D1ACH2303 **(2 Pages)** **Name.....**
Reg.No.....

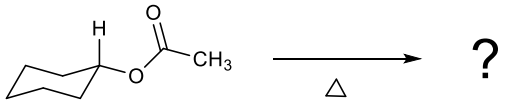
FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2023
(Regular/Improvement/Supplementary)

CHEMISTRY
FCHE1C03- STRUCTURE AND REACTIVITY OF ORGANIC COMPOUNDS

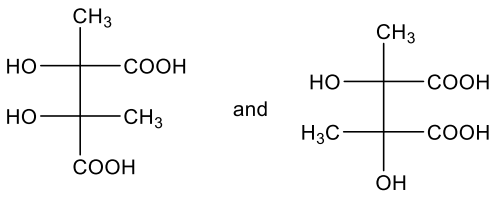
Time: 3 Hours **Maximum Weightage: 30**

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

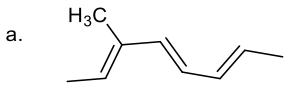
1. Cyclopentadiene has a pKa value 15, which is quite high for a hydrogen bonded to a sp^3 carbon atom. Account.
2. What is HSAB principle? Explain with suitable examples.
3. Explain conformational stability of *cis*- and *trans*-decalins.
4. What is meant by steric assistance? Explain with suitable examples.
5. What is Hammond's postulate? Draw potential energy diagram for a slow endothermic reaction.
6. What are the destabilizing interactions present in axially substituted cyclohexanes?
7. Predict the product and explain its conformational stability of the following reaction.

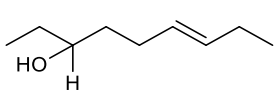


8. Among menthol and neomenthol, which one is more reactive in esterification reaction? Rationalize.
9. Predict the *R* & *S* for the following molecules and find out the relation of these molecules.



10. Name the following molecules with correct stereochemistry.

a. 

b. 

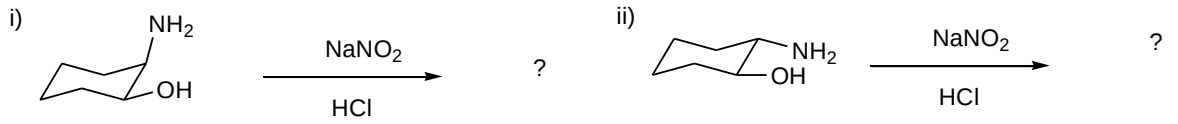
(P.T.O.)

11. What is meant by *pro R* and *Pro S*? Explain with suitable examples.
12. What is chiral pool? Give examples for chiral pool from the nature.

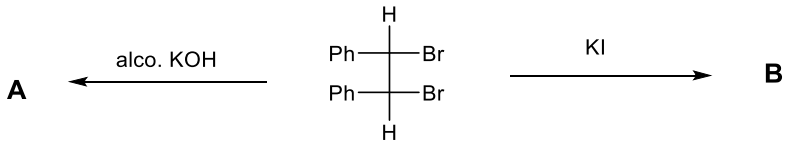
(8 x 1 = 8 weightage)

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

13. State and explain Bredt's rule. Will 1-bromo bicyclo [2,2,1] heptane undergo elimination? Justify your answer.
14. Discuss addition–elimination and elimination-addition mechanisms of aromatic nucleophilic substitution reactions with suitable examples.
15. Illustrate the terms kinetic and thermodynamic control with suitable examples.
16. What is atropisomerism? Explain with suitable examples.
17. Explain asymmetric aldol reaction by Zimmerman-Taxler model.
18. Giving conformational analysis and mechanism, find out the products of the following reactions.



19. Predict the products **A** and **B** in the following reactions and justify your answer.



(4 x 3 = 12 weightage)

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

20. Discuss the application of perturbation theory to benzenoid systems.
21. a) Discuss the conformational isomerism in dimethyl cyclohexanes.

    b) How will you account for the conformational stability of 1,3-dihydroxy cyclohexanes.
22. Illustrate the concept of asymmetric induction and the prediction of stereochemical outcome with Felkin – Ahn model with an appropriate example.
23. a) Explain primary and secondary isotope effects.

    b) Deriving Hammet and Taft equations, discuss the significances of σ and ρ parameters.

(2 x 5 = 10 weightage)