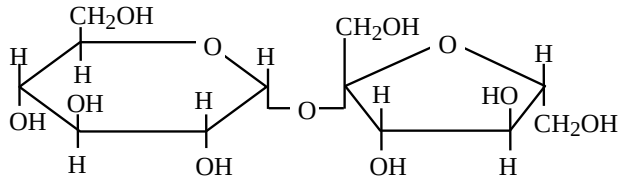
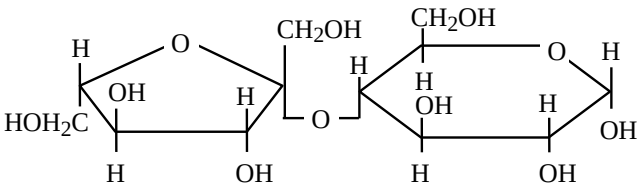
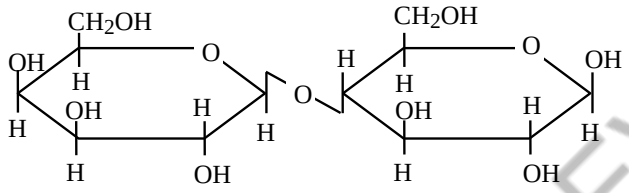
ORGANIC CHEMISTRY

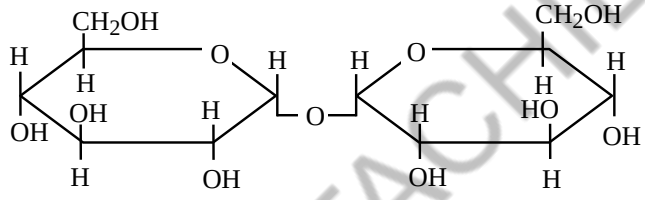
BIOMOLECULES

1. A disaccharide **X** cannot be oxidised by bromine water. The acid hydrolysis of **X** leads to a laevorotatory solution. The disaccharide **X** is **[JEE(Advanced) 2023]**

(A) 

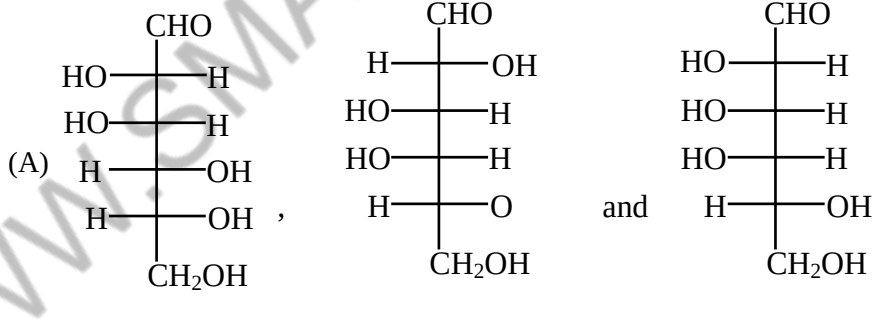
(B) 

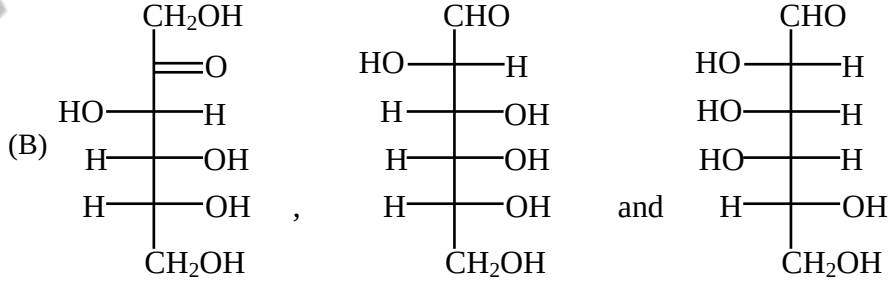
(C) 

(D) 

2. Treatment of D-glucose with aqueous NaOH results in a mixture of monosaccharides, which are

[JEE(Advanced) 2022]

