CHEMISTRY

JEE (MAIN AND ADVANCED) CHEMISTRY

CARBOHYDRATES

Exercise Level I

1. The smallest units in living organism is

A. Organelle

B. Tissue

C. Organ

D. Biomolecule

Answer: D

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2. Oxygen balance in the atmosphere is maintained by a process called

A. Photosynthesis

B. Protein synthesis

C. Respiration

D. Fast synthesis

Answer: A

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3. The materials required for photosynthesis are

A. CO_2 and H_2O

B. Chlorophyll only

C. CO_2, H_2O and sunlight

D. CO_2, H_2O, sunlight and chlorophyll

Answer: D

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4. Biological reactions associated with positive ΔG are called

A. Exergonic

B. Endergonic

C. Exothermic

D. Endothermic

Answer: B

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5. Which one of the following is a pentose sugar?

A. Ribose

B. Arabinose

C. Lyxose

D. All the three

Answer: D

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6. Monosaccharides contain

A. Six carbon atom only

B. Five carbon atom only

C. Four carbon atom only

D. May contain 3 to 7 carbom atoms

Answer: D

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7. Raffinose on hydrolysis gives

A. glucose, fructose and lactose

B. glucose, fructose and galactose

C. fructose, glucose and erithrose

D. glucose, fructose and mannose

Answer: B

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8. Which of the following is not an oligosaccharide

A. xylose

B. Maltose

C. Raffinose

D. Sucrose

Answer: A

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9. Im majority of the cells, the principe biomolecules undergoing oxidation during respiration are

A. Vitamins

B. Fats

C. Proteins

D. Carbohydrates

Answer: D

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10. Which of the following monosaccharides is a pentose

A. Glucose

B. Frutose

C. Ribose

D. Galactose

Answer: C

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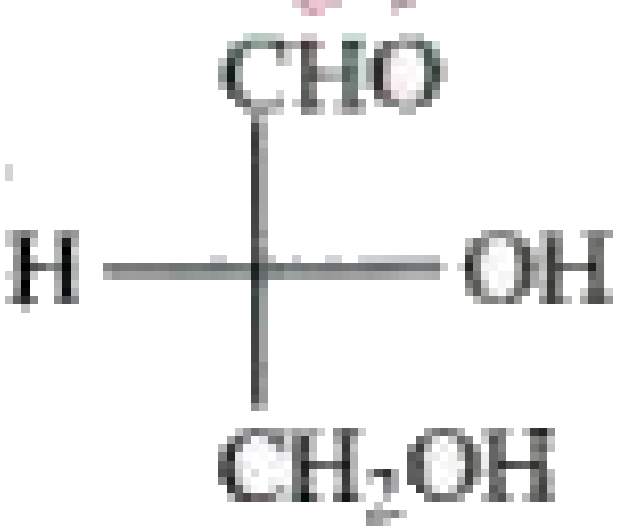
11. The correct description of the fischer projection of glyceraldehyde given below, in terms of D & L, R & S and d & l, respectively is



A. D, R, d

B. D, R , l

C. D, S , d

D. D, S, l

Answer: A

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12. Glyceraldehyde and trihydroxy acetone are a pair of

A. Anomers

B. Enantiomeres

C. Functional isomers

D. Epimers

Answer: C

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13. According to CIP rules, the configuration of (+) glyceraldehyde can be designed as

A. R

B. S

C. D

D. L

Answer: A

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14. Glucose is not

A. a hexose

B. a carbohydrate

C. an oligosaccharide

D. an aldose

Answer: C

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15. On heating glucose with Fehling solution, we get a precipitate whose colour is

A. Orange

B. Red

C. Black

D. White

Answer: B

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16. Glucose gives silver mirror test with Tollen's reagent. It shows the presence of

A. Carboxylic group

B. Alcoholic group

C. Ketonic group

D. Aldehydic group

Answer: D

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17. The reagent which forms crystalline osazone derivatives with glucose is

A. Fehling solution

B. Phenyl hydrazine

C. Benedict's solution

D. Hydroxylamine

Answer: B

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18. When glucose is heated with nitric acid the product is

A. Lactic acid

B. Saccharic acid

C. Glycollic acid

D. oxalic acid

Answer: B

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19. When hemiacetal reacts with alcohol the product is

A. dihemiacetal

B. alcohol

C. acetal

D. Peptide

Answer: C

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20. Freshly prepared $\alpha - D -$ glucose solution has specific rotation $+111^{\circ}$ and after sometime it becomes

A. $+52^{\circ}$

B. $+99^{\circ}$

C. -92°

D. None

Answer: A

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21. Ring structure of glucose is due to formation of hemiacetal and ring formation is in between

A. C_1 and C_5

B. C_1 and C_4

C. C_1 and C_3

D. C_2 and C_4

Answer: A

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22. The wrong statement about glucose is

A. It has one 1° – alcoholic group

B. It has four 2° – alcoholic group

C. It has one aldehydic group

D. It has one 3° – alcoholic groups

Answer: D

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23. Glucose and mannose are

A. Mirror images

B. Anomers

C. Functional isomers

D. Epimers

Answer: D

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24. Anomers have different

A. Physical Properties

B. Melting points

C. Specific rotation

D. All of these

Answer: D

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25. According to CIP rules, the configuration of chircal carbon atoms in D (+) glucose are

A. 2S, 3S, 4R, 5R

B. 2S, 3R, 4S, 5R

C. 2R, 3R, 4S, 5S

D. 2R, 3S, 4R, 5R

Answer: D

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26.

List - I Chemical property of Glucose	List -II Structure elucidation of Glucose
A) Acetylation	1) Presence of carbonyl group
B) Reaction with HCN	2) Six carbon atoms straight chain.
C) Reaction with HI/P	3) Presence of 1^0-alcohol group
D) Oxidation with HNO_3	4) Presence of 5-OH group

Correct match is

A.

A	B	C	D
1	2	3	4

B.
A	B	C	D
4	1	2	3

C.
A	B	C	D
3	1	2	4

D.
A	B	C	D
3	2	1	4

Answer: B

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27. Oxidation of glucose with Ag_2O gives

A. D-Gluconic acid

B. L-Glucaric acid

C. L-Gluconic acid

D. L-Glucaric acid

Answer: A

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28. $\alpha - D -$ Glucose and $\beta - D$ glucose differ from each other due to difference in one carbon with respect to its?

A. Size of hemiacetal ring

B. Number of OH groups

C. Configuration

D. Conformation

Answer: C

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29. In an aquose solution of D-Glucose the percentage of α and β anomers at equilibrium condition are respectively

A. 80 and 20

B. 20 and 80

C. 36 and 64

D. 64 and 36

Answer: C

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30. Which of the following statement is correct about D-Glucose & D-Galactose compounds?

A. They are diastereomers

B. Both are components of lactose

C. They are C-4 epimers

D. All the above are correct

Answer: D

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31. D -Glucose shows mutarotation because,

A. It is dextrorotatory

B. It undergoes inter conversion between its pyranose structure and furanose structure

C. It undergoes inter conversion between its α and $\beta(+)$ Glucopyranose structures

D. It underoges interconversion with $D(-)$ fructose

Answer: C

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32. The number of chircal central in the open -chain structure of Glucose is

A. 3

B. 4

C. 5

D. 6

Answer: B

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33. The number of chiral centres in the cyclic hemiacetal form of Glucose is

A. 3

B. 4

C. 5

D. 6

Answer: C

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34. The specific rotation of a freshly prepared solution of $\alpha - D -$ Glucose changes from a value of x° to a constant value of y°. The values of x and y are respectively

A. $19^\circ, 52.5^\circ$

B. $111^\circ, 52.5^\circ$

C. $52.5^\circ, 19^\circ$

D. $52.5^\circ, 111^\circ$

Answer: B

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35. The end product (B) formed in the reaction sequence. Glucose $\xrightarrow[H_3O^-]{HCN} A \xrightarrow[\Delta]{HI, P} B.$

A. Hexanoic acid

B. hexane

C. heptane

D. heptanoic acid

Answer: C

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36. With how many molecules of acetic anhydride does not molecule of glucose react?

A. 3

B. 4

C. 5

D. 6

Answer: C

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37. Which one of the following statements is not true for glucose?

