Sl. No.

21ICH1C2L

M.Sc. I Semester Degree Examination, April/May - 2023

Industrial Chemistry

Paper No. DSC 2 : Theoretical Organic Chemistry

Time : 3 Hours

Maximum Marks : 70

Note : (i)   Answer **any five** of the following questions with question No.**1 compulsory**.

(ii)   **All** questions carry **equal** marks.

1.   (a)   Explain the terms hyperconjugation and tautomerism by taking suitable examples.   **4+3+3+4=14**
     (b)   Explain the aromaticity of azulenes.
     (c)   What are the criteria for the compounds to be aromatic ?
     (d)   Discuss the aromaticty in tropyllium cation and cyclopentadienyl anion.

2.   (a)   Discuss the conformational analysis of butane.   **5+5+4=14**
     (b)   Give an account on optical activity in biphenyls and spiranes.
     (c)   By taking suitable examples, explain the terms enantiomers, diastereomers and epimers.

3.   (a)   Discuss the mechanism and stereochemistry of S_N1 and S_N2 reactions. **5+5+4=14**
     (b)   Discuss how isotope labelling and stereochemical evidence methods are useful for the determination of reaction mechanism.
     (c)   Outline two methods for the generation of carbenes and give two reactions involving carbine as reaction intermediate.

4.   (a)   Predict the product with possible mechanism :   **4+6+4=14**
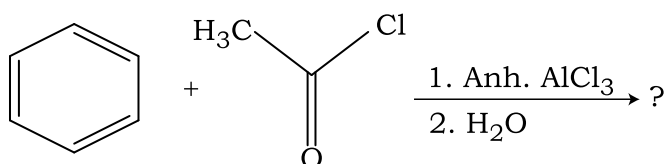
     (b)   Write brief notes on malonic ester synthesis and Strecker synthesis of amino acids.
     (c)   Write the product and propose plausible mechanism :
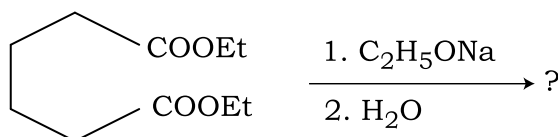
5. (a) Draw the molecular orbital diagram of 1,3,5-hexatriene and label HOMO and LUMO under both thermal and photochemical condition along with its symmetry. **5+5+4=14**

(b) Write the product with mechanism and name the reactions :

(i)

$\xrightarrow{\Delta}$?

(ii)

$\xrightarrow{\Delta}$?
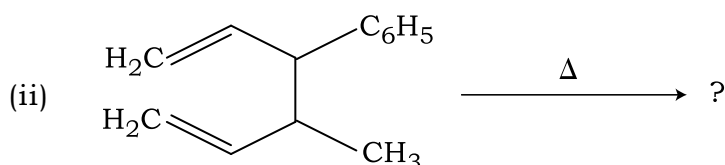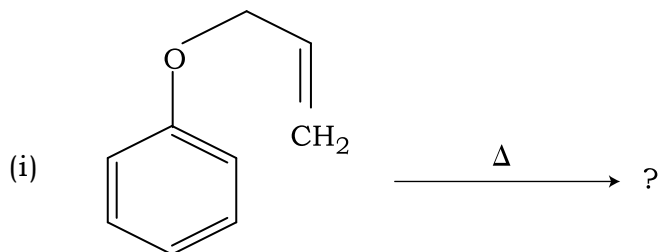
(c) Write a note on chelotropic reactions.

6. (a) With illustrative examples, discuss the geometrical isomerism in aldoximes and ketoximes. **5+5+4=14**

(b) Write a note on generation, stability and reactions of carbanions.

(c) Assign R or S configuration to the following compounds :

(i)

(ii)
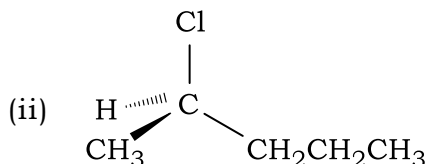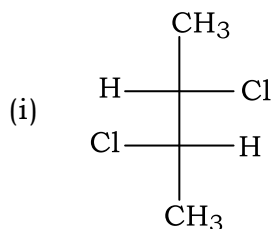
7. (a) Discuss the mechanism of following reactions : **6+4+4=14**
   (i)   Michael addition   (ii)   Wittig reaction

(b) Account on Curtin-Hammett principle.

(c) Explain Baeyer-Villiger reaction taking suitable example.

8. (a) [1,3] hydrogen shift cannot occur under thermal condition but [1,3] carbon shift can occur under thermal condition. Explain. **5+5+4=14**

(b) Discuss cyloaddition reactions of 4n and 4n+2 systems by taking suitable examples.

(c) Account on Suzuki coupling reaction.

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