(A) 

(B) 

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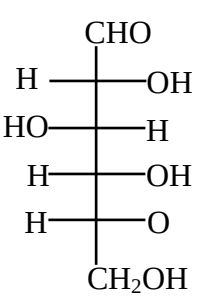
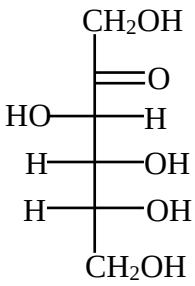
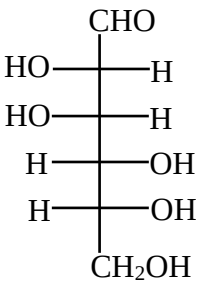
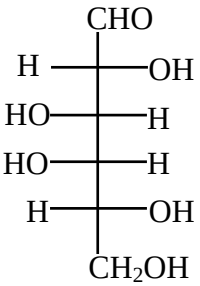
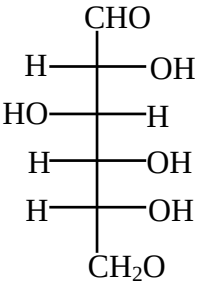
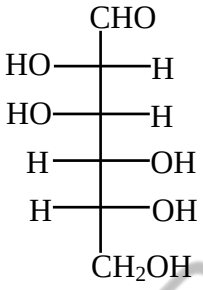
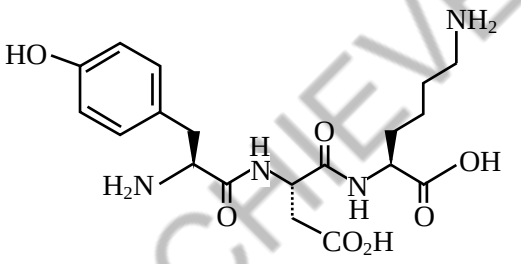
(C)  ,  and 

(D)  ,  and 

3. The structure of a peptide is given below



If the absolute values of the net charge of the peptide at pH = 2, pH = 6, and pH = 11 are $|z_1|$, $|z_2|$ and $|z_3|$, respectively, then what is $|z_1| + |z_2| + |z_3|$? **[JEE(Advanced) 2020]**

4. Which of the following statement(s) is(are) true ? **[JEE(Advanced) 2019]**

(A) Oxidation of glucose with bromine water gives glutamic acid

(B) The two six-membered cyclic hemiacetal forms of D-(+)-glucose are called anomers

(C) Hydrolysis of sucrose gives dextrorotatory glucose and laevorotatory fructose

(D) Monosaccharides **cannot** be hydrolysed to give polyhydroxy aldehydes and ketones

5. Choose the correct option(s) from the following **[JEE(Advanced) 2019]**

(A) Natural rubber is polyisoprene containing *trans* alkene units

(B) Nylon-6 has amide linkages

(C) Cellulose has only α-D-glucose units that are joined by glycosidic linkages

(D) Teflon prepared by heating tetrafluoroethene in presence of a persulphate catalyst at high pressure

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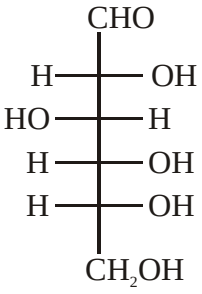
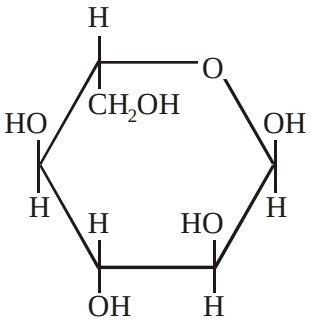
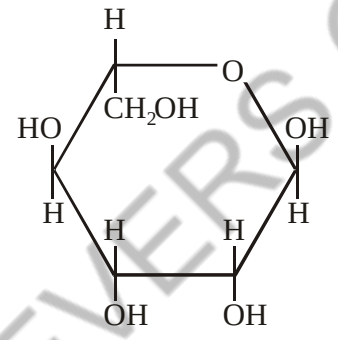
6. The Fischer presentation of D-glucose is given below.