A. $\alpha - D(+) -$ glucose undergoes mutarotation

B. It has four asymmetric carbons in Fischer projection formula

C. It gives saccharic acid with Tollen's reagent

D. It reacts with hydroxyl amine

Answer: C

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38. Match the following columns

List - I	List - II
A) α and β-D Glucose	1) Mutarotation
B) (+) and (-) Glucose	2) Enantiomers
C) D and L-notations	3) Anomers
D) α from ⇄ β-form	4) configurational isomers

A. $\begin{matrix} A & B & C & D \\ 2 & 3 & 4 & 1 \end{matrix}$

B. $\begin{matrix} A & B & C & D \\ 2 & 3 & 1 & 4 \end{matrix}$

C. $\begin{matrix} A & B & C & D \\ 3 & 2 & 4 & 1 \end{matrix}$

D.

A	B	C	D
3	2	1	4

Answer: C

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39. A laevorotatory sugar present in fruits is

A. Glucose

B. Fructose

C. Sucrose

D. Lactose

Answer: B

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40. Fructose contains

A. 3 secondary alcoholic groups

B. One ketonic group

C. 2 primary alcoholic groups

D. All the above

Answer: D

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41. Which of the following is called as Laevulose?

A. Glucose

B. Fructose

C. Lactose

D. Maltose

Answer: B

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42. Which sugar is present in frutis?

A. Fructose

B. Glucose

C. Sucrose

D. Galactose

Answer: A

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43. For naturally occuring fructose, the configuration and sign of specific rotation respectively

A. $D,\ -$

B. $D,\ +$

C. $L,\ -$

D. $L, +3$

Answer: A

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44. Which of the following reagents can not be used to distinguish between glucose and fructose?

A. Tollen's reagent

B. Fehling's solution

C. Benedict's solution

D. All of these

Answer: D

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45. Fructose gives the silver mirror test because it

A. Contains an aldehyde group

B. Contains a keto group

C. Undergoes rearrangement under the alkaline conditions of the reagent to form a mixture of glucose and mannose

D. It has pyranose structure

Answer: C

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46. In which of the following all are disaccharides?

A. Maltose, Sucrose, Lactose

B. Maltose, Lactose, Glucose

C. Glycogen, Lactose, Sucrose

D. Strach, Maltose, Lactose

Answer: A

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47. A disaccharide on hydrolysis gives

A. Two molecules of the same monosaccharide

B. Two different monosaccharides

C. Three molecules of the same monosaccharide

D. Two molecules of the same or different monosaccharides

Answer: D

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48. Which of the following is not a reducing sugar?

A. Glucose

B. Sucrose

C. Lactose

D. Maltose

Answer: B

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49. Identify the one which does not belong to the class to which the other three belong based on hydrolysis

A. Sucrose

B. Fructose

C. Lactose

D. Maltose

Answer: B

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50. Which does not show mutarotation?

A. Glucose

B. Fructose

C. Maltose

D. Sucrose

Answer: D

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51. Glucose and cane sugar can't be distinguished by

A. Fehling solution

B. Baeyer's reagent

C. Tollen's reagent

D. Benedict's solution

Answer: B

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52. Change in optical rotation of sucrose solution due to hydrolysis is called

A. Specific rotation

B. Inversion

C. Rotatory motion

D. Mutarotation

Answer: B

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53. Inverted sugar is

A. Optically inactive form of sugar

B. Equimolecular mixture of glucose and fructose

C. Mixture of glucose and fructose

D. A variety of cane sugar

Answer: B

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54. The glycosidic linkage in carbohydrates is

A. Link between two carbon atoms in a carbohydrate by a covalent bond

B. Link between a carbon atom and an oxygen atom

C. Link between carbon atoms in a carbohydrate through an oxygen atom formed by elemination of water

D. None of these

Answer: C

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55. Which among the following does not give a silver mirror test with Tollen's reagent?

A. Fructose

B. Glucose

C. Galactose

D. Sucrose

Answer: D

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56. Sucrose molecule contains

A. a glucopyranose and a fructopyranose units

B. a glucopyranose and a fructofuranose units

C. a glucofuranose and a fructopyranose units

D. a glucofuranose and a fructofuranose units

Answer: B

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57. Maltose consists of

A. Only $\alpha - D$ glucose units

B. α and $\beta - D$ Glucose units

C. Glucose and fructose

D. Fructose only

Answer: A

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58. Incorrect statements among the following

(A) Sucrose is reducing sugar

(B) Two $\alpha - D -$ glucose units in maltose are linked by 1,4-linkage

(C) $\beta - D$ glucose and $\beta - D$ fructose units are linked by 1, 4-linkage in lactose

(D) All polysaccharides are reducing nonsugars

A. only AB

B. A, B, C, D

C. A, C, D only

D. A, B, C only

Answer: C

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59. Regarding lactose some statements are given below

(A) On hydrolysis lactose gives $\beta - D -$ galactose and $\beta - D$-glucose

In lactose C_1 of $\beta - D -$ galactose has acetal structure and C_1 of $\beta - D$-glucose has hemiacetal structure

(C) In lactose molecule $\beta - D$-galactose is a nonreducing unit and $\beta - D -$ glucose is a reducing unit

The correct statements are

A. A, C

B. A, B

C. B, C

D. A, B, C

Answer: D

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60. Which of the following is animal polysaccharide?

A. Amylopectin

B. Glycogen

C. Amylose

D. Cellulose

Answer: B

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61. Amylose consists of

A. Branched chain of $\alpha - D -$ glucose units

B. Unbranched chain of $\beta - D -$ glucose units

C. Units of sucrose

D. Unbranched chain of $\alpha - D -$ glucose units

Answer: D

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62. Amylopectin is a polymer of

A. $\beta - D -$ glucose

B. $\alpha - D$ glucose

C. $\beta - D$ fructose

D. $\alpha - D -$ fructose

Answer: B

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63. In Amylpectin the linkage absent is

A. $C_1 \quad \& \quad C_4$

B. C_1 & C_6

C. C_1 & C_2

D. Both C_1 & C_6 and C_1 & C_4

Answer: C

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64. The intermediate compound in the conversion of starch to glucose is

A. Lactose

B. Maltose

C. Fructose

D. Sucrose

Answer: B

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65. Starch is turned to disaccharide in presence of

A. Maltase

B. Zymase

C. Diastase

D. Lactase

Answer: C

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66. Which one of the following statements about starch is correct?

A. It occurs in the cell wall of plants

B. It is a disaccharide

C. It gives a dark blue colour with iodine solution

D. It gives an organce red precipitate on boiling with Fehling's solution

Answer: C

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67. Salvia helps in the digestion of

A. Fats

B. Starch

C. Proteins

D. Vitamins

Answer: B

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68. Which of the following carbohydrates is the essential constituent of cell wall?

A. Starch

B. Maltose

C. Cellulose

D. Sucrose

Answer: C

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69. Which of the following can exist as food storages and structural materials?

A. Monosaccharides

B. Disaccharides

C. Oligosaccharides

D. Polysaccharides

Answer: D

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70. The carbohydrates are stored in animal bodies as

A. Starch

B. Amylum

C. Glycogen

D. Cellulose

Answer: C

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71. Which of the following is a branched chain polysaccharide?

A. Cellulose

B. Raffinose

C. Amylose

D. Glycogen

Answer: D

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Level Ii Lecture Sheet Exercise I

1. Which molecule possess the general formula of carbohydrates, but is not a carbohydrate?

A. Glyceraldehyde

B. Arabinose

C. Acetic acid

D. All of these

Answer: C

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2. The letter 'D' in carbohydrates represents

A. direct synthesis of carbohydrates

B. dextororotation of sugar

C. mutarotation of sugar

D. configuration of sugar

Answer: D

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3. Glucose and fructose posses the following similarities:

A. taste

B. action of heat

C. action of Tollens reagent

D. direction of optical rotation

Answer: A::B::C

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4. Glucose gives many reactions of aldehyde because

A. it is hydrolysed to acetaldehyde

B. it is a polyhydroxy ketone

C. it is a cyclic aldehyde

D. it is a hemicacetal in equilibrium with its aldehyde form in solution

Answer: D

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5. Osazone formation involves only 2 carbon atoms of glucose because of

A. chelation

B. oxidation

C. reduction

D. hydrolysis

Answer: A

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6. When glucose reacts with bromine water, the major product is

A. gluconic acid

B. Saccharic acid

C. sorbital

D. Galactose

Answer: A

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7. Colour of osazone of glucose is

A. red

B. brown

C. yellow

D. orange

Answer: C

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8. which reagent is used for detection of sugar in urine?

A. Baeyer's reagent

B. Ozonolysis

C. Fehling's reagent

D. Benedicts solution

Answer: C::D

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9. Sugar are characterised by the preparation of osazone derivatives. Which sugar have identical osazones?

