A–0995

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MCH-601

M.Sc. Chemistry (MSCCH)

Reaction Mechanism and Pericyclic Reaction

Examination February, 2026

Time : 2:00 Hrs. Max. Marks : 35

Note* :–** This paper is of Thirty Five (35) marks divided into Two (02) Sections 'A' and 'B'. Attempt the questions contained in these Sections according to the detailed instructions given therein. ***Candidates should limit their answers to the questions on the given answer sheet. No additional (B) answer sheet will be issued.

Section–A

(Long Answer Type Questions) (2×9½=19)

***Note* :–** Section 'A' contains Five (05) Long-answer type questions of Nine and Half (9½) marks each. Learners are required to answer any *two* (02) questions only.

1. Explain the mechanisms of E1 and E2 elimination reactions. Discuss the anti-periplanar requirement in E2 reactions and how it affects the formation of cis/trans alkenes.

2. Explain the classification of pericyclic reactions. Discuss the stereochemistry of pericyclic reactions with reference to conrotatory and disrotatory modes in electrocyclic reactions.

3. Discuss the concept of reaction intermediates. Explain the formation, structure, and stability of carbocations, carbanions, and free radicals with suitable examples.

4. Explain the concept of molecular orbitals (MOs) and their symmetry properties in the context of pericyclic reactions. Discuss how the symmetry of frontier molecular orbitals (HOMO and LUMO) governs the stereochemistry and feasibility of the Cycloaddition reactions.

5. Define the concept of neighbouring group participation (NGP). Discuss the effect of neighbouring group participation on the rate of reaction and the stereochemistry of the product.

Section–B

(Short Answer Type Questions) (4×4=16)

***Note* :–** Section 'B' contains Eight (08) Short-answer type questions of Four (04) marks each. Learners are required to answer any *four* (04) questions only.

1. Describe the Pinacol-Pinacolone rearrangement in detail. Explain the mechanism with a suitable example.

2. Define a sigmatropic rearrangement. Give an example of a [3, 3]-hydrogen shift and explain the movement of atoms.

3. Predict the major product in the elimination of 2-bromo-3-methylbutane with alcoholic KOH and explain the reason using Saytzeffs rule.

4. What is a benzyne intermediate, and how is it generated in nucleophilic aromatic substitution reactions ?

5. Define a thermal cycloaddition reaction and give one example of a [4+2] cycloaddition.

6. Explain any one rearrangement reaction in which a carbocation intermediate undergoes alkyl group migration.

7. Explain the difference between conrotatory and disrotatory ring closure in electrocyclic reactions with an example.

8. Define the carbene reaction intermediate and discuss their stability factors.

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