3 (Sem–6/CBCS) CHE HC 2

2024

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) Give an example of triphenylmethane dye.

   (b) Write the name of the five-membered cyclic hemeacetal form of D-ribose.

   (c) Draw the structure of the product obtained from sodium borohydride reduction of D-glucose.

   (d) In which region NMR spectra are observed ?

(e) Which of the following statements is false about glucose ?

(i) It is a reducing sugar.

(ii) It is a disaccharide.

(iii) It has a pyranose structure.

(iv) It is a polyalcohol.

(f) Fill up the blank :

Two monosaccharides are joined through a ___ bond to form a disaccharide.

(g) Mention the configuration of natural rubber.

2. Give answer of the following : 2×4=8

(a) Draw the Fisher projection diagram of the tetroses.

(b) Name the monomer units of Buna-S-rubber.

(c) (i) Between nitrobenzene and nitrophenol which one is more intensely coloured ?

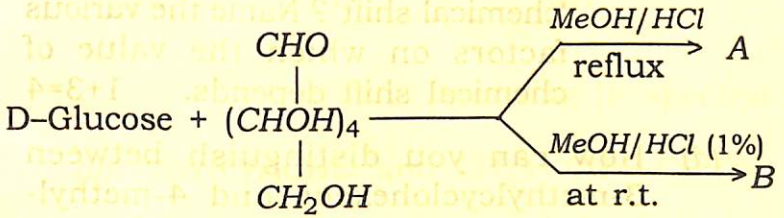
(ii) What are the commonly encountered transitions in UV spectroscopy ?

(d) Fill up the blanks :

Starch contains about 20% of a water-soluble fraction called ____ and 80% of water-insoluble fraction called ____.

3. Answer ***any three*** of the following : 5×3=15

(a) (i) Find out *A* and *B* in the following reaction : 2



(ii) Write the synthesis of methyl orange. 3

(b) Write true ***or*** false for the following statements : 1×5=5

(i) Fructose exists as both pyranose and furanose structures.

(ii) The simplest carbohydrate is glyceraldehyde.

(iii) Galactose is not a disaccharide.

(iv) Hydrolysis of starch with dil. H_2SO_4 at 393K under pressure gives glucose.

(v) Glucose is also known as dextrose.

(c) (i) Fill up the blank : 1

No two compounds except the ____ can have similar IR-spectra.

(ii) What do you mean by the term 'chemical shift'? Name the various factors on which the value of chemical shift depends. 1+3=4

(d) How can you distinguish between 3-methylcyclohexene and 4-methyl-cyclohexene on the basis of mass spectroscopy?

(e) Write short notes on : ***(any two)*** 2½×2=5

(i) Zeigler-Natta polymerisation

(ii) Amylose

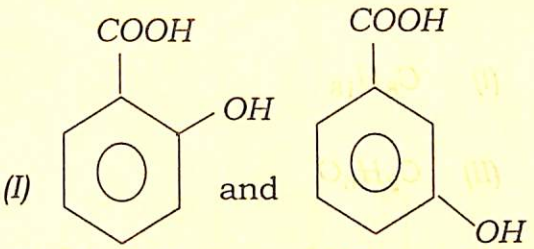
(iii) Volcanization of rubber

(iv) Degree of polymerisation

4. Answer ***any three*** of the following : 10×3=30

(a) (i) Define absorbance. 1

(ii) How will you differentiate between the following pairs of compounds? 3×3=9

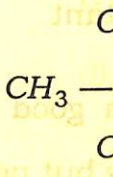
(I) 

(by using IR spectra)

(II) CH_3CH_2CHO and $CH_2=CH-CH_2OH$

(by using IR spectra)

(III) $CH_3-CH_2-CH_2-CH_3$ and



(by using NMR spectra)

(b) (i) Predict the structural formula for the compounds with the following molecular formulas showing only one PMR signal each : 2×2=4

