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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 ?

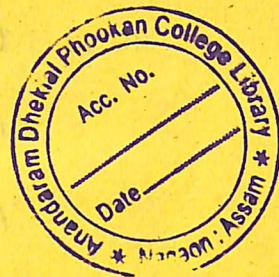
(b) Which of the following is a chromophore ?

(i)  $-\text{SO}_3\text{H}$

(ii)  $-\text{OH}$

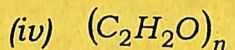
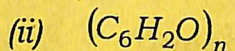
(iii)  $-\text{COOH}$

(iv)  $-\text{NO}_2$



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?

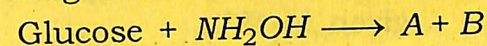
(f) Give *one* example of a thermosetting plastic.

(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?  $2+2+1=5$

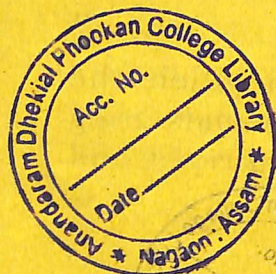
(c) Match the following in 'A' with those given in 'B' :  $1 \times 5 = 5$

'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  $\alpha$ -D(+) and  $\beta$ -D(+) glucopyranose.

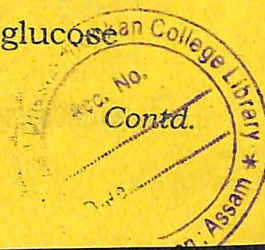
(iv) How do you explain the greater stability of  $\beta$ -D(+)-glucopyranose from their conformers?

$1+3+3+3=10$

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

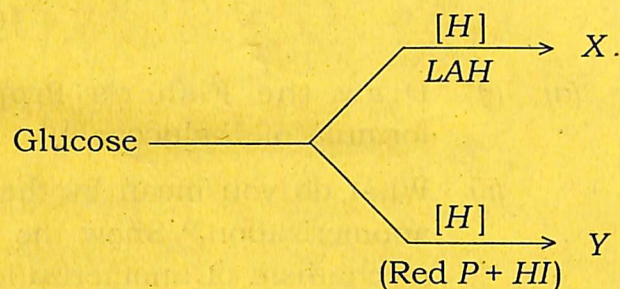
(A) An aldopentose to an aldohexose

(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

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 \_\_\_\_\_.

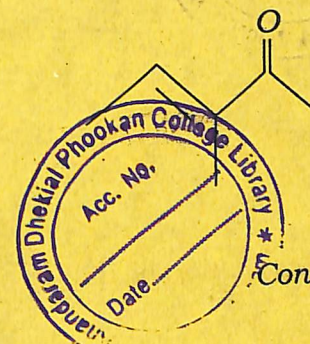
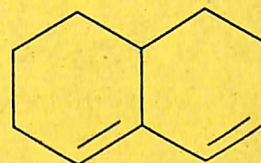
(B) Polyethene is obtained by the polymerisation of \_\_\_\_\_.

(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  $\lambda_{max}$  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  $^1\text{H}$  NMR spectrum. 3
- (iv) In a  $^1\text{H}$  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  $\text{CH}_3$  using ESR spectroscopy. 3

