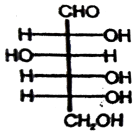
CHEMISTRY

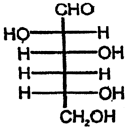
PHYSICAL, INORGANIC, AND ORGANIC CHEMISTRY

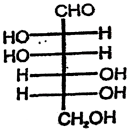
BIOMOLECULES & POLYMER

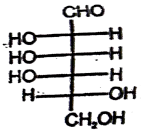
Organic Chemistry Biomolecules Polymer

1. Which two of the following aldohexoses give the same osazone derivative ?









A. $1\&4$

B. $1\&3$

C. $2\&3$

D. $3\&4$

Answer: 2

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2. A hexapeptide has the composition $Ala, Gly, Phe, Val.$ Both the $N-$ terminal and $C-$ teminal units are Val. Cleavage of the hexapeptide by chymotypsin gives two different tripeptides, both having Val as the N-terminal group. Among the products of

random hydrolysis is a $Ala - Val$ dipeptide fragment . What is the primary structure of the hexapeptide?

A. Val-Gly -Phe -Val-Ala-Val

B. Val-Ala-Phe-Val-Gly-Val

C. Val-Gly-Ala-Val-Phe-Val

D. Val-Phe-Val-Ala-Gly-Val

Answer: 1

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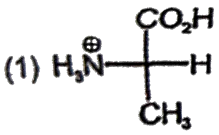
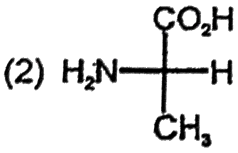
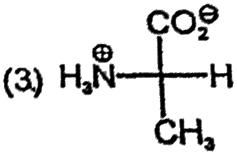
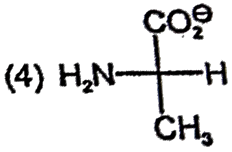
3. Which of the following is the major solute species in a solution of alanine at $pH = 2$?

A. 

B. 

C. 

D. 

Answer: 1

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4. Glucose is a / an

A. Aldohexose

B. Aldopentose

C. Aldotetrose

D. Ketohexose

Answer: 1

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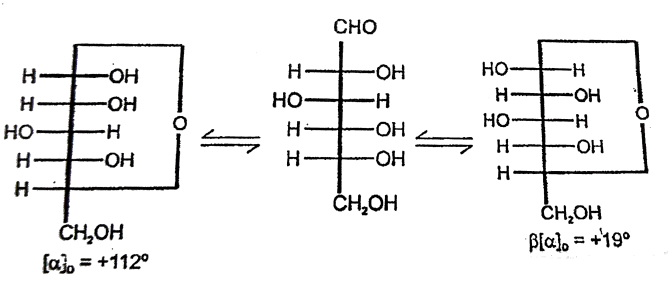
5.



The above process in which α and β form remain in

equilibrium with acyclic form and a change in optical rotation is observed which is known as —

A. Mutarotation

B. Epimerisation

C. Saccharic acid

D. Gluconic acid

Answer: 1

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6. Glucose on reduction with Na/Hg and water gives:

A. Sorbitol

B. Fructcse

C. Saccharic acid

D. Gluconic acid

Answer: 1

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7. Which of the following pairs give positive Tollens test?

A. Glucose and sucrose

B. Glucose and fructose

C. Fructose and sucrose

D. Acetophenone and hexanal

Answer: 2

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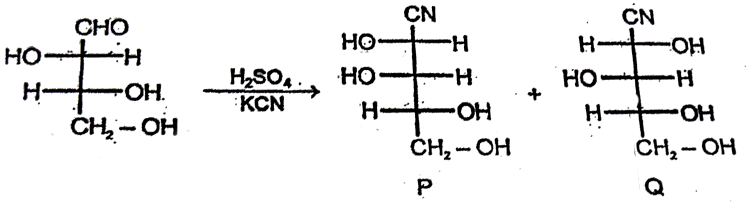
8. Product P & Q may be grouped as



A. Diastereomers

B. Enantiomers

C. Anomers

D. None of these

Answer: A

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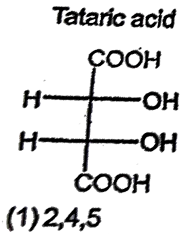
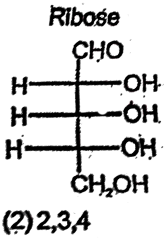
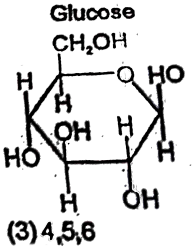
9. How many moles of acetic anhydride (Ac_2O) is needed to react completely with tataric acid, ribose and glucose respectively,



(1) 2,4,5



(2) 2,3,4



(3) 4,5,6

A. 2,4,5

B. 2,3,4

C. 4,5,6

D. 4,5,5

Answer: 1

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10. Glucose reacts with bromine water to products :

A. Glyceraldehyde

B. Gluconic acid

C. Seccharic acid

D. Glucaric acid

Answer: 2

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11. Which one of the following statements is not true regarding $(+)$ Lactose ?