A. Glucose and lactose

B. Glucose and fructose

C. Glucose and arabinose

D. Glucose and maltose

Answer: B

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10. Invert sugar is

A. chemically inactive form of sugar

B. Equimolecular mixture of glucose and fructose

C. Mixture of glucose and sucrose

D. A variety of cane sugar

Answer: B

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11. Cane sugar is made of

A. 5 membered glucose ring and 5 membered fructose ring

B. 6 membered glucose ring and 6 membered fructose ring

C. 6 membered glucose ring and 5 membered fructose ring

D. 6 membered galactose ring and 6 membered fructose ring

Answer: C

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12. The ultimate product of the hydrolysis of starch is:

A. glucose

B. Fructose

C. Sucrose

D. None of these

Answer: A

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13. Cellulose is a linear polymer of

A. $\alpha - D -$ glucose

B. $\beta - D -$ glucose

C. α-frutose

D. None of these

Answer: B

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14. Starch is changed into disaccharides in the presence of:

A. diastase

B. maltase

C. lactase

D. zymase

Answer: A

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15. Which is used for making rayon (artificial silk)?

A. Starch

B. Cellulose

C. terephthalic acid

D. Adipic acid

Answer: B

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16. After digestion, starch is converted into

A. glucose

B. Fructose

C. Lactose

D. Sucrose

Answer: A

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17. Starch is made up of

A. glucose and fructose

B. amylose and amlopectin

C. amylose and glycogen

D. amylopectin and glycogen

Answer: B

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18. Aqueous solution of carbohydrate with 2 drops of alcoholic solution of α- naphthol and H_2SO_4 gives a ring at the junction. The colour of the ring is

A. Yellow

B. green

C. violet

D. red

Answer: C

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19. Artifical sweetener used in soft drinks is:

A. glucose

B. Fructose

C. Cellulose

D. asparatame

Answer: D

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20. A certain compound gives negative test with ninhydrin, but positive test with Benedict's solution. The compound is:

A. protein

B. monosaccharide

C. lipid

D. amino acid

Answer: B

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Level Ii Lecture Sheet Exercise Ii

1. A compound (X) $C_6H_{12}O_6$ is oxidised by bromine water into monobasic acid and also reduces Tollens' reagent. It reacts with HCN to give a compound (Y) which on hydrolysis gives a compound (Z).On treating

compound (Z) with HI in the presence of red phosphorus n-heptanoic acid is obtained. Compound (X) on treatment with excess phenylhydrazine gave D-glucosazone.

The compound (Y) is

A. $CN-(CH-OH)_5-CH_2OH$

B. $HOOC-(CHOH)_5-CH_2OH$

C. $OHC-(CHOH)_5-CHO$

D. $CN-(CHOH)_4-CHO$

Answer: A

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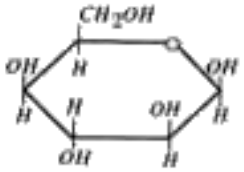
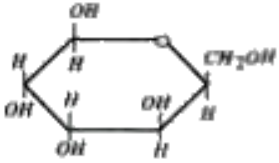
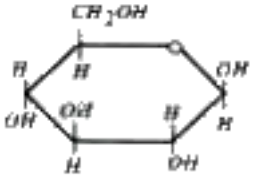
2. A compound (X) $C_6H_{12}O_6$ is oxidised by bromine water into monobasic acid and also reduces Tollens' reagent. It reacts with HCN to give a compound (Y) which on hydrolysis gives a compound (Z).On treating compound (Z) with HI in the presence of red phosphorus n-heptanoic acid is obtained. Compound (X) on treatment with excess phenylhydrazine

gave D-glucosazone.

The cyclic form of compound (X) is

A. 

B. 

C. 

D. 

Answer: C

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3. Mutarotation is the change in specific rotation of an optically active compound in solution with time to an equilibrium value. Interconversion is possible only if sugar has anomeric hydroxyl group i.e., sugar is reducing. Diastereomers which differ in configuration of chiral carbon developed in hemiacetal formation are called anomers. Epimers are a pair of stereoisomers which differ in the configuration about one of its chiral carbon

The anomeric carbon in fructose is

A. C_1

B. C_2

C. C_3

D. C_4

Answer: B

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4. Mutarotation is the change in specific rotation of an optically active compound in solution with time to an equilibrium value. Interconversion is possible only if sugar has anomeric hydroxyl group i.e., sugar is reducing. Diastereomers which differ in configuration of chiral carbon developed in hemiacetal formation are called anomers. Epimers are a pair of stereoisomers which differ in the configuration about one of its chiral carbon

On which carbon atom glucose and galactose differ in the position of $-H$ and $-OH$ groups?

A. Second

B. Third

C. Fourth

D. Fifth

Answer: C

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5. Mutarotation is the change in specific rotation of an optically active compound in solution with time to an equilibrium value. Interconversion is possible only if sugar has anomeric hydroxyl group i.e., sugar is reducing. Diastereomers which differ in configuration of chiral carbon developed in hemiacetal formation are called anomers. Epimers are a pair of stereoisomers which differ in the configuration about one of its chiral carbon

$\alpha -$ glucose and $\beta -$ glucose differ in configuration at _____ and are called

A. C_1, Anomers

B. C_2, Anomers

C. C_2, Epimers

D. C_3, Tautomers

Answer: A

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Level Ii Lecture Sheet Exercise Iii

1. Match the following columns

List - I	List - II
A) Amylose	p) Trisaccharide
B) Maltose	q) Polysaccharide
C) Mannose	r) Disaccharide
D) Raffinose	s) Hexose and monosaccharide

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2. Match the following columns

List - I	List - II
A) Sucrose $\rightarrow$ Glucose + Fructose	p) Lipase
B) Cellulose $\rightarrow$ Glucose	q) Invertase
C) Proteins $\rightarrow$ α-L amino acid	r) Cellulase
D) Oil $\rightarrow$ Glycerol + Fatty acid	s) Pepsin

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3. Match the following columns

List - I	List - II
A) Blood sugar	p) Glucose
B) Milk sugar	q) Fructose
C) Invert sugar	r) Lactose
D) Fruit sugar	s) Glucose + Fructose

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4. Match the following columns

List - I	List - II
A) Glucose	p) Inulin
B) Fructose	q) Amylose
C) Sucrose	r) Amylum
D) Starch	s) Glycoside

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Level Ii Lecture Sheet Exercise Iv

1. The number of $-OH$ groups in s orbitol

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2. Specific rotation for α-anomer of a given mono saccharide is 100° and for β-anomer is $+20^\circ$, specific rotation of equilibrium mixture is 68°, if % of α anomer is $x \times 10\,\%$ then 'x' is

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3. $\begin{matrix} CHO \\ | \\ (CHOH)_4 \\ | \\ CH_2OH \end{matrix} + xC_6H_5NHNH_2 \rightarrow \begin{matrix} CH=NNHC_6H_5 \\ | \\ C \\ | \\ (CHOH)_3 \\ | \\ CH_2OH \end{matrix} - \mathbb{N}HC_6H_5$

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4. Maximum number of optical isomers possible for fructose

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Practice Sheet 1

1. Which of the following is not a polysaccharide?

A. Cellulose

B. Glycogen

C. Lactose

D. Starch

Answer: C

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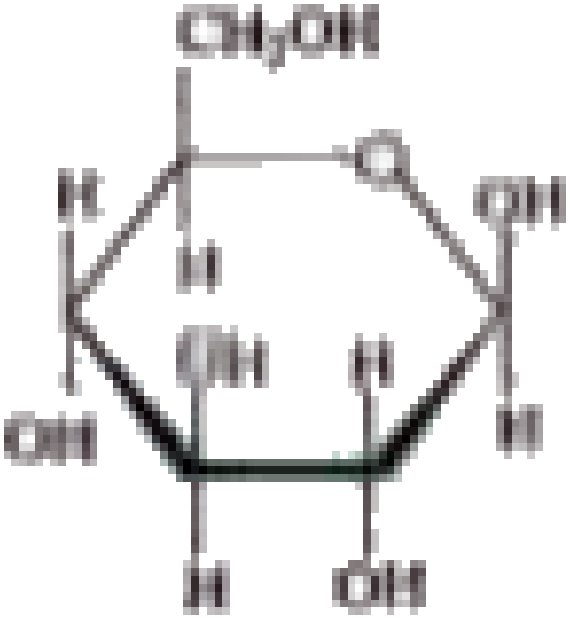
2. The strcture pictured is the Haworth structure of



A. $\beta - D -$ galactose

B. $\beta - D -$ glucose

C. $\alpha - D -$ galactose

D. $\alpha - D -$ glucose

Answer: B

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3. Which of the following statement is right

A. Reduction of glucose gives only sorbitol

B. Reduction of fructose gives only mannitol

C. Reduction of fructose gives only sorbitol

D. Reduction of glucose gives both sorbitol and mannitol

Answer: A

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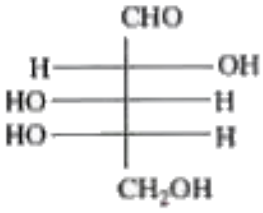
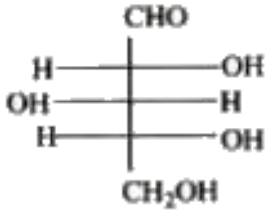
4. Which of the following on oxidation give a meso dicarboxylic acid

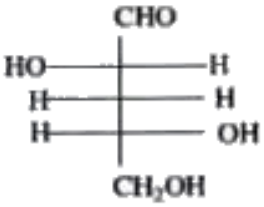
A.



