## ORGANIC CHEMISTRY

## BIOMOLECULES

1. A disaccharide $\mathbf{X}$ cannot be oxidised by bromine water. The acid hydrolysis of $\mathbf{X}$ leads to a laevorotatory solution. The disaccharide $\mathbf{X}$ 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)


and

(B)



(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 $\mathrm{pH}=2, \mathrm{pH}=6$, and $\mathrm{pH}=11$ are $\left|\mathrm{z}_{1}\right|,\left|\mathrm{z}_{2}\right|$ and $\left|z_{3}\right|$, respectively, then what is $\left|z_{1}\right|+\left|z_{2}\right|+\left|z_{3}\right|$ ?
[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 $\alpha$-D-glucose units that are joined by glycosidic linkages
(D) Teflon prepared by heating tetrafluoroethene in presence of a persulphate catalyst at high pressure
6. The Fischer presentation of D-glucose is given below.


D-glucose
[JEE(Advanced) 2018]
The correct structure(s) of $\beta$-L-glucopyranose is (are) :-
(A)

(B)

(C)

(D)

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


The structure of $\mathrm{L}(-)$-glucose is
(A)


(B)


(C)


[JEE(Advanced) 2015]

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


## SOLUTIONS

1. Ans. (A)

Sol. Sucrose $\xrightarrow{\mathrm{H}_{3} \mathrm{O}^{+}}$Glucose + Fructose
Specific rotation $+52.5^{\circ} \quad-92^{\circ}$ (mixture of products is laevorotatory)
Sucrose $\xrightarrow{\mathrm{Br}_{2}+\mathrm{H}_{2} \mathrm{O}}$ No reaction
$\mathrm{BCD} \Rightarrow$ reducing sugars, will get oxidized by $\mathrm{Br}_{2}+\mathrm{H}_{2} \mathrm{O}$
2. Ans. (C)

Sol. Basic catalyse tautomerism through enediol intermediate

3. Ans. (5)

Sol. $\left|z_{1}\right|+\left|z_{2}\right|+\left|z_{3}\right|=5$



At $\mathrm{pH}=2$
$\stackrel{1}{\mathrm{~N}} \mathrm{H}_{2}$ and $\stackrel{2}{\mathrm{~N}} \mathrm{H}_{2}$ of Tyrosine and Lysine is +ve charged ( +1 each)
$+2\left|\mathrm{z}_{1}\right|=2$
At $\mathrm{pH}=6 \quad \mathrm{NH}_{2}$ of Lysine ( +1 ),
$\mathrm{COOH}(-1)$ of glutamic acid,
so because of dipolar ion exist $\left|z_{2}\right|=0$
At $\mathrm{pH}=11$
COOH of Glutamic acid ( -1 )
COOH of Lysine ( -1 )
OH of phenol ( -1 )
$\left|z_{3}\right|=3$
4. Ans. (B, C, D)

Sol. (1) FALSE :

(2) TRUE : Six member hemiacetal on anomeric carbon gives $\alpha$-D glucose $\& \beta$-D glucose.
(3) TRUE : $\mathrm{C}_{12} \mathrm{H}_{22} \mathrm{O}_{11}+\mathrm{H}_{2} \mathrm{O} \xrightarrow{\text { Invertase }} \mathrm{C}_{6} \mathrm{H}_{12} \mathrm{O}_{6}+\mathrm{C}_{6} \mathrm{H}_{12} \mathrm{O}_{6}$ Glucose Fructose
(+) (-)
(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 $\leftrightarrows \mathrm{HN}-\left(\mathrm{CH}_{2}\right)_{5}-\underset{\mathrm{O}}{\mathrm{C}} \mathrm{T}_{\mathrm{n}}$
3. Cellulose has only $\beta$-D glucose units.
4. $\mathrm{F}_{2} \mathrm{C}=\mathrm{CF}_{2} \xrightarrow{\text { Per sulphate }} \mathrm{CCF}_{2}-\mathrm{CF}_{2} \mp_{\mathrm{n}}$
6. Ans. (D)

Sol.


D-glucose


$\beta$-L-glucopyranose
7. Ans. (A)

Sol. The structure of $D(+)$ glucose is


The structure of $\mathrm{L}(-)$ glucose which is enantiomer of $\mathrm{D}(+)$-glucose is

8. Ans. (1)

Sol.

$\mathrm{A} \Rightarrow$ is glycine which is only naturally occuring amino acid.

