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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: $1 \times 7 = 7$
 - (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?

Contd.

(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: $2 \times 4 = 8$

(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?

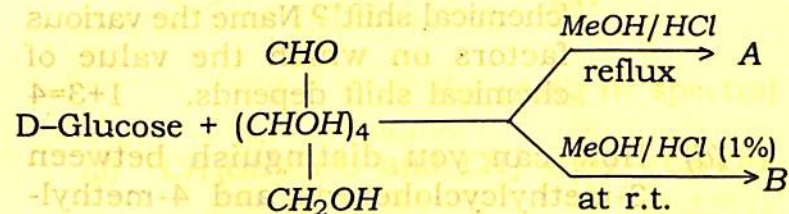
(d) Fill up the blanks:

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

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

$5 \times 3 = 15$

(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 \times 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-methylcyclohexene on the basis of mass spectroscopy?

(e) Write short notes on: **(any two)** $2\frac{1}{2} \times 2 = 5$

(i) Zeigler-Natta polymerisation

(ii) Amylose

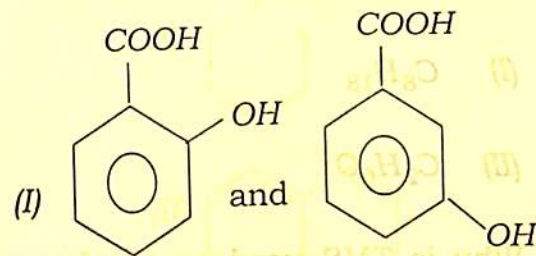
(iii) Vulcanization of rubber

(iv) Degree of polymerisation

4. Answer **any three** of the following : $10 \times 3 = 30$

(a) (i) Define absorbance. 1

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

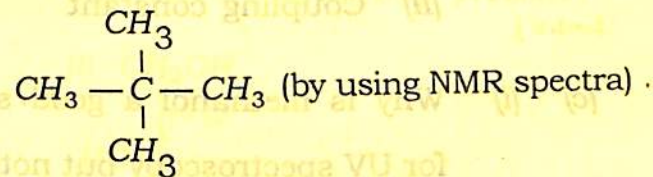


(by using IR spectra)

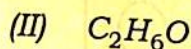
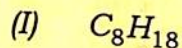
(II) CH_3CH_2CHO and $CH_2=CH-CH_2OH$

(by using IR spectra)

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



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



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

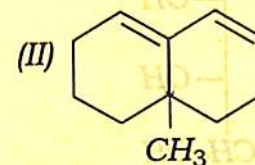
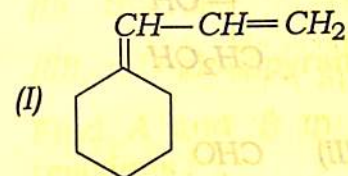
(iii) Define: $1 \frac{1}{2} \times 2 = 3$

(I) Spin-spin splitting

(II) Coupling constant

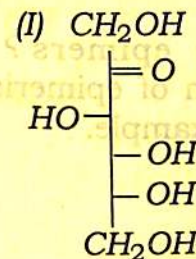
(c) (i) Why is methanol a good solvent for UV spectroscopy but not for IR spectroscopy? 2

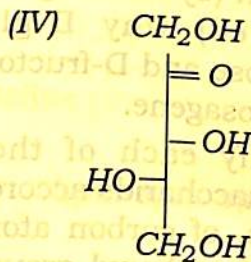
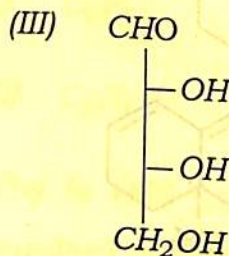
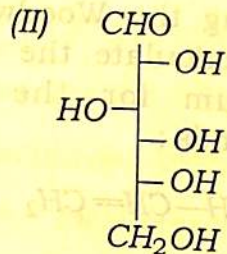
(ii) By using the Woodward-Fieser rules, calculate the absorption maximum for the following compounds: $2 \times 2 = 4$



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

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





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

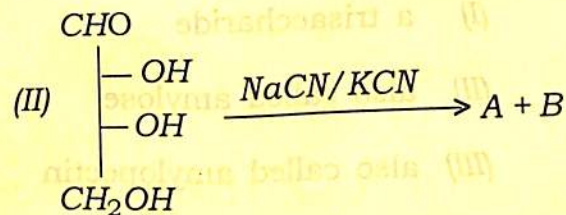
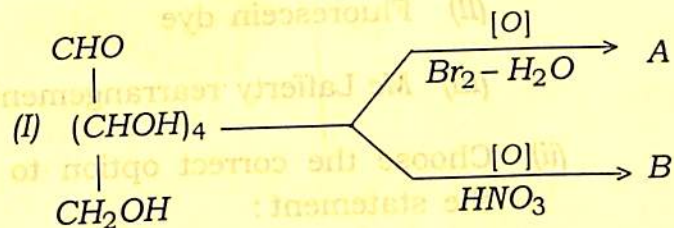
- (e) (i) Give the Haworth projection diagram of: **(any two)** 1½×2=3

(I) Lactose

(II) Sucrose

(III) α-D-glucopyranose

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



(iii) Draw the most stable conformer of—

(I) α -D-glucose, and

(II) β -D-mannose.

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

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

(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: $1 \times 2 = 2$

(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