A. On hydrolsis $(+)$ Lactose gives equal emount of $D(+)$ glucose and $D(+)$ galactose.

B. $(+)$ Lactose is a $\beta-$ glycoside formed by the union of a molecule of $D(+)$ glucose and a molecule of $D(+)$ galactose.

C. $(+)$ Lactose is a reducting sugar and does not exhibit mutarotation.

D. $(+)$ Lactose, $C_{12}H_{22}O_{11}$ contains $8-OH$ groups.

Answer: C

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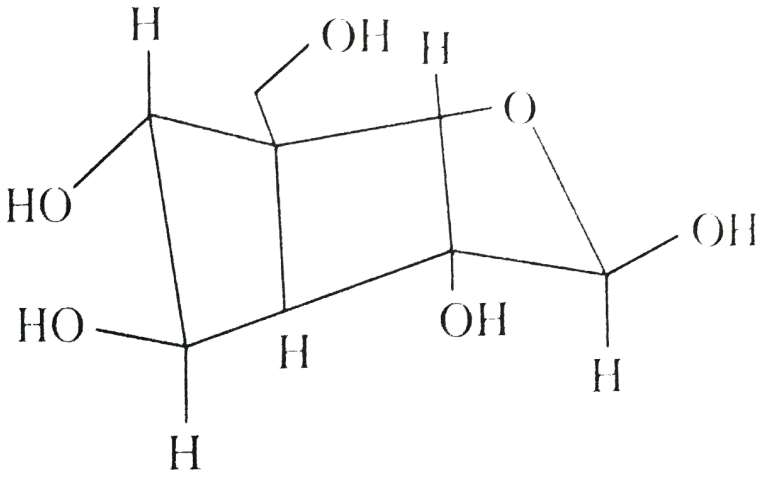
12. The following carbohydrate is:



A. a ketohexose

B. an aldohexose

C. an $\alpha -$ furanose

D. an$\alpha -$ pyranose

Answer: B

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13. Test by which starch and cellulose can be distinguished from each other is `:

A. reducing sugar test

B. analysis of products of hydrolysis

C. iodine test

D. Molisch test

Answer: 3

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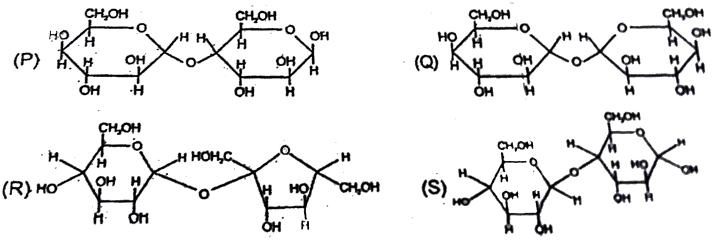
14. Which of the following disaccharides will not reduce tollen's reagent.



A. $P\&Q$

B. $P\&S$

C. $Q\&R$

D. $Q\&S$

Answer: 3

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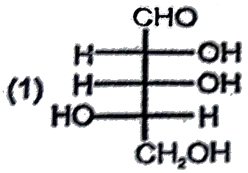
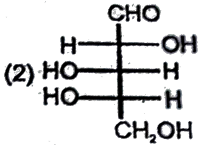
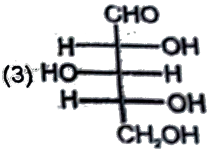
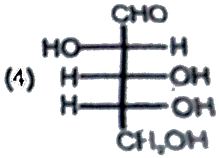
15. $(+)-$ Arabinose is $(2R, 3S, 4S)-$ aldopentose.

Which of the following is $(+)$ arabinose ?

A. 

B. 

C. 

D. 

Answer: B

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16. Acid- catalyzed reaction of D- glucose with benzaldehyde produces the $4,6-O0$ benzylidene derivative. Reduction with $NaBH_4$ followed by excess HIO_4 cleavage and acid hydrolysis yields a $C_4H_8O_4$ tetrose and benzaldehyde . What is the configuration of this tetrose ?