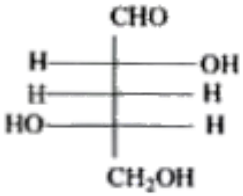
B.



C.



D.



Answer: B

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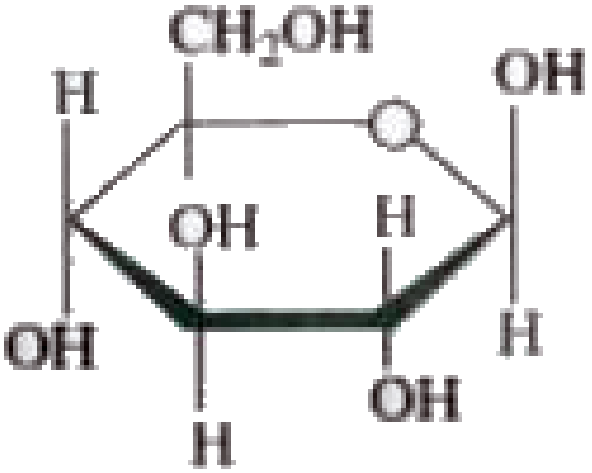
5. Chiral centres are found in



A. C_1, C_2, C_3, C_4, C_5 and C_6

B. C_1 and C_4 only

C. C_2 and C_3 only

D. C_1, C_2, C_3, C_4 and C_5

Answer: D

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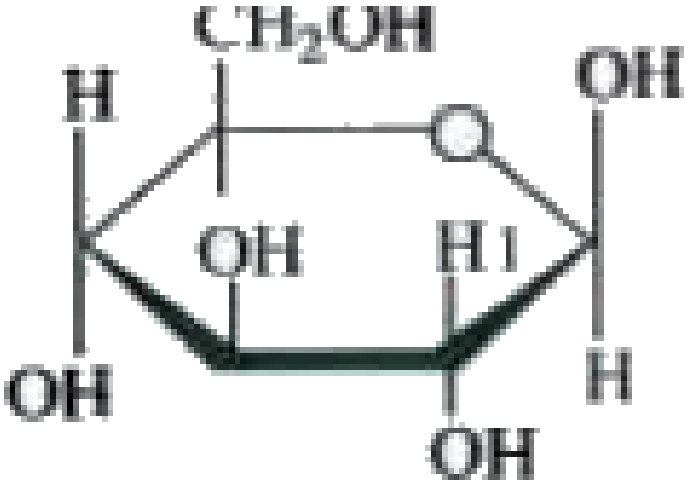
6. At room temperature, the lowest energy conformation of this molecule is



A. In chair form, all bulky groups occupy equatorial positions

B. In chair form all bulky groups occupy axial positions

C. In chain form, bulky groups at C_1, C_3, C_5 occupy axial

D. In chair form, bulky groups at C_1, C_4 occupy axial position

Answer: A

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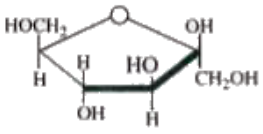
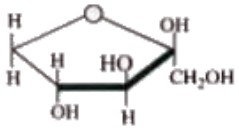
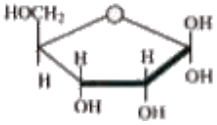
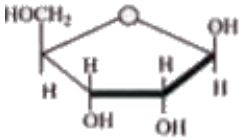
7. Which of the following compounds is a β-aldopentofuranose?

A. 

B. 

C. 

D. 

Answer: D

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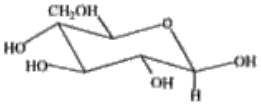
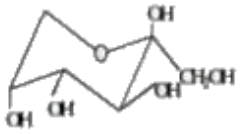
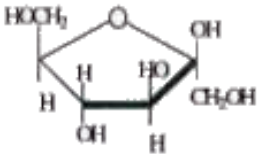
8. Which of the following compounds is a β- ketohexafuranose?

A. 

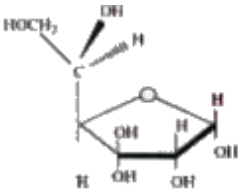
B.



C.



D.



Answer: C

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9. The optical rotation of the α form of a pyranose is + 150.70, that of the β form is +52.80. In solution an equlibrium mixture of the anomers has an optical rotation of +80.20. The percentage of the α form at equilibrium is

A. 0.28

B. 0.32

C. 0.68

D. 0.72

Answer: A

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10. A pyranose ring consists of a skeleton is

A. 5 carbon atoms and one oxygen atom

B. 6 carbon atoms

C. 6 carbon atoms and one oxygen atom

D. 4 carbon atoms and one oxygen atom

Answer: A

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11. Which of the following statements is correct?

A. All naturally occuring glucose is dextrorotatory

B. All naturally occuring fructose is laevorotatory

C. Sucrose on hydrolysis give glucose and fructose

D. Dextrorotatory sucrose on dissolving in water become levorotatory sucrose

Answer: A::B::C::D

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12. Which of the following reagents is useful to distinguish between glucose and sucrose

A. I_2 & NaOH solution

B. $AgNO_3$

C. Conc. HCl

D. Fehling's solution

Answer: B::D

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13. Which of the following is correct statement?

A. Fructose is laevorotatory

B. α-glucose and $\beta-$ glucose differ in configuration at anomeric carbon

C. The linkage connecting α-glucose and $\beta-$ fructose in sucrose is known as glycosidic linkage

D. Fructose is dextro rotatory

Answer: A::B::C

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14. Which of the following statement is/are correct?

A. Glucose exhibits mutarotation when dissolved in water

B. Sucrose is not a reducing sugar and so does not exhibit mutarotation

C. When sucrose is hydrolysed by dil HCl, the resulting solution is laevorotatory

D. Fructose also is a reducing sugar as it exists in equilibrium with glucose in alkaline soltuion

Answer: A::B::C::D

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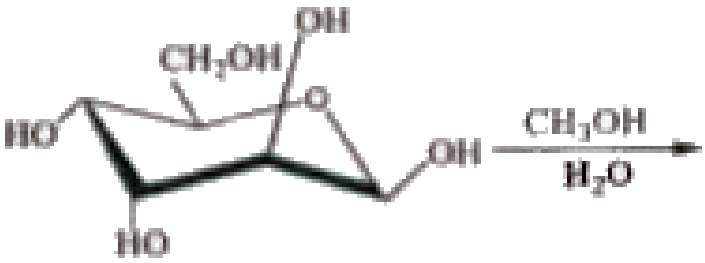
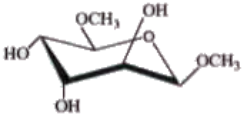
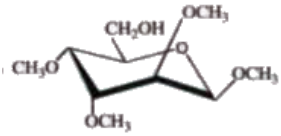
15. What is /are the major product (s) in the reaction below?



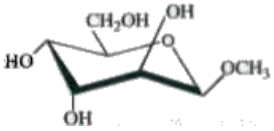
A.



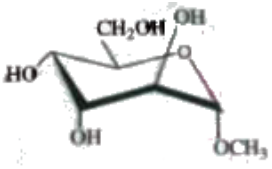
B.



C.



D.



