - Hinshelwood mechanism of bimolecular surface reactions.

(2 × 5 = 10 weightage)