A. $2S, 3S$

B. $2R, 3S$

C. $2R, 3R$

D. $2S, 3R$

Answer: 4

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17. Which of the statement is incorrect.

A. Fructose on reduction with $NaBH_4$ gives only one product.

B. Solubility of amino acid at its isoelectric point is minimum.

C. Guanidline is more basic than diethyl amine

D. Mutarotation is observed in the aqueous solution of glucose.

Answer: A

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18. Which of the following is not reducing sugar.

A. Sucrose

B. Glucose and fructose

C. Fructose

D. maltose

Answer: 1

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19.

$$\begin{array}{l} CH_2OH \\ | \\ C=O \\ | \\ (CHOH)_3 \\ | \\ CH_2OH \end{array} \xrightarrow{MaBH_4} A + B$$

Fructose

The product A and B in the a above reaction are not

A. Diastereomers

B. $C-2$ epimers

C. Anomers

D. Optically active hexahydroxy compounds

Answer: 3

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20. The incorrect structure of glycine at given pH are :

A. $H_3\overset{\oplus}{N}CH_2-\underset{\underset{O}{||}}{C}-OH \quad \text{at} pH=2.0$

B. $H_3\overset{\oplus}{N}CH_2-\underset{\underset{O}{||}}{C}-O^{\ominus} \quad \text{at} \quad pH=6.0$

C. $H_2NCH_2 - \underset{\underset{O}{||}}{C} - O^{\ominus}$ at $pH = 9$

D. $H_2NCH_2 - \underset{\underset{O}{||}}{C} - OH$ at $pH = 12$

Answer: 4

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21. Threonine is $(2S, 3R) - 2 -$ amino$- 3 -$ hydroxybutanoic acid. Which of the following is threonine ?

A. 

B. 

C. 

D. 

Answer: C

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22. Two aldopentoses X and Y give the same osazone derivative. X is oxidized to an optically inactive aldaric acid by dilute nitric acid. Ruff degradation of Y gave a tetrose which was similarly oxidized to an optically active aldaric acid. Assign the structures of X and Y from the following list ?

A. $X-1 \& Y-4$

B. $X-4 \& Y=1$

C. $X-2 \& Y=3$

D. $X=3 \& Y=2$

Answer: 3

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23. Which of the following is not an important secondary structural feature in large peptides and proteins ?

A. the $\alpha-$ helix

B. the $\beta-$ tum

C. chair conformations

D. the $\beta -$ pleated sheet

Answer: C

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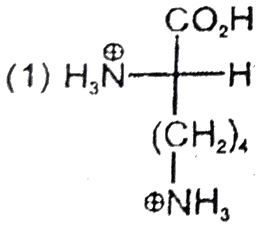
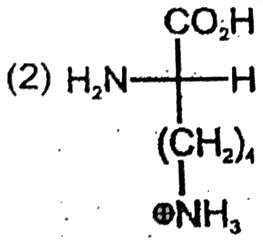
24. Which of the following is the major solute species in a solution of lysine at $pH = 10.5$?

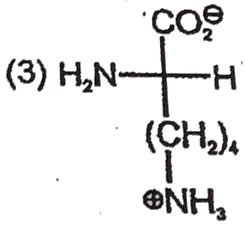
A.



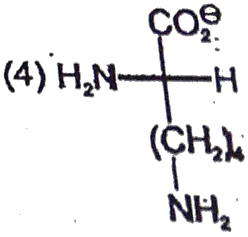
B.



C.



D.



Answer: 4

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25. The commercial name of polymethyl methacrylate $(PMMA)$ is :

A. Lucite

B. Plexiglass

C. Perspex

D. All of these

Answer: 4

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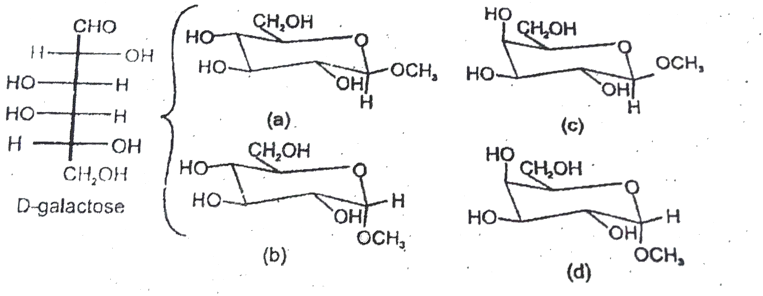
26. Which of the structure represent methyl $\alpha - D -$ galactopyranoside ?