Answer: C::D

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16. Which of the following statements is/are correct

A. Maltose is also known as malt sugar

B. Sucrose is also known as cane sugar

C. Lactose is also known as graphe sugar

D. Starch is also known as Amylum

Answer: B::D

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17. $C_6H_{12}O_6$ can be glucose or Fructose

$$C_6H_{12}O_6 \xrightarrow{HCN} A\left(H_3O^+\right) \rightarrow B \xrightarrow{P/HI} C$$

If $C_6H_{12}O_6$ acts as fructose then compound C is

A. n-heptanoic acid

B. n-pentanoic acid

C. n=hexane

D. 2-methyl hexane

Answer: D

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18. $C_6H_{12}O_6$ can be glucose or Fructose

$C_6H_{12}O_6 \xrightarrow{HCN} A\left(H_3O^+\right) \rightarrow B \xrightarrow{P/HI} C$

If $C_6H_{12}O_6$ acts as glucose then compound C is

A. `2-methyl hexanoic acid

B. n-heptanoic acid

C. Heptan

D. n-pentanoic acid

Answer: C

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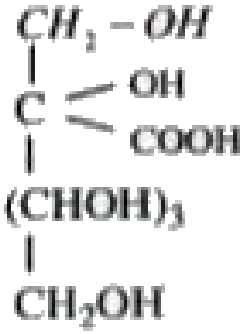
19. $C_6H_{12}O_6$ can be glucose or Fructose

$$C_6H_{12}O_6 \xrightarrow{HCN} A\left(H_3O^+\right) \rightarrow B \xrightarrow{P/HI} C$$

If $C_6H_{12}O_6$ acts as fructose then compound B is

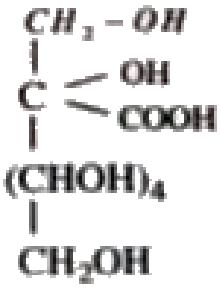
A.



B. $(CHOH)_4$ (CH_2OH / CH_2OH)

C. $(CHOH)_5$ ($COOH$ / CH_2OH)

D.



Answer: A

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20. Monosaccharides and disaccharides in which aldehyde group is free reduce Tollen's reagent as well as Fehling solution and hence are known as reducing sugars. Carbohydrates react with excess of phcayl kydrazine to yield their crystalline derivatives called oxazones. In osazone formation only the first two carbon atoms are irrelved Osazone on hydrolysis gives same which are reduction with $ZnCH_3COOH$ gives a ketose sugar

The same osazone is formed by

A. Glucose, galactose, mannose

B. Glucose, mannose, fructose

C. Maltose, surcrose, lactose

D. Starch, cellulose, glycogen

Answer: B

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21. Monosaccharides and disaccharides in which aldehyde group is free reduce Tollen's reagent as well as Fehling solution and hence are known as reducing sugars. Carbohydrates react with excess of phcayl kydrazine to yield their crystalline derivatives called oxazones. In osazone formation only the first two carbon atoms are irrelved Osazone on hydrolysis gives same which are reduction with $ZnCH_3COOH$ gives a ketose sugar

The end product 'Z' in the following sequence of reactions. Glucose,

$$\xrightarrow[(\text{excess})]{Ph.NH.NH_2} X \xrightarrow[\Delta]{H_2 \frac{\emptyset}{H^+}} Y \xrightarrow{Zn/AcOH} Z$$

A. Mannotol

B. Arabinose

C. Fructose

D. Ribose

Answer: C

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22. Monosaccharides and disaccharides in which aldehyde group is free reduce Tollen's reagent as well as Fehling solution and hence are known as reducing sugars. Carbohydrates react with excess of phcayl kydrazine to yield their crystalline derivatives called oxazones. In osazone formation only the first two carbon atoms are irrelved Osazone on hydrolysis gives same which are reduction with $ZnCH_3COOH$ gives a ketose sugar Osazone cannot be formed by whihc of the following

A. $C_6H_5 - CH(OH)COC_6H_5$

B. $OHC - CH(OH) - (CH(OH))_3 - CH_2OH$

C. $HOH_2C - CO - (CHOH)_3 - CH_2OH$

D. $OHC - CH_2 - (CH(OH))_3 - CH_2OH$

Answer: D

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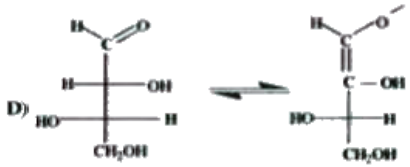
23. Match the following columns

List - I	List - II
A) α–D –glucopyranose $\rightleftharpoons$ β– D–glucopyranose	p) Lobry DeBruyn–Van Ekenstein brans formation
B) Glucose $\rightleftharpoons$ Mannose	q) Mutarotation
C) Fructose $\rightleftharpoons$ Glucose	r) Tautomerism
D) 	s) Epimerisation

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24. Match the following columns

List - I	List - II
A) Maltose	p) Invertsugar
B) Sucrose	q) Reducing sugar
C) Lactose	r) Glycosidic linkage
D) Fructose	s) Disaccharide
	t) Exhibit mutarotation

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25. The minimum number of carbon atoms that should present in a carbohydrate is_____

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26. The number of chiral centers in the open chain structure of glucose is_____

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27. How many chiral centers are present in the product obtained by reaction of glucose with conc. HNO_3?

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28. The no. of chiral carbon atoms present in ketopentose is _____

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29. How many chiral carbon atoms are present in $\beta - D -$ ribose?

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30. The number of chiral centers present in fructo furanose is_____

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Practice Sheet 2

1. Which of the following statement is correct

A. All monosaccharides are reducing sugars

B. All disaccharides are reducing sugars

C. All polysaccharides are reducing sugars

D. All aldohexoses are reducig sugars but not ketohexoses

Answer: A

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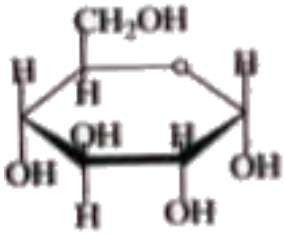
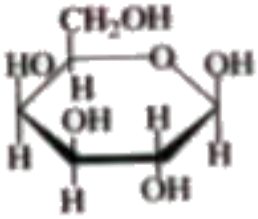
2. Which of the following structures represent a non reducing sugar

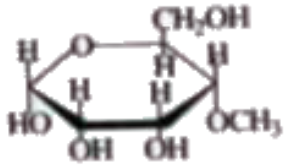
A.



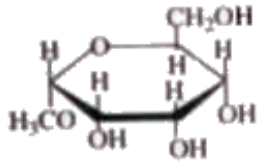
B.



C.



D.



Answer: D

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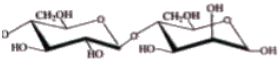
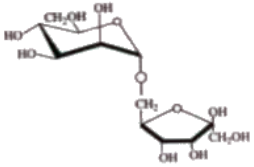
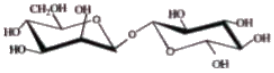
3. Which of the following is/are reducing sugars?

A. 

B. 

C. 

D. None

Answer: A

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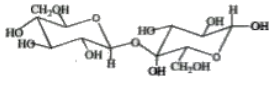
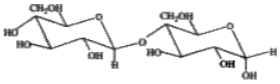
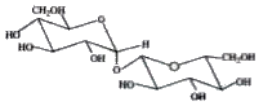
4. Which of the following disaccharides is a non-reducing sugar (does not react with Tollens' reagent)?

A. 

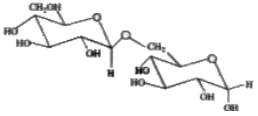
B.



C.



D.



Answer: C

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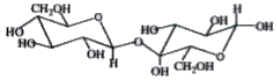
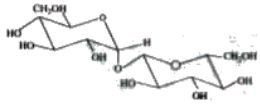
5. Which of the following disaccharides is the β-anomer of $4-O-(\beta-D-\text{glucopyranosyl})$ D-glucopyranose?

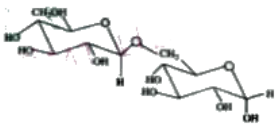
A.



B.

C.



D. 

