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Name.....

Reg. No.....

**FOURTH SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY)
EXAMINATION, APRIL 2026**

(CBCSS)

Chemistry

CHE 4E 05—INDUSTRIAL CATALYSIS

(2019 Admission onwards)

Time : Three Hours

Maximum : 30 Weightage

Part A*Answer any **eight** questions.**Each question carries a weightage of 1.*

1. Why is chemisorption usually irreversible ?
2. What are geometric factors in catalysis ?
3. Compare catalyst activation and pre-activation.
4. Compare coke formation and metal deposition.
5. Define liquid-liquid phase transfer catalysis.
6. Why are enzymes highly specific ?
7. Define syngas conversion.
8. Why are palladium catalysts effective in oxidation reactions ?
9. How does temperature affect physisorption ?
10. Define semiconductor catalyst.

(8 × 1 = 8 weightage)

Turn over

Part B

*Answer any **six** questions.*

Each question carries a weightage of 2.

11. Describe the variation of the heat of adsorption with surface coverage.
12. Illustrate the Eley-Rideal mechanism with a suitable example.
13. Discuss crystal growth during zeolite synthesis.
14. Analyze the role of temperature in catalyst sintering.
15. Explain the use of dual catalysts in phase transfer reactions.
16. Discuss the effect of enzymes on reaction rate.
17. Discuss the process and importance of hydrocracking in petroleum refining.
18. Explain the role of metallocene catalysts in propene polymerization.

(6 × 2 = 12 weightage)

Part C

*Answer any **two** questions.*

Each question carries a weightage of 5.

19. (a) Explain the BET adsorption isotherm in detail and discuss its importance in surface area determination.
(b) Analyze the kinetics of heterogeneous catalysis with and without diffusion effects.
20. (a) Compare ZSM₅ and ZSM₁₁ with respect to structure and catalytic performance.
(b) Discuss industrial examples of catalyst poisoning and regeneration.
21. (a) Explain the role of phase transfer catalysis in environmentally friendly organic synthesis.
(b) Explain immobilized biocatalysts and their industrial applications.
22. (a) Explain the application of catalysis in automobile emission control.
(b) Explain hydroformylation and carbonylation reactions with mechanisms.

(2 × 5 = 10 weightage)