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 : 1×7=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) $-NO_2$

(c) The general formula of carbohydrate is—

(i) $(C_4H_2O)_n$

(ii) $(C_6H_2O)_n$

(iii) $(CH_2O)_n$

(iv) $(C_2H_2O)_n$

(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 : 2×4=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 :

$$\text{Glucose} + NH_2OH \longrightarrow A + B$$

(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 : 5×3=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'** : 1×5=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 : 10×3=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

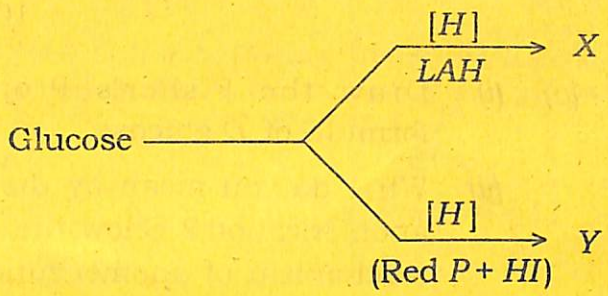
(b) (i) How will you bring the following conversions ? 3×2=6

(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 _____ .

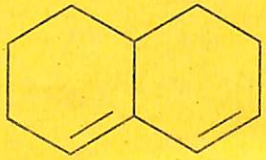
(B) Polyethene is obtained by the polymerisation of _____ .

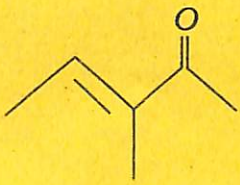
(C) Polystyrene is obtained by the polymerisation of styrene in presence of _____ as initiator.

(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