Answer: A

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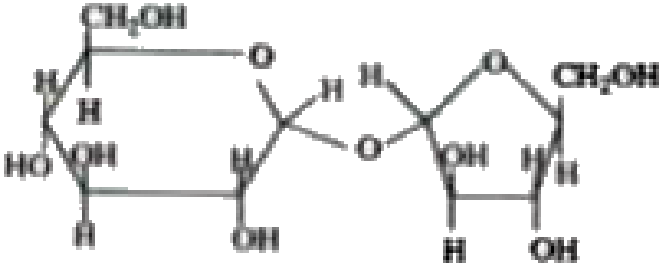
6. What is true about the following carbohydrate



A. It anomeriszes in solution phase

B. It is a reducing sugar

C. It shows the phenomenon of inversion of sugar in acidic medium

D. It shows mutarotation

Answer: C

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7. In maltose the glucose units are connected through

A. α glycosidic linkage between C_1 of one unit and C_4 of another

B. α glycosidic linkage between C_1 of one unit and C_1 of another

C. β glycosidic linkage between C_1 of one unit and C_2 of another

D. β glycosidic linkage between C_1 of one unit and C_4 of another

Answer: A

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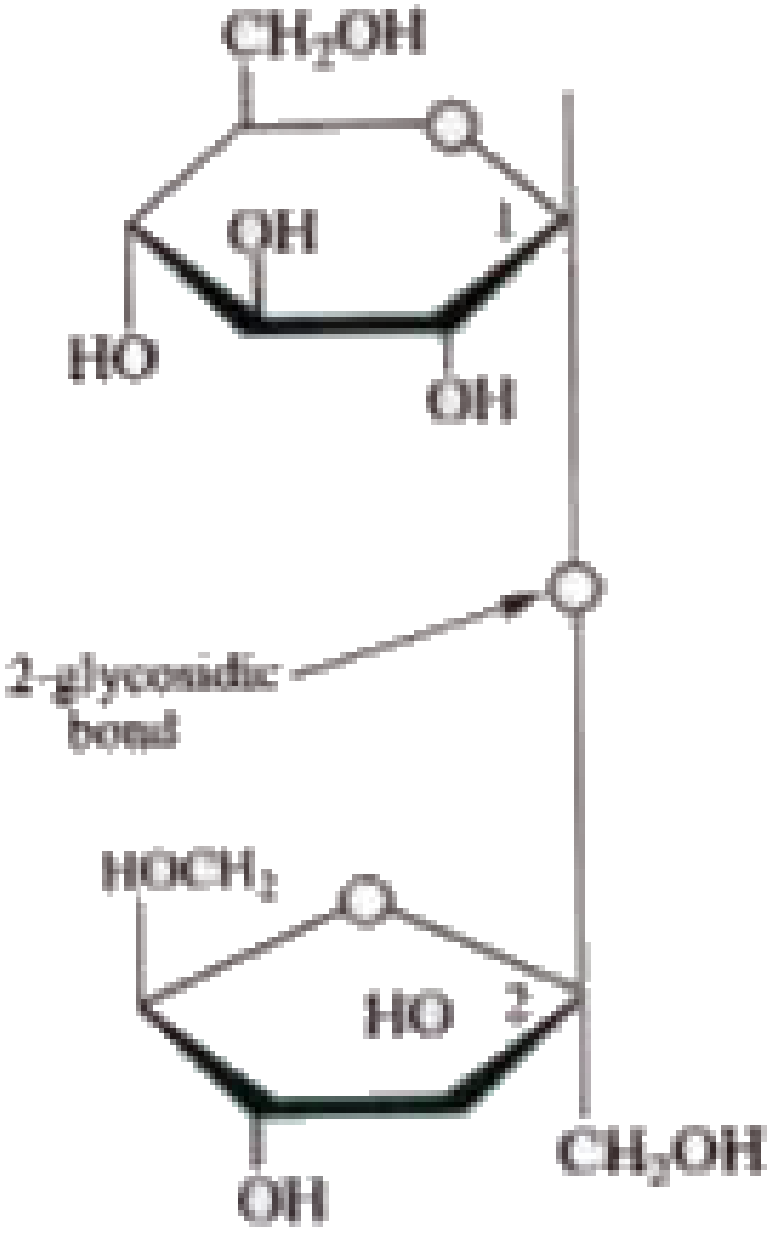
8. The structure shown below is



A. maltose

B. lactose

C. Cellulose

D. Sucrose

Answer: D

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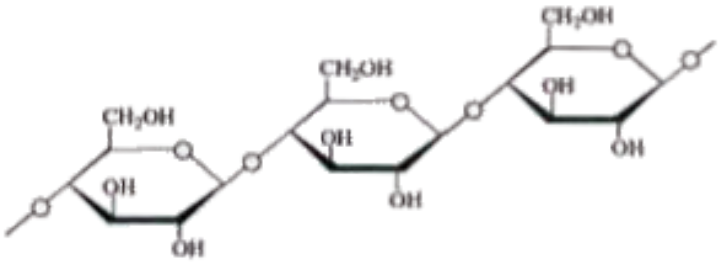
9. The piece of the chain pictured would be part of



A. amylpectin

B. Cellulose

C. amylose

D. Glycogen

Answer: B

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10. Which of the following best describes the polysaccharide amylose?

A. a 1, $4-O-\alpha-$ linked poly -D-glucose

B. a 1, $4-O-\beta-$ linked poly -D- glucose

C. an alternating $1,4-\alpha/\beta$- linked poly -D-glucose

D. a 1, $4-O-\alpha$-linked poly -D- mannose

Answer: A

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11. Which does not exhibit mutarotation

A. Sucrose

B. Starch

C. Cellulose

D. Maltose

Answer: A::B::C

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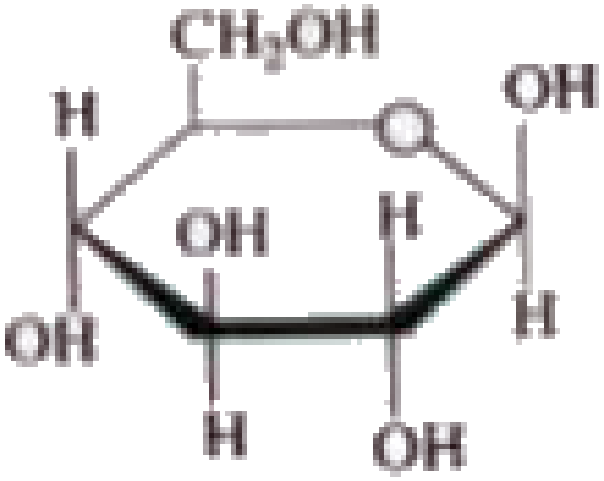
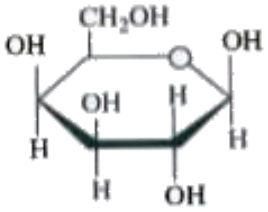
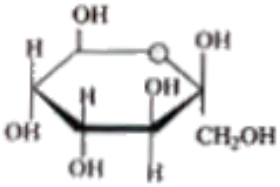
12. During mutarotation, the structure of the molecule given below changes to



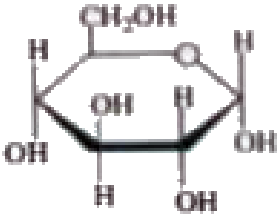
A.



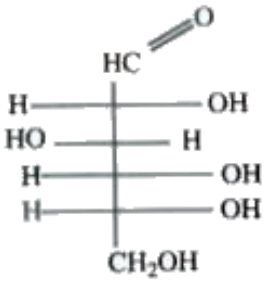
B.



C.



D.



Answer: C::D

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13. α-maltose can be hydrolysed to glucose according to the following reaction. Given

Standard enthalpies of formation of $C_{12}H_{22}O_{11}$ (aq) = -2238kJ/mol

Standard enthalpies of formation of $H_2O(l) = -285kJ/mol$

Standard enthalpies of formation of $C_6H_{12}O_6$ (aq) $= -1263kJ/mol$

Time (min)	0	1.0	100
$\text{Conc. Of -maltose(M)}$	4.0	1.0	0.25

Which of the following statements(s) is/are true?

A. The hydrolysis of maltose is exothermic

B. Heat liberated in combustion of 1.0 mol of α-maltose is greater than the heat liberated in combustion of 2.0 mol of glucose

C. Increasing temperature will increase the degree of hydrolysis of α-maltose

D. The hydrolysis of α-maltose follow 1st order kinetics

Answer: A::B::C

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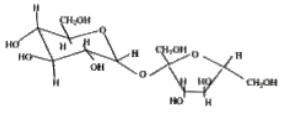
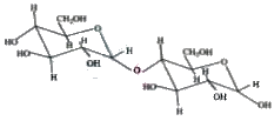
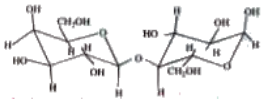
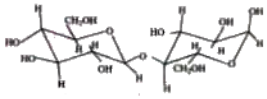
14. The ones with β-glycosidic linkage are:

A. 

B. 

C. 

D. 

