QP Code: P25DRIS028

Reg. No : ....
Name : ....

ST MARY'S COLLEGE (AUTONOMOUS), THRISSUR-20

I SEMESTER (CBCSS-PG) DEGREE EXAMINATIONS, NOVEMBER 2025
(Regular/Improvement/Supplementary)
M. Sc. Chemistry
CHE1C04 : THERMODYNAMICS, KINETICS, AND CATALYSIS
2024 Admission Onwards

Time: 3 Hours **Maximum Weightage: 30**

Section A

Answer **any eight** questions. Weightage **1** for each. **(8x1 = 8 Weightage)**

1. Discuss Duhem Margules equation.
2. Define excess entropy.
3. Differentiate ideal and non-ideal solutions.
4. State and explain entropy production in irreversible process.
5. Discuss the term force and fluxes.
6. Discuss phenomenological law and phenomenological co-efficient in coupled flow.
7. What are chain reactions? Explain the different steps of chain reaction.
8. Distinguish the two limits of diffusion-controlled reactions.
9. Apply adsorption at surfaces to differentiate it from absorption.
10. Examine biocatalysis and give one advantage of using enzymes over traditional catalysts.

Section B

Answer **any six** questions. Weightage **2** for each. **(6x2 = 12 Weightage)**

11. What is meant by chemical potential? Explain the variation of chemical potential with temperature and pressure.
12. Discuss third law of thermodynamics and determination of absolute entropies.
13. Evaluate thermo molecular pressure difference and electrokinetic effect.

Turn Over

14. Examine thermal osmosis and thermal diffusion.

15. Analyse the branching chain explosion using H_2 and O_2.

16. Evaluate and discuss potential energy surface.

17. Explain
    (a) Surface acidity.
    (b) Temperature programmed desorption.

18. Discuss sol-gel method of preparation of catalysts.

Section C

Answer **any two** questions. Weightage **5** for each. **(2x5 = 10 Weightage)**

19. Compare Langmuir-Hinshelwood surface catalyzed reactions. How would you identify the mechanism under a guess set of conditions?

20. Analyse the BET theory of multilayer adsorption and derive the equation.

21. Analyze the collision theory in detail.

22. Evaluvate the primary and secondary salt effects in solution kinetics.

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