**D1ACH2403** **(2 Pages)** **Name.....**
**Reg.No.....**

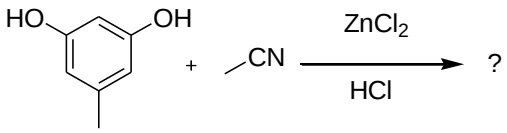
**FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2024**
**(Regular/Improvement/Supplementary)**

**CHEMISTRY**
**FCHE1C03- STRUCTURE AND REACTIVITY OF ORGANIC COMPOUNDS**

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

**Section A: Short answer questions. Answer *any eight* questions. Each carries 1 weightage.**

1. Is pentalene aromatic, antiaromatic or non-aromatic? Justify your answer.
2. Identify the product of the following reaction.




3. What is primary kinetic isotope effect?
4. The bridgehead adamantyl tosylate does undergo $S_N1$ reaction extremely slowly and it does not undergo $S_N2$ reaction. Validate this statement.
5. Write the debromination products obtained when *meso*-stilbene dibromide is treated with KI.
6. Distinguish between homotopic and enantiotopic hydrogens.
7. What is meant by prochiral carbon? Give an example for a molecule with such carbon.
8. Identify and sketch the *Re*- and *Si*- faces of 2-butanone.
9. What are chiral auxiliaries? Give any two examples.
10. Illustrate the role of BINAL-H as chiral reagent.
11. Define optical purity. What are the essential conditions for optical activity?
12. What is meant by the term resolution? Mention any two methods for resolution.

**(8 x 1 = 8 weightage)**

**Section B: Short essay questions. Answer *any four* questions. Each carries 3 weightage.**

13. Explain aromaticity in fulvenes and fulvalenes.
14. Discuss Taft equation and its advantages over Hammett equation.
15. Discuss the stereochemistry of fused, bridged and caged ring systems.

**(P.T.O.)**

16. Using conformational arguments, compare and explain the course and rate of reactions in esterification of methanol, isomenthol, neomenthol, and neoisomenthol.
17. What is meant by enantiomeric excess and how is it determined? The (+) enantiomer of compound A has an optical rotation of $125^0$. If a pure sample of compound A has an optical rotation of $100^0$, what is the composition of the sample?
18. What is chiral pool? Illustrate with a suitable example. What is its significance relation in to asymmetric synthesis?
19. Predict the major product obtained when:
    i) $IPCBH_2$ reacting with *(E)*-2-butene; (ii) $IPC_2BH$ reacting with *(Z)*-2-butene.

**(4 x 3 = 12 weightage)**

**Section C: Essay questions. Answer *any two* questions. Each carries 5 weightage.**

20. Discuss the addition-elimination and benzyne mechanism of nucleophilic aromatic substitution reactions with suitable examples.
21. i) What do you mean by Linear Free Energy Relationship? Explain what can be learnt from Hammett's parameters about mechanism of a reaction and influence of substituents on it.
    ii) Curtin- Hammet principle and its significance.
22. i) Discuss the internal factors affecting the stability of molecules.
    ii) Draw the different conformations of decalins and explain.
23. i) Predict the different products formed from the four diastereomeric 2-bromo-4-phenylcyclohexanols when treated with base or $Ag_2O$.
    ii) Discuss the effect of conformation on $S_N1$ and $S_N2$ reactions of equatorial leaving groups in flexible and rigid cyclohexanes.

**(2 x 5 = 10 weightage)**