Answer: C::D

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15. Hydrolysis of sucrose is carried out in presence of a mineral acid to give

A. Dextrorotatory fructose

B. Dextrorotatory glucose

C. Laevorotatary of fructose

D. Laevorotatary glucose

Answer: B::C

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16. In amylopectin, the glucose molecules are connected by

A. beta-1, 4-glycosidc bonds

B. alpha-1, 6-glycosidc bonds

C. alpha-1, 4-glycosidc bonds

D. beta-1, 6-glycosidc bonds

Answer: B::C

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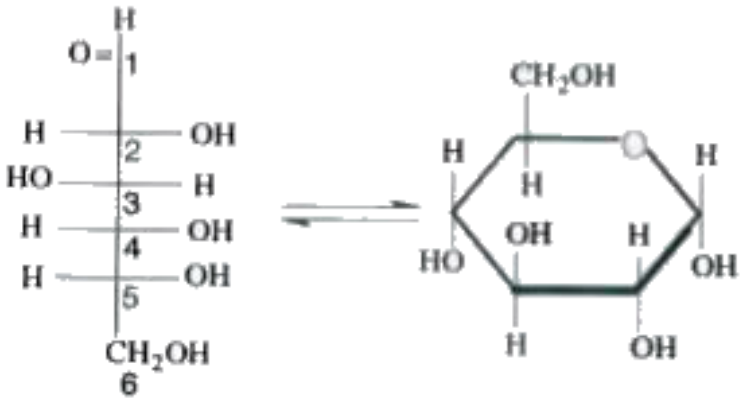
17. Use the equilibrium for glucose shown below to answer questions



The pyranose form of glucose is a

A. Acetal

B. Hemiacetal

C. Ester

D. Ether

Answer: B

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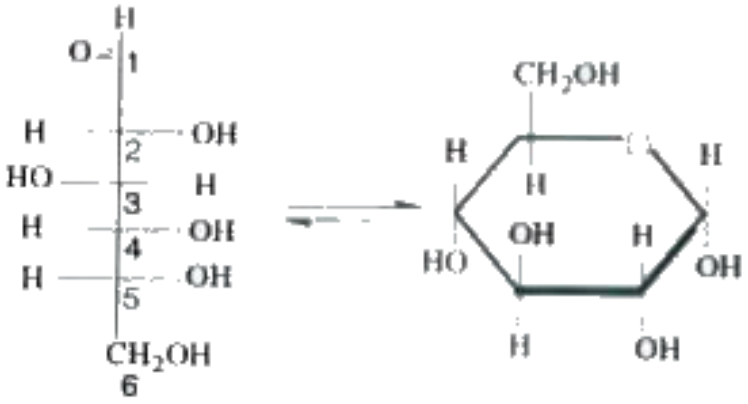
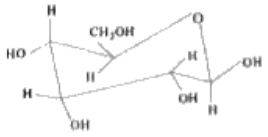
18. Use the equilibrium for glucose shown below to answer questions

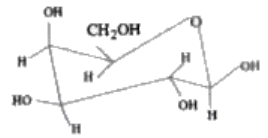


Which chair conformation corresponds to the pyranose shown at the equilibrium

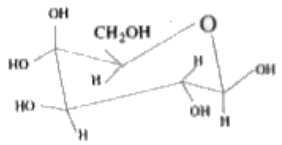
A.



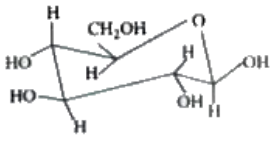
B.



C.



D.



Answer: D

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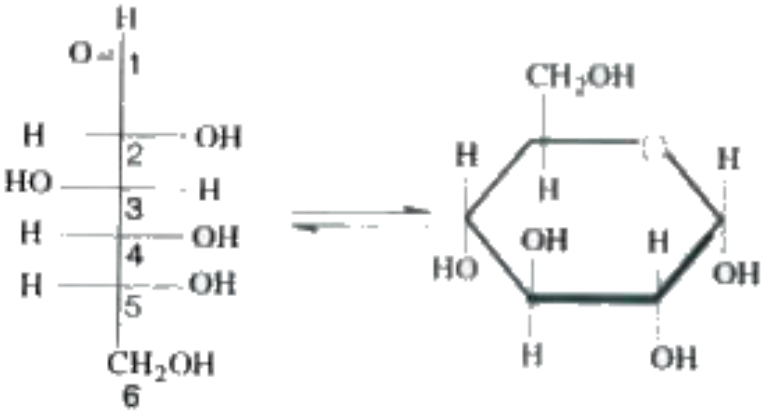
19. Use the equilibrium for glucose shown below to answer questions



The anomeric carbon in the glucose molecule is

A. C_1

B. C_3

C. C_5

D. C_6

Answer: A

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20. An organic compound (P) has carbon = 40%, hydrogen = 6.6%. Its vapour density is 90. It forms penta acyl derivatives. Though it gives positive Fehling's test and positive Tollen's test it does not have -CHO group. Compound (P) on oxidation gives two hydroxy acids (Q) and (R). (Q) is a dihydroxy dicarboxylic acid with formula $C_4H_6O_6$ while (R) is a monocarboxylic acid with formula $C_2H_4O_3$. The compound (P) on methylation followed by oxidation gives another carboxylic acid $C_8H_{14}O_7$. (S) containing three methoxy groups

The carbohydrate (P) is

A. Glucose

B. Fructose

C. Galactose

D. altose

Answer: B

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21. An organic compound (P) has carbon = 40%, hydrogen = 6.6%. Its vapour density is 90. It forms penta acyl derivatives. Though it gives positive Fehling's test and positive Tollen's test it does not have -CHO group. Compound (P) on oxidation gives two hydroxy acids (Q) and (R). (Q) is a dihydroxy dicarboxylic acid with formula $C_4H_6O_6$ while (R) is a monocarboxylic acid with formula $C_2H_4O_3$. The compound (P) on methylation followed by oxidation gives another carboxylic acid $C_8H_{14}O_7$. (S) containing three methoxy groups

The compound (Q) is

A. $HOOC-CH(OH)CH(OH)-COOH$

B. $HOOC-CH(OH)-\underset{\underset{O}{||}}{C}-COOH$

C. $OHC-CH(OH)CH(OH)-CHO$

D. $HOOC-CH(OH)-\underset{\underset{CHO}{|}}{CH(OH)}$

Answer: A

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22. An organic compound (P) has carbon = 40%, hydrogen = 6.6%. Its vapour density is 90. It forms penta acyl derivatives. Though it gives positive Fehling's test and positive Tollen's test it does not have -CHO group. Compound (P) on oxidation gives two hydroxy acids (Q) and (R). (Q) is a dihydroxy dicarboxylic acid with formula $C_4H_6O_6$ while (R) is a monocarboxylic acid with formula $C_2H_4O_3$. The compound (P) on methylation followed by oxidation gives another carboxylic acid $C_8H_{14}O_7$. (S) containing three methoxy groups

The compound (S) is

A. $HOOC-(CHOCH_3)_3-COOH$

B. $OHC-(CHOCH_3)_3-CHO$

C. $HOOC-(CHOCH_3)_4-COOH$

D. None of these

Answer: A

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23. Match the following columns

List - I (Carbohydrate)	List - II (Source)
A) Glucose	p) Inulin
B) Fructose	q) Amylose
C) Sucrose	r) Amylopectin
D) Starch	s) Glycoside

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24. Match the following columns

List - I	List - II
A) Glucose, Fructose	p) Functional Isomers
B) Fructose, mannose	q) Mutarotation
C) Mannose	r) Reducing sugar
D) Maltose	s) Lobsry de-bryn van ekestein Rearrangement

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25. The number of chiral centers present in glucopyranose is _____

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26. The total no. of formicacid and formaldehyde molecules obtained, when glucose reacts with periodic acid are_____

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27. The total no. of formic acid and formaldehyde molecules obtained when fructose reacts with perioidic acid are _____

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28. The no. of possible optical isomers of fructose are _____

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29. How many moles of phenyl hydrazine molecules are required to form osazone by one mole of glucose?

