

[This question paper contains 4 printed pages.]

Sr. No. of Question Paper : 812 E Your Roll No.....

Unique Paper Code : 217603

Name of the Course : B.Sc. (H) Chemistry

Name of the Paper : Organic Chemistry V (CHHT-616)

Semester : VI

Duration : 3 Hours

Maximum Marks : 75

**Instructions for Candidates**

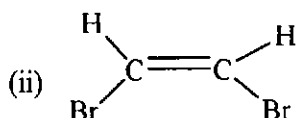
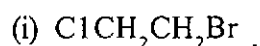
1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Answer six questions in all.
3. Question No. 1 carries 15 marks.

1. Answer any five parts :

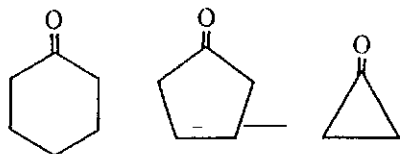
- (a) Cis-1, 2-Dichloroethylene shows C=C stretching absorption in its IR spectrum whereas trans-1, 2-Dichloroethylene does not show C=C stretching. Give reason.
- (b) Explain why the absorption bands in UV spectrum are generally broad when compared to the absorption bands in IR spectrum?
- (c) A 60 MHz spectrometer records the signal for a proton at a position 150 Hz downfield from TMS
  - (i) Determine the chemical shift in  $\delta$
  - (ii) Predict the shift of the same proton from TMS in Hz for 100 MHz spectrometer
- (d) What are activators and antioxidants used during the process of vulcanization of rubber? Give one example of each.
- (e) What are the characteristic features of a dye?

P.T.O.

- (f) Why TMS (Tetramethylsilane) is chosen as reference compound in NMR spectroscopy?
- (g) C=O stretching in IR of acetone comes at  $1720\text{ cm}^{-1}$  while C=O stretching in acetamide ( $\text{CH}_3\text{CONH}_2$ ) comes at  $1680\text{ cm}^{-1}$ . Give reason. (5×3)
2. (a) Which of the following molecules show spin-spin coupling? Justify your answer. If splitting is observed, give the multiplicity of each kind of proton.

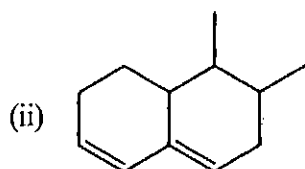
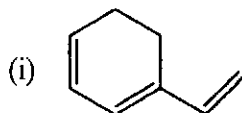


- (b) Compare the PMR spectrum of ordinary (impure) ethanol and pure ethanol. Give reason for the difference?
- (c) Explain why the aldehydic proton appears much downfield in PMR spectrum? (3×4)
3. (a) Salicylic acid shows C=O absorption band at a lower frequency than p-Hydroxybenzoic acid in its IR spectrum? Explain and give the structures.
- (b) Arrange the following compounds in increasing order of carbonyl absorption frequency. Give reason also:



- (c) 1-Butene shows C=C stretching at  $1650\text{ cm}^{-1}$  in its IR spectrum whereas 1,3-Butadiene shows C=C stretching at  $1610\text{ cm}^{-1}$ . Explain giving reason. (3×4)

4. (a) Calculate the  $\lambda_{\max}$  (nm) for the following compounds:



*Base values for:*

Acyclic/ heteroannular diene = 214 nm

Homoannular diene = 253 nm

*Addition for each substituent:*

Alkyl substituent or ring residue = 5 nm

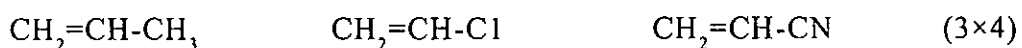
Exocyclic double bond = 5 nm

Double bond extending conjugation = 30 nm

- (b) Identify the geometric isomers of stilbene ( $\text{C}_6\text{H}_5\text{-CH=CH-C}_6\text{H}_5$ ) from their  $\lambda_{\max}$  values of 294 nm and 274 nm giving reason for the assignment?
- (c) Define bathochromic and hypsochromic shifts? Predict the shift in  $\lambda_{\max}$  value of phenol when its UV spectrum is first recorded in neutral and then in alkaline medium? Give reasons for the answer. (3×4)
5. (a) Give one synthesis of Methyl Orange? Why is it red at a pH below 3.1 and yellow above pH 4.4. Explain with the help of suitable structures.
- (b) Write the three possible structures that arise out of different ways in which two Isatin units may link to form indigo (M.F. =  $\text{C}_{16}\text{H}_{10}\text{N}_2\text{O}_2$ ). Give the reaction that establishes the correct linkage and explain.

- (c) Coupling of diazonium salt with phenol is favoured in mildly alkaline medium while coupling of diazonium salt with aniline is favoured in mildly acidic medium. Give reasons. (3×4)

6. (a) Give the mechanism involved when vinyl chloride is polymerised in presence of benzoyl peroxide?
- (b) How is polyester synthesised. Also give the synthesis of its monomer units?
- (c) List the following group of monomers in order of decreasing ability to undergo anionic polymerization. Give reason for your answer?



7. (a) An organic compound A with molecular formula  $\text{C}_8\text{H}_8\text{O}$  gave following spectral data:

UV:  $\lambda_{\text{max}}$  292 nm  $\epsilon_{\text{max}}$  16

IR shows important bands at 2862(w) and 1722 $\text{cm}^{-1}$  (s)

NMR:  $\delta$  2.8 (2H, d); 7.27(5H, s); 9.78(1H, t)

Explaining the UV, IR and NMR data, derive the structure of the compound?

- (b) Explain the following terms with example:

(i) Mordant dyes

(ii) Thermoplastics

(8,4)

8. Write short notes on the following (any three):

(a) Biodegradable polymers

(b) Synthetic rubber

(c) Edible dyes

(d) Phthalein dyes

(3×4)

(1600)