

**FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2023**  
**(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. What is the need of third law of thermodynamics?
2. Write and explain the Glansdorf-Pregogine equation.
3. What are phenomenological relations?
4. Explain the term thermal diffusion.
5. Differentiate between steady state and equilibrium conditions.
6. What are molecular beams?
7. Explain the term surface acidity.
8. What is Michaelis-Menten constant? Explain its significance.
9. Explain autocatalysis with an example.
10. What are potential energy surfaces?
11. Explain phase transfer catalysis with example.
12. Elaborate on the method of flame hydrolysis for the preparation of heterogeneous catalysts.

**(8 × 1 = 8 weightage)**

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

13. State Duhem-Margules equation and discuss its applications.
14. Define electrokinetic effects. Rationalize any one electrokinetic effect from irreversible thermodynamics.
15. State and explain Onsager reciprocal relations.
16. State and explain Lindemann's theory of unimolecular reactions.
17. Explain the thermodynamic aspects of activated complex theory.
18. How are the kinetics of fast reactions explained using relaxation methods?
19. Explain the methods for determination of surface acidity.

**(4 × 3 = 12 weightage)**

**(P.T.O.)**

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

20. a) What are partial molar quantities? Explain.  
b) Discuss the determination methods of partial molar volume.
21. Discuss the effect of solvent and ionic strength on kinetics of reactions in solution.
22. Explain various methods for the determination of surface area of adsorbents.
23. What are oscillating reactions? Describe various mechanisms for oscillating reactions.

**(2 × 5 = 10 weightage)**