



MSc DEGREE (CSS) EXAMINATION, DECEMBER 2025

First Semester

Core Courses - CH500102 - STRUCTURAL AND MOLECULAR ORGANIC CHEMISTRY

M Sc CHEMISTRY, MSc POLYMER CHEMISTRY, MSc ANALYTICAL CHEMISTRY, MSc APPLIED CHEMISTRY, MSc PHARMACEUTICAL CHEMISTRY

2019 Admission Onwards

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Time: 3 Hours

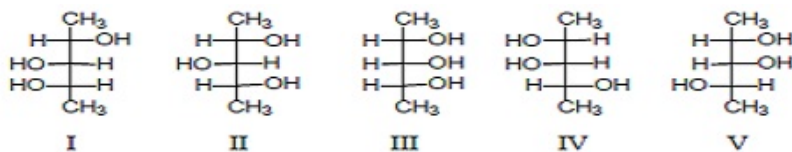
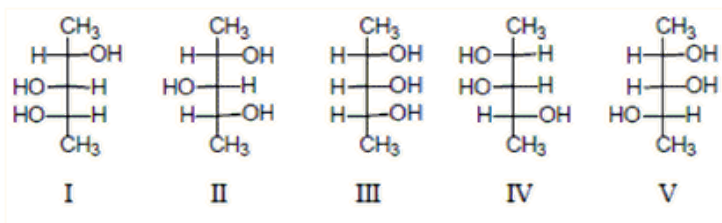
Weightage: 30

Part A (Short Answer Questions)

Answer any **eight** questions.

Weight 1 each.

- What is hybridisation?
- Explain the acidity of the following compounds $\text{FCH}_2\text{-COOH}$, $\text{BrCH}_2\text{-COOH}$, $\text{ICH}_2\text{-COOH}$, $\text{ClCH}_2\text{-COOH}$
- Explain the term kinetically controlled product.
- What is Norrish type I reaction?
- Comment on the chirality of 2-Chloropropane and 2-Chlorobutane.
- Which structure(s) represent(s) diastereomer of **1**?



- How NMR can be used as a tool to distinguish enantiotopic molecules?
- The energy barriers in ethyl halides (Et-X) are similar in magnitude irrespective of the size of the halogen. Why?





9. Discuss briefly upon the conformational analysis of lactose.
10. S_N1 pathway predominates in 2° and 3° alcohols. Explain.

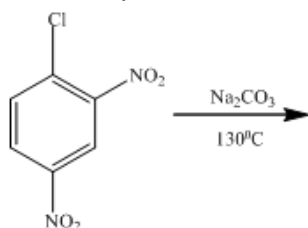
(8×1=8 weightage)

Part B (Short Essay/Problems)

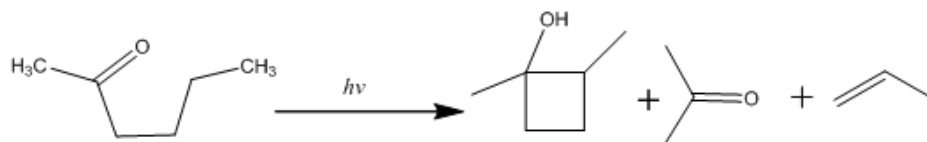
Answer any **six** questions.

Weight 2 each.

11. How NMR spectroscopy is used as a tool for aromaticity?
12. Give a brief account of the mechanism of saponification of esters.
13. Explain the mechanism of photo Fries rearrangement.
14. What characterizes helical enantiomers? Elaborate on the assignment of configurational nomenclature to these molecules, including relevant examples.
15. Give an account of the optical activity of ansa and cyclophanic compounds with suitable examples.
16. Out of cis and trans isomers of 4-t-butyl cyclohex-1-yl tosylate, which one will undergo a faster elimination reaction with $C_2H_5ONa/EtOH$?
17. Predict the product of the reaction and suggest a mechanism



18. Explain the mechanism of the following reaction



(6×2=12 weightage)

Part C (Essay Type Questions)

Answer any **two** questions.

Weight 5 each.

19. a) What are annulenes? How do [10], [14], and [18] annulenes related to the Huckel rule?
b) How NMR spectroscopy can be treated as a tool for aromaticity
20. a) Describe the Hammett equation, the importance of Hammett parameters and explain why Hammett equation is a linear free energy relationship?
b) Discuss in detail the power of Hammett plots in deciphering mechanisms.
21. a) Write a note on the important photochemical reactions of butadiene
b) Describe the photochemistry of Vision.





22. a) Explain the techniques used to convert geometrical isomers, providing relevant examples.
b) Discuss the significance of IR and UV spectroscopy in analyzing cis-trans isomerism, citing examples to illustrate their utility.

(2×5=10 weightage)

