D 52780 **(Pages : 2)** **Name.....**

Reg. No.....

FIRST SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY) EXAMINATION, NOVEMBER 2023

(CBCSS)

Chemistry

CHE 1C 03—STRUCTURE AND REACTIVITY OF ORGANIC COMPOUNDS

(2019 Admission onwards)

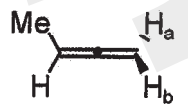
Time : Three Hours Maximum : 30 Weightage

Section A

Answer any **eight** *questions.*

Each question carries 1 *weightage.*

1. To which category does cyclopentadienyl radical belong - aromatic, anti-aromatic, homo-aromatic or non-aromatic ?
2. Which has a larger pK_a value - cyclopentadiene or cycloheptatriene ?
3. Illustrate a reaction where a hydroxyl group acts as a neighbouring group to produce an epoxide.
4. Arrange in the order of increasing stability for the conformational isomers of cyclohexane - boat, chair and twist boat.
5. Cis-4-t-Bu-cyclohexanol undergoes oxidation faster than trans-4-t-Bu-cyclohexanol. Why ?
6. Predict the product formed when l-bromo-l-methyl cyclopentane is reacted with tert-butoxide anion in DMF solvent ?
7. Designate the topicity of H_a and H_b in :



8. Depict the Fischer projection of R-alanine [Alanine is CH (CH_3) (NH_2) (CO_2H)].

Turn over

9. What product is formed when 2(R)-hydroxy pentane is treated with thionyl chloride ?

10. Depict the structure of IPC_2BH.

(8 × 1 = 8)

Section B

Answer any **six** *questions.*

Each question carries 2 *weightage.*

11. Illustrate the substitution and elimination product obtained by action of methanol on l-chloro-l-phenyl cyclopentane.

12. Which has higher dipole moment and why - 2, 3-diphenyl cyclopropenone or 2, 3-diphenyl cyclobut-2-enone.

13. Arrange the following in increasing order of basicity : pyrrole, indole, pyridine and piperidine.

14. Give an example of a molecule possessing diastereotopic hydrogens.

15. Specific rotation of a mixture of 2-bromobutanes is – 9.2° (R)-bromobutane has a specific rotation of – 23.1° . How much % R and % S enantiomer is there in the mixture ?

16. What product is formed when trans-2-chlorocyclohexanol is treated with a base ?

17. Illustrate the Sharpless asymmetric epoxidation reaction.

18. Illustrate the structure of a catalyst which can do asymmetric reductions.

(6 × 2 = 12)

Section C

Answer any **two** *questions.*

Each question carries 5 *weightage.*

19. Predict the major and minor products formed by the reaction of α-phenyl propionaldehyde with methyl magnesium bromide.

20. Considering the base hydrolysis of esters as an example, explain the Hammett equation, and the significance of reaction constant and substitution constant.

21. Give the structures of : (i) Cis-decalin ; (ii) (1R, 2S, 5R)-2-Isopropyl-5-methylcyclohexanol ; and (iii) Bicyclo[2.2.2]octane ; (iv) A R-allene ; and (v) A chiral biphenyl compound.

22. How are asymmetric reactions classified ? Give examples of any *two* classes.

(2 × 5 = 10)