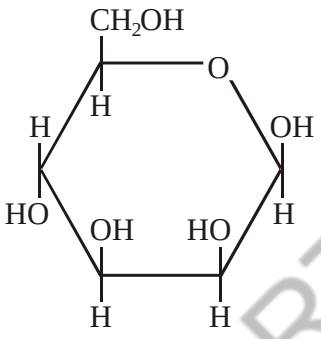


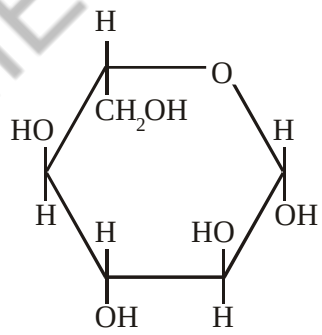
D-glucose

The correct structure(s) of β-L-glucopyranose is (are) :- **[JEE(Advanced) 2018]**

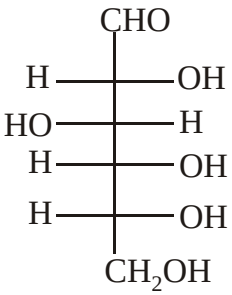
(A) 

(B) 

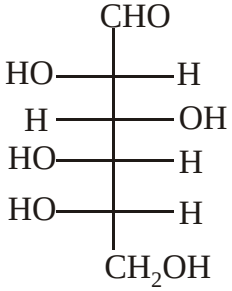
(C) 

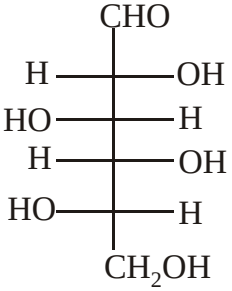
(D) 

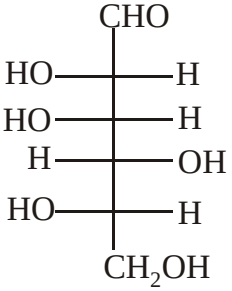
7. The structure of D-(+)-glucose is

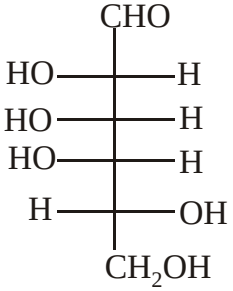


The structure of L(–)-glucose is **[JEE(Advanced) 2015]**

(A) 

(B) 

(C) 

(D) 

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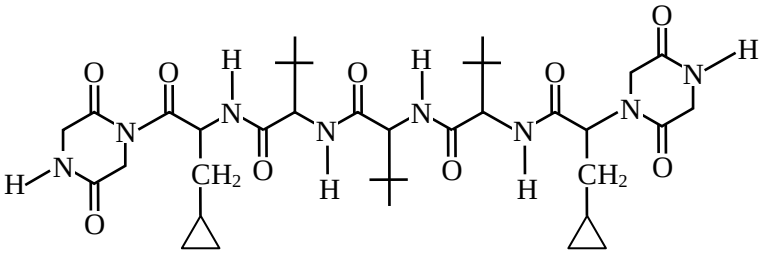
8. The total number of ***distinct naturally occurring amino acids*** obtained by complete acidic hydrolysis of the peptide shown below is **[JEE(Advanced) 2014]**



