

**FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2022**  
**(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 residual entropy? Give examples.
2. Explain the term local equilibrium? What is its significance?
3. Define activity and activity coefficient.
4. What are excess thermodynamic functions? Give examples.
5. What is secondary salt effect?
6. Elaborate on diffusion-controlled reactions.
7. Explain briefly the TDP method to determine surface acidity.
8. Write Rice -Ramsperger and Kassel (RRK) model for unimolecular reactions.
9. What are potential energy surfaces?
10. Briefly discuss polymer supported catalysis.
11. Explain briefly the methods for the preparation of silica supports.
12. What is nano-catalysis?

**(8 × 1 = 8 weightage)**

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

13. Rationalize thermal diffusion using irreversible thermodynamics.
14. What are partial molar quantities? Explain the method for determination of partial molar volume.
15. Derive Gibbs Duham equation.
16. Briefly discuss the mechanism of oscillating reactions using Lotko -Volterra model?
17. Explain the kinetics and mechanism of oxidation of CO on solid surface.
18. What is the effect of ionic strength on rate of reactions in solution?
19. Explain the term reaction co-ordinate with the help of potential energy surfaces.

**(4 × 3 = 12 weightage)**

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

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

20. Discuss the theory of branching chain reactions.
21. What are the assumptions of activated complex theory? Derive the equation for rate constant using activated complex theory.
22. Derive an equation for the rate of entropy production in one component system in terms of forces & fluxes for heat and matter transfer.
23. Derive BET adsorption isotherm. Explain the limiting conditions where BET isotherm limits to Langmuir adsorption isotherm.

**(2 × 5 = 10 weightage)**