A. a

B. b

C. c

D. d

Answer: 4

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27. When octa $-O-$ methyl $D-$ cellobiose is hydrolyzed by aqueous acid, two $O-$ methylated glucose derivative are formed. One is a tetramethyl derivative, and the other is a trimethyl derivative. Whyd is a single methyl substituent lost in this process ?

A. one methyoxy group is lost by $\beta-$ elimination

B. one methyoxy group is an ester and the other are all ethers.

C. one methyoxy group is part of an acetal, the others are all ethers..

D. one glucose is an $\alpha -$ methyl glycoside, the other is a $\beta -$ methyl glycoside

Answer: 3

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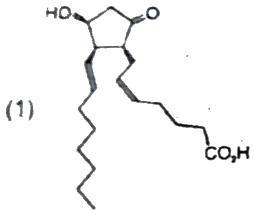
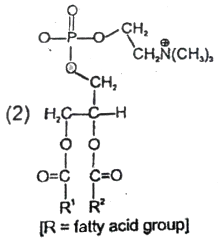
28. Which of the following is vitamin A ?

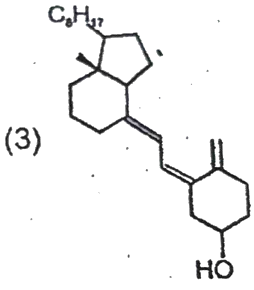
A.



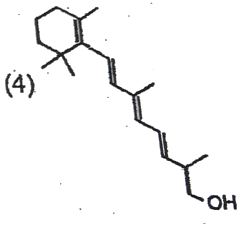
B.



C.



D.



Answer: 4

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29. What is the complementary $m - RNA$ sequence for the DNA segment AATCAGTT?

A. AAUCAGUU

B. CCAUCGAA

C. AACUGAUU

D. UUAGUCAA

Answer: 1

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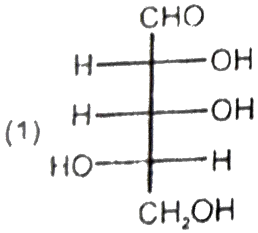
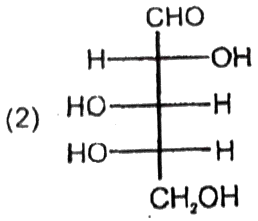
30. Which of the following gives an optically inactive aldaric acid on oxidatin with dilute nitric acid ?

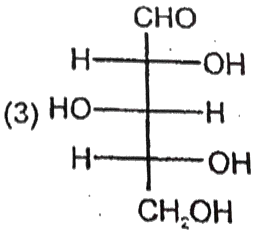
A.



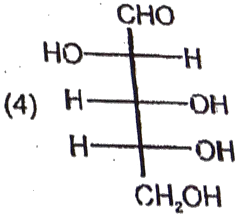
B.



C.



D.



Answer: C

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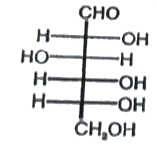
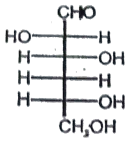
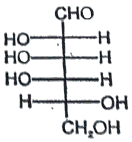
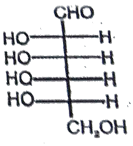
31. Which two of the following compounds, if any, are epimers ?









A. 1&4

B. 1&3

C. 2&3

D. 3&4

Answer: 4

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32. Which statement is incorrect .

A. Glucose and Fructose give the same osazone on reaction with excess of phenyl hydrazine

B. Hydrolysis of sucrose brings a change in sign of rotation towards plane polarised light.

C. Pentacetate of glucose fromm oxime on treatment with H_2N-OH

D. Glucose on reaction with acetic anhydride forms pentacetate under suitable condition.

Answer: 3

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33. An amino acid is characterized by two pKa values the one corresponding to the more acidic site is designated as pKa_1 and the other corresponding to the less site is designated as pKa_2. Some amino acids have side chain with acidic or basic groups. These amino acids have pKa_3 value also for the side chain.

$S.\ No$	Amino acid	P^{Ka1}	P^{Ka2}	P^{Ka3}	(Side chain)
I	Aspartic acid	1.88	9.6	3.65	
II	Glutamic acid	2.19	9.67	4.25	
III	Lysine	2.18	8.95	10.53	
IV	Arginine	2.17	9.04	12.48	

The isoelectric point (pI) of Aspartic acid and lysine will be respectively :

A. $6.62\&9.74$

B. $2.77\&5.6$

C. $2.77\&9.74$

D. $9.74\&6.62$

Answer: 3

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