

Total number of printed pages-8

3 (Sem-6/CBCS) CHE HC 2

2023

CHEMISTRY

(Honours Core)

Paper : CHE-HC-6026

(Organic Chemistry-V)

Full Marks : 60

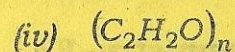
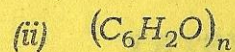
Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Answer the following questions : $1 \times 7 = 7$
- (a) What do you mean by fingerprint region ?
- (b) Which of the following is a chromophore ?
- (i) $-SO_3H$
 - (ii) $-OH$
 - (iii) $-COOH$
 - (iv) $-NO_2$

Contd.

(c) The general formula of carbohydrate is—



(d) Which of the following compounds do not absorb light above $200m\mu$?

(i) Ethanol

(ii) Diethyl ether

(iii) 2-Butanone

(iv) Benzene

(e) At what wavelength range the coloured compounds absorb?

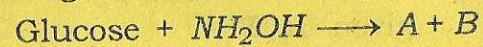
(f) Give *one* example of a thermosetting plastic.

(g) What are the expected products of hydrolysis of Lactose?

2. Give answer of the following : $2 \times 4 = 8$

(a) What are the different types of electronic transitions that occur in an organic molecule?

(b) Find out the products A and B in the following reaction :



(c) What is a mordant dye? Give *one* example. $1 + 1 = 2$

(d) Give *one* example of each of the following polymers : $1 + 1 = 2$

(i) Polyamides

(ii) Polyesters

3. Answer **any three** of the following : $5 \times 3 = 15$

(a) (i) How can you distinguish between intra and inter-molecular hydrogen bonding with the help of IR spectroscopy? 3

(ii) How can you distinguish the following pair of compounds using IR spectroscopy Propanone and Propanal? 2

(b) Fructose contains a keto group, but still it gives silver mirror test on treatment with Tollen's reagent. Explain by showing the rearrangement reactions involved. What is the name of the rearrangement reaction? $2+2+1=5$

(c) Match the following in 'A' with those given in 'B' : $1 \times 5 = 5$

'A'

'B'

- | | |
|----------------------|----------------------|
| (i) D-Sorbitol | (a) Anomeric carbon |
| (ii) L-Ascorbic acid | (b) A disaccharide |
| (iii) Glycoside | (c) A sugar lactone |
| (iv) C-L of glucose | (d) Sugar alcohol |
| (v) Maltose | (e) A reducing sugar |

(d) Write the synthesis of Congo red dye. Show the structural changes involved due to which it changes color from red to blue in acid solution. $2+3=5$

(e) (i) Write the full form of the following terms : 2

- (i) PAN
- (ii) PTFE
- (iii) PCTFE
- (iv) BSR

(ii) What are polyolefins and polydienes? Give one example of each. $1+2=3$

4. Answer **any three** of the following :

$10 \times 3 = 30$

(a) (i) Draw the Fisher's Projection formula of *D*-glucose.

(ii) What do you mean by the term anomerization? Show the mechanism of anomerization of *D*-glucose.

(iii) Draw the chair conformers of both the α -*D*(+) and β -*D*(+) glucopyranose.

(iv) How do you explain the greater stability of β -*D*(+)-glucopyranose from their conformers?

$1+3+3+3=10$

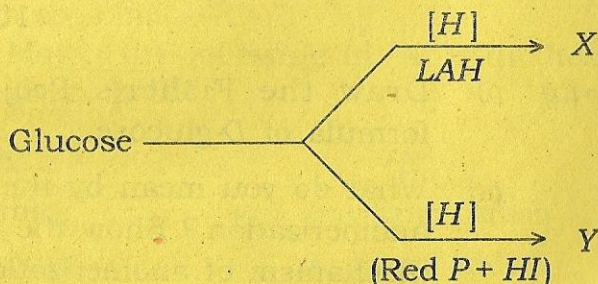
(b) (i) How will you bring the following conversions? $3 \times 2 = 6$

(A) An aldopentose to an aldohexose

(B) *D*-fructose to *D*-glucose

(ii) How many stereoisomers are possible for both aldohexoses and 2-ketohexose? 2

(iii) Find X and Y in the following reactions : 2



(c) (i) Give the classification of dyes on the basis of their functional group or chemical constitution. 5

(ii) What are acid and basic dyes? Give *one* example of each dye. Name the fabric to which they can be applied. 5

(d) (i) What are the two monomers of Dacron? 2

(ii) Give *two* differences between linear polymers and branched chain polymers. 2

(iii) Write a note on biodegradable polymers. 2

(iv) Fill in the blanks : 1×4=4

(A) Polymers which have (—COO—) linkages are known as _____.

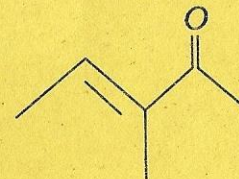
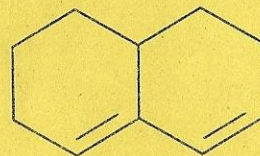
(B) Polyethene is obtained by the polymerisation of _____.

(C) Polystyrene is obtained by the polymerisation of styrene in presence of _____ as initiator.

(D) Proteins are the examples of _____ polymers.

(e) (i) How many electronic transitions are expected for benzene? 1

(ii) Use Woodward-Fieser rule to determine the λ_{max} of the following compounds : 2+2=4



- (iii) Predict the chemical shift positions for the protons in 1-bromoethane and hence draw a rough sketch of the ^1H NMR spectrum. 3
- (iv) In a ^1H NMR spectrum, the protons of ethene appear at a more downfield region than expected. Why? 2
- (f) (i) Explain the basic principle of NMR spectroscopy. 5
- (ii) Explain, why ESR spectrum is recorded in derivative mode? 2
- (iii) Predict and draw the hyperfine structure of CH_3 using ESR spectroscopy. 3
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