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SOLUTIONS

1. Ans. (A)

Sol. Sucrose $\xrightarrow{H_3O^+}$ Glucose + Fructose

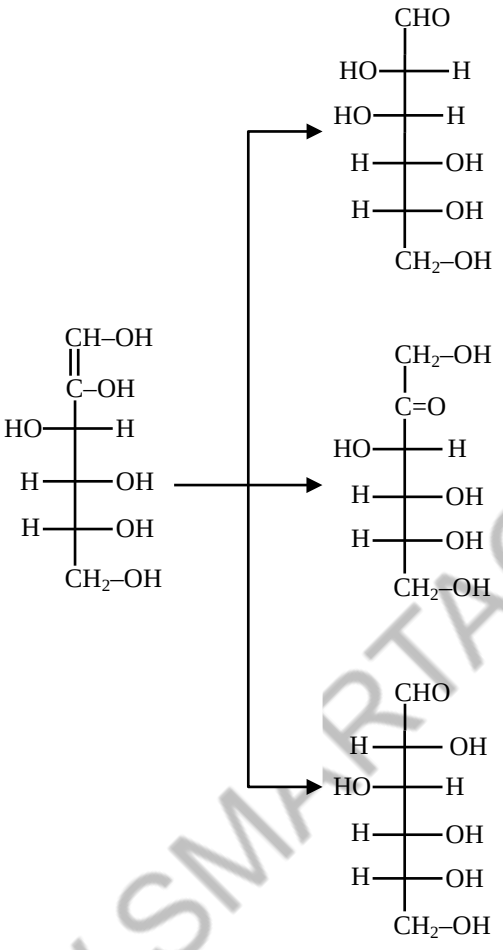
Specific rotation + 52.5° –92° (mixture of products is laevorotatory)

Sucrose $\xrightarrow{Br_2+H_2O}$ No reaction

BCD $\Rightarrow$ reducing sugars, will get oxidized by $Br_2 + H_2O$

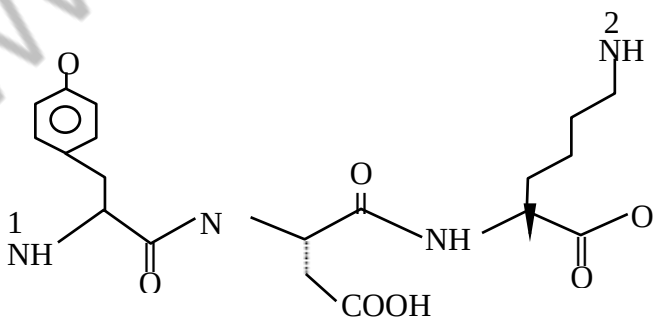
2. Ans. (C)

Sol. Basic catalyse tautomerism through enediol intermediate



3. Ans. (5)

Sol. $|z_1| + |z_2| + |z_3| = 5$



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At pH = 2 $\overset{1}{N}H_2$ and $\overset{2}{N}H_2$ of Tyrosine and Lysine is +ve charged (+1 each)

$+2 |z_1| = 2$

At pH = 6 NH_2 of Lysine (+1),

COOH (–1) of glutamic acid,

so because of dipolar ion exist $|z_2| = 0$

At pH = 11

COOH of Glutamic acid (–1)

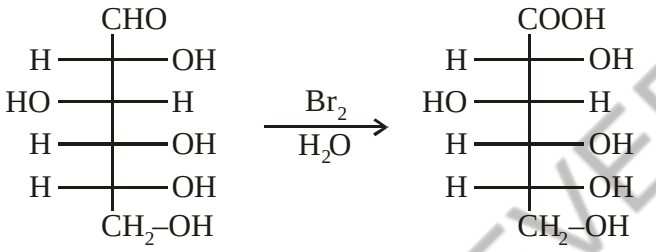
COOH of Lysine (–1)

OH of phenol (–1)

$|z_3| = 3$

4. Ans. (B, C, D)

Sol. (1) FALSE :



D(+) glucose Gluconic acid

(2) TRUE : Six member hemiacetal on anomeric carbon gives α-D glucose & β-D glucose.

