25P113 (Pages: 2) Name: .....

Reg.No: .....

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2025

(CBCSS - PG)

(Regular/Supplementary/Improvement)

CC19PCHE1C04 - THERMODYNAMICS, KINETICS AND CATALYSIS

(Chemistry)

(2019 Admission onwards)

Time : 3 Hours Maximum : 30 Weightage

Section A

Answer any ***eight*** questions. Each question carries 1 weightage.

1. Explain the term work function.
2. Explain Gibbs-Helmholtz equation.
3. Explain Onsager's reciprocal relations.
4. What is thermo-osmosis?
5. What is meant by chain retardation? Explain using an example.
6. Explain the shock-tube method to study the kinetics of fast reactions.
7. How does the charge on reactants influence the change in rate constant with change in ionic strength?
8. Give the scheme proposed by Lindemann for the kinetic study of unimolecular reactions.
9. Explain heat of adsorption.
10. Give one method for the preparation of heterogeneous catalyst.
11. Explain the oscillating reaction with a suitable example.
12. Give three examples for biocatalysis.

(8 × 1 = 8 Weightage)

Section B

Answer any ***four*** questions. Each question carries 3 weightage.

13. Derive the Gibbs-Duhem equation.
14. Explain excess thermodynamic functions.
15. Derive the expression for volume of activation.

16. Discuss the concept of potential energy surface for a bimolecular reaction.
17. Derive Langmuir's adsorption isotherm,
18. Write a note on catalysis. What is the role of catalyst in a reaction?
19. Explain Eley Rideal mechanism.

(4 × 3 = 12 Weightage)

Section C

Answer any ***two*** questions. Each question carries 5 weightage.

20. Discuss the theorem of minimum entropy production due to heat flow.
21. Discuss the general kinetic scheme for a branching chain reaction. Explain the explosion limits based on pressure taking H_2-O_2 chain reaction as an example.
22. Derive and verify the BET equation.
23. Explain the following (a) nanocatalysis and (b) polymer supported catalysis.

(2 × 5 = 10 Weightage)

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