(I) C_8H_{18}

(II) C_2H_6O

(ii) Why is TMS used as a reference standard in NMR spectroscopy ? 3

(iii) Define : 1½×2=3

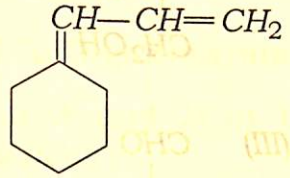
(I) Spin-spin splitting

(II) Coupling constant

(c) (i) Why is methanol a good solvent for UV spectroscopy but not for IR spectroscopy ? 2

(ii) By using the Woodward-Fieser rules, calculate the absorption maximum for the following compounds : 2×2=4

(I)



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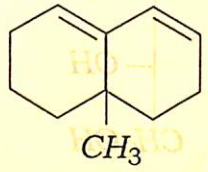
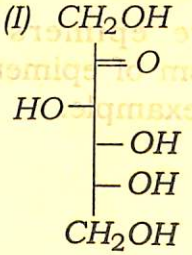


(iii) Explain (by showing the reactions involved) why D-glucose, D-mannose and D-fructose form the same osagene. 4

(d) (i) Classify each of the following monosaccharids according to both the no. of carbon atoms and the type of carbonyl group present : 1×4=4

(I)



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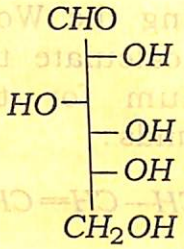
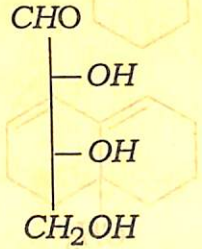


(III)



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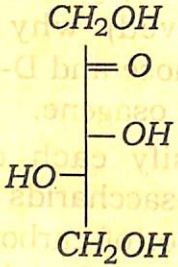


(ii) What are epimers? Give the mechanism of epimerisation with suitable example. 1+5=6

(e) (i) Give the Haworth projection diagram of: ***(any two)*** 1½×2=3

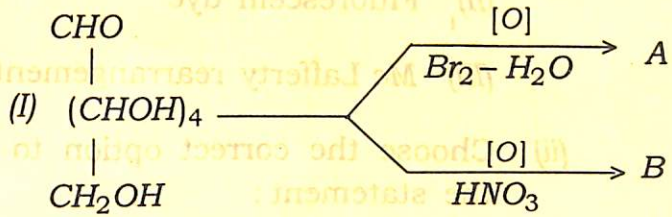
(I) Lactose

(II) Sucrose

(III) α-D-glucopyranose

(ii) Find *A* and *B* in the following reactions: 2+2=4

(I)



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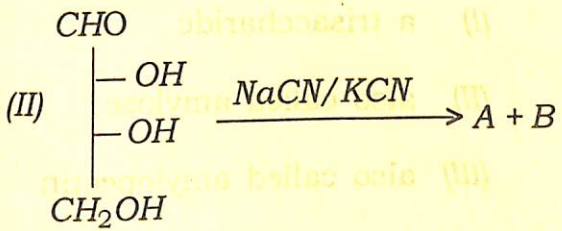

(iii) Draw the most stable conformer of—

(I) α-D-glucose, and

(II) β-D-mannose.

(in polar solvent) $1\frac{1}{2}\times2=3$

(f) (i) Explain with suitable example : ***(any two)*** $2\times2=4$

(I) Chain-growth polymerisation

(II) Fluorescein dye

(III) *Mc* Lafferty rearrangement

(ii) Choose the correct option to fill the statement : 1

"Starch is____."

(I) a trisaccharide

(II) also called amylose

(III) also called amylopectin

(IV) mixture of amylose and amylopectin

(iii) Give *one* example of each of the following : $1\times2=2$

(I) Carbohydrate that acts as a biofuel.

(II) Write two uses of congo red.

(iv) Illustrate the process of Killiani-Fisher synthesis of an aldotetrose from an aldotriose. 3