(3) TRUE : $C_{12}H_{22}O_{11} + H_2O \xrightarrow{\text{Invertase}} \underset{\text{Glucose (+)}}{C_6H_{12}O_6} + \underset{\text{Fructose (–)}}{C_6H_{12}O_6}$

(4) TRUE : Monosaccharide cannot be hydrolysed to give polyhydroxy aldehydes and ketones

5. Ans. (B, D)

Sol. 1. Natural rubber is polyisoprene containing cis alkene units

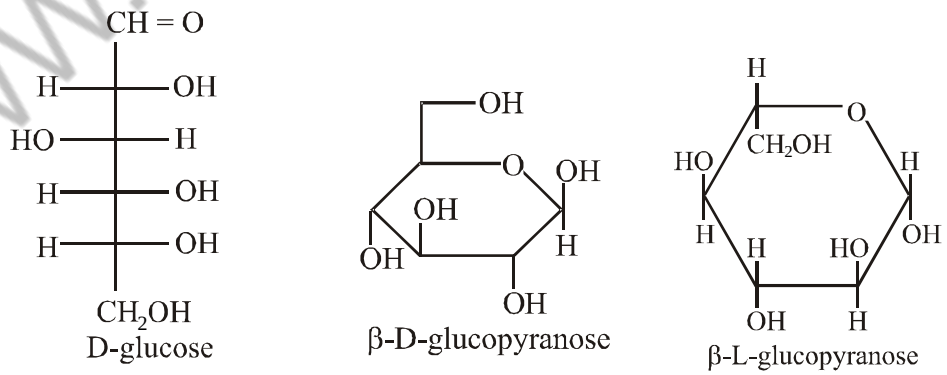
2. Nylon-6 has amide linkage $\left[HN-(CH_2)_5-\overset{\overset{O}{\|}}{C}\right]_n$

3. Cellulose has only β-D glucose units.

4. $F_2C = CF_2 \xrightarrow{\text{Per sulphate}} [CF_2 - CF_2]_n$

6. Ans. (D)

Sol.



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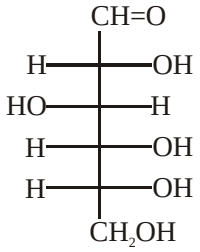
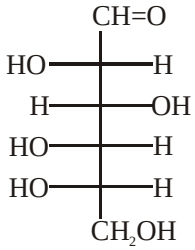
7. Ans. (A)

Sol. The structure of D(+) glucose is

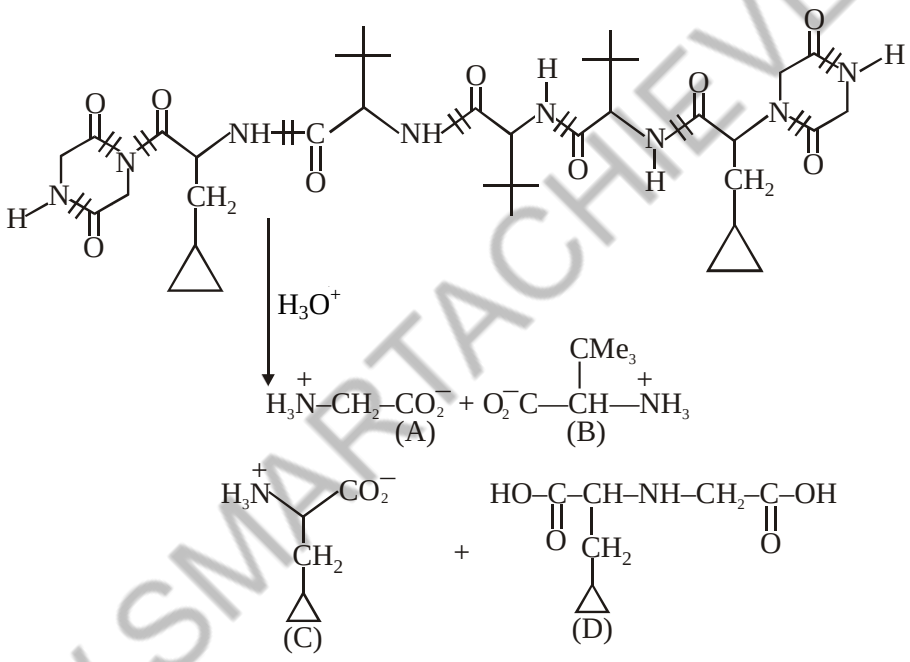


The structure of L(–) glucose which is enantiomer of D(+)-glucose is



8. Ans. (1)

Sol.



A ⇒ is glycine which is only naturally occuring amino acid.

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