

**2023**  
**B.A./B.Sc.**  
**Sixth Semester**  
CORE – 14  
**CHEMISTRY**  
*Course Code: CHC 6.21*  
(Organic Chemistry - V)

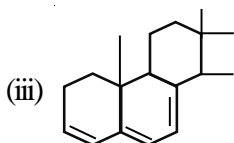
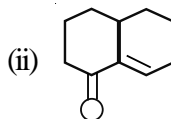
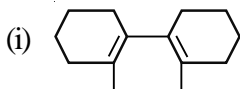
Total Mark: 70  
Time: 3 hours

Pass Mark: 28

Answer five questions, taking one from each unit.

**UNIT-I**

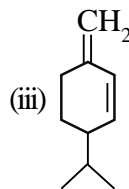
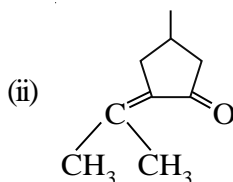
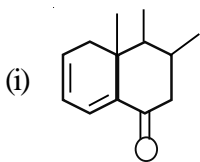
1. (a) Explain the following terms: 2×3=6  
(i) Chromophore (ii) Auxochrome  
(iii) Bathochromic shift
- (b) On the basis of Woodward rules calculate the absorption maximum ( $\lambda_{\max}$ ) of the following compound: 2×3 = 6



- (c) Write the application of UV spectroscopy. 2
2. (a) Explain types of fundamental vibrations. 4  
(b) A compound with molecular weight 130 gave a negative iodoform test. In its IR spectrum the various bands are at 3042, 2941, 2862, 2740, 1722, 1605, 1575, and 1462  $\text{cm}^{-1}$ . Write the structural formula of the compound. 4

(c) Calculate the  $\lambda_{\max}$  of the following compounds:

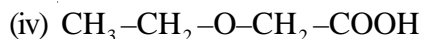
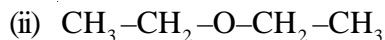
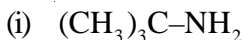
2×3=6



## UNIT-II

3. (a) How many NMR signals would you expect from the following?

1×4=4



(b) An organic compound with molecular formula  $\text{C}_3\text{H}_8\text{O}$  gives the following NMR data

(i) Three proton triplet (9.1  $\tau$ )      (ii) Two proton sextet (8.45  $\tau$ )

(iii) Two proton triplet (6.4  $\tau$ )      (iv) One proton singlet (7.7  $\tau$ )

Assign the name of the compound.

4

(c) An organic compound with molecular formula  $\text{C}_8\text{H}_8\text{O}$  gives the following NMR data

(i) multiplet 2.72  $\tau$  (5H)

(ii) doublet 7.2  $\tau$  (2H)

(iii) triplet 0.22  $\tau$  (1H)

Give the structural formula of the compound.

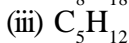
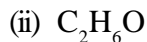
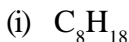
4

(d) Which type of nuclei show magnetic properties for the purpose of NMR spectroscopy?

2

4. (a) Predict the structural formula for the compounds with the following formulae showing one NMR signal each.

1×4=4



(b) An organic compound with molecular formula  $\text{C}_6\text{H}_{12}\text{O}_2$  gave the following NMR data

(i) singlet 1.18  $\tau$  (6H)

(ii) singlet 2.18  $\tau$  (3H)

(iii) singlet 2.68  $\tau$  (2H)

(iv) singlet 3.98  $\tau$  (1H)

Give the structural formula of the compound.

5

- (c) How will you distinguish inter and intra-molecular hydrogen bonding from NMR spectra? 2
- (d) How many NMR signals are expected for the following compounds? 1×3=3
- (i)  $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-Br}$
- (ii)  $\text{CH}_3\text{-CHCl-CO-CH}_3$
- (iii)  $\text{CH}_3\text{-CHO}$

### UNIT-III

5. (a) How will you convert the following? 5
- (i) Aldopentose to aldohexose
- (ii) Aldohexose to aldopentose
- (b) Write a short note on mutarotation. 3
- (c) Starting with glucose, how will you prepare 6
- (i) Sorbitol (ii) Gluconic acid
- (iii) Glucose phenylhydrazone
6. (a) What are carbohydrates? How are they classified? 1+3=4
- (b) Write the Haworth projection formula for (+) sucrose and (+) maltose. 4
- (c) Establish the structure of glucose. 6

### UNIT-IV

7. (a) Write the synthesis of methyl orange. Give its structure in acid and alkali solution. Write its uses. 3+2+1=6
- (b) Outline the synthesis of the following dyes: 2×3=6
- (i) Rosaniline (ii) Crystal violet
- (c) How are dyes classified? Give an example of each class of dyes. 2
8. (a) Write the synthesis of phenolphthalein and give its benzenoid and quinonoid structure and write its uses. 3+2+1=6
- (b) Write the structure elucidation and synthesis of alizarin. 6
- (c) What are chromophores? Give examples of the chromophores. 2

### UNIT-V

9. (a) Write the mechanism for anionic and free radical addition polymerization reaction. 3+3=6

(b) Define thermoplastic and thermosetting polymers with two examples each. 2+2=4

(c) In a polymer samples 30% molecules have a molecular mass 20,000, 40% have molecular mass 30,000 and the rest have 60,000.

Calculate weight average and number average molecular mass. 4

10. (a) Explain the following with examples: 3×3=9

(i) Addition polymerization

(ii) Condensation polymerization

(iii) Synthetic rubber

(b) Write a short note on vulcanization of rubber. 2

(c) Write the synthesis of Buna-S rubber and its uses. 3

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