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30. The no. of primary hydroxyl groups present in fructo furanose

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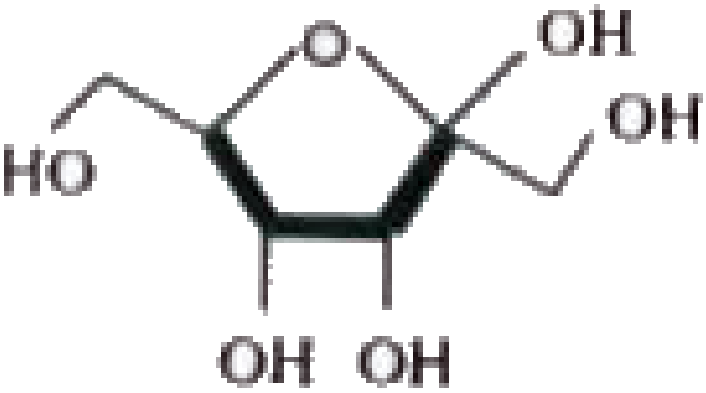
Practice Sheet 3

1. Which description fit the following sugar best?



A. Ketose, furanose, α

B. Ketose, furanose, β

C. Aldose, pyranose, β

D. aldose, pyranose, α

Answer: B

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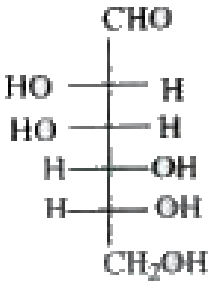
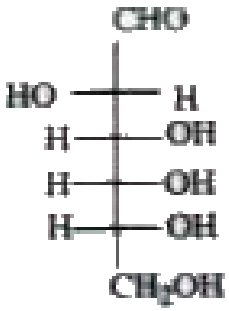
2. Which of the following is the correct Fischer representation of D-galactose? The structure of $\beta - D$-galactopyranose is provided

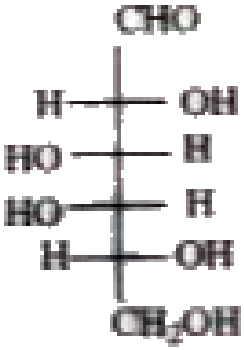
A.



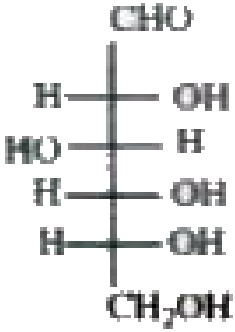
B.



C.



D.



Answer: C

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3. Which of the following statement about the pyranose form of mannose is not correct?

A. It exists as two anomeric stereoisomers

B. It reacts with Tollen's reagent to give a silver mirror (i.e, it is a reducing sugars)

C. Reaction with excess CH_3I and $AgOH$ gives a non-reducing penta -O- methyl derivative

D. It resist reduction with aqueous sodium borohydride

Answer: D

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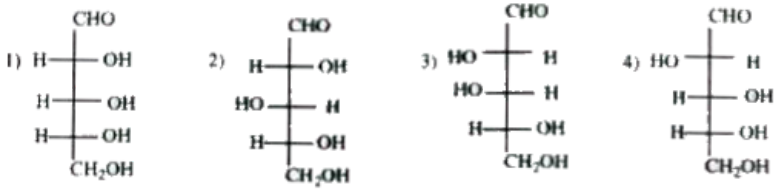
4. Two aldopentoses X and Y give the same osazone derivative. X is oxidized to an optically active aldaric acid by dilute nitric acid. Ruff degradation of Y gave a tetroe which was similarly oxidized to an optically active aldaric acid. Assign the structures of X and Y from the following

list?



A. X=1 and Y=4

B. X = 4 and Y=1

C. X=2 and Y=3

D. X=3 and Y=2

Answer: D

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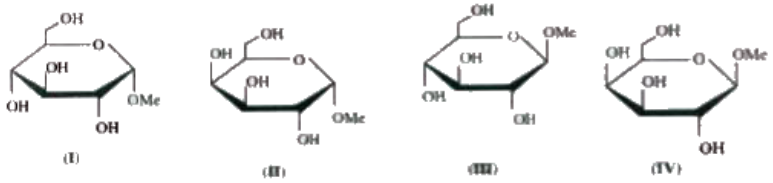
5. Identify the correct set of stereochemical relationship among the following monosaccharides I-IV



A. I and II are anomers, III and IV are epimers

B. I and III are epimers, II and IV are anomers

C. I and II are epimers, III and IV are anomers

D. I and III are anomers, I and II are epimers

Answer: D

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6. D-glucose $\overset{HO^-}{\Longleftrightarrow} A + B$ A and B are

A. D-mannose & D-mannitol

B. D-mannose & D-Fruclose

C. D-Allose & D-Altrose

D. D-Glucose & D-Idose

Answer: B

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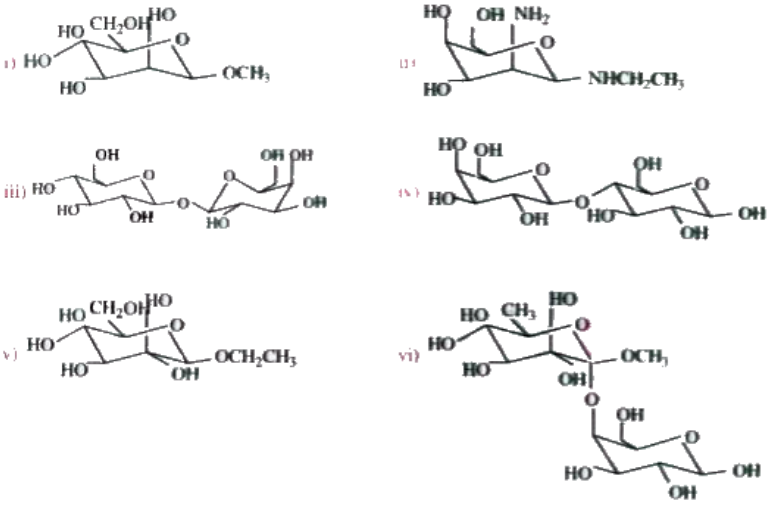
7. Which of the molecules below will react with alcohol?



A. (i), (iii) and (v)

B. (ii) and (iv)

C. (iv) and (vi)

D. (i), (ii), (iii) and (vi)

Answer: C

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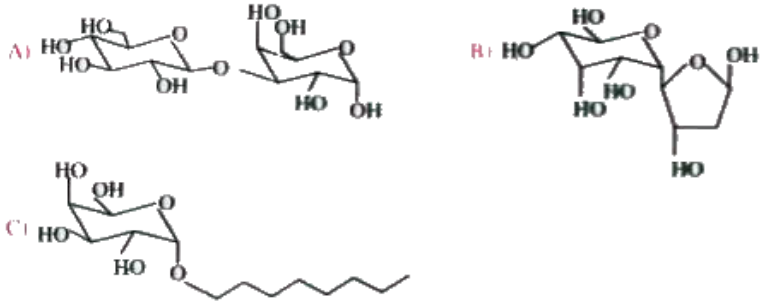
8. 

Which of the compounds (A-C) depicted above is NOT a hemiacetal linkage?

A. Compound A

B. Compound B

C. Compound C

D. None of the above (they are all hemiacetals)

Answer: D

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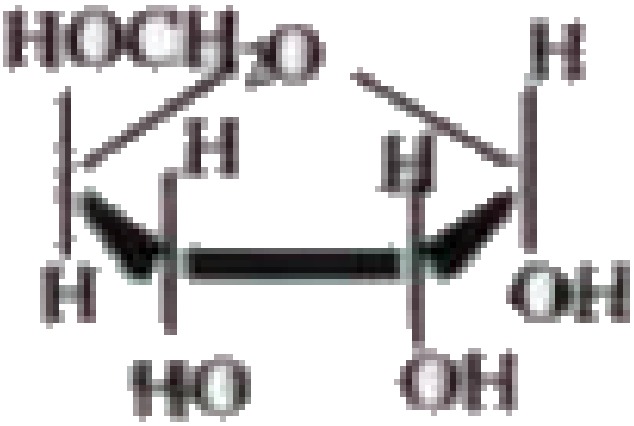
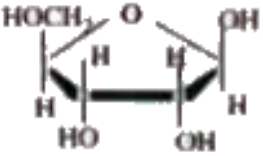
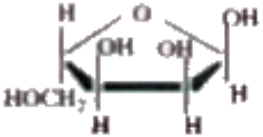
9. Which of the following represents the anomer of the compound shown?



A. 

B. 

C. 

D. None of these

Answer: B

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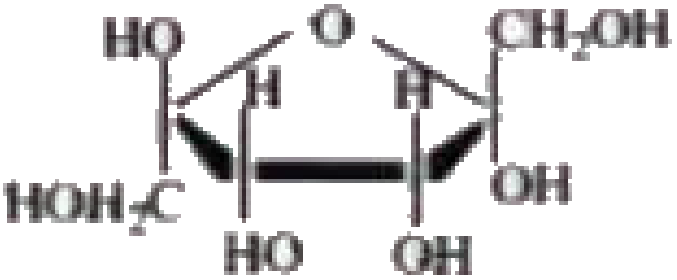
10. Which set of terms correctly identifies the carbohydrate shown ?



(1) Pentose (2) Pentulose (3) Hexulose (4) Hexose (5) Aldose (6) Ketose (7) Pyranose (8) Furanose

A. $4, 6, 8$

B. $2, 6, 7$

C. $1, 5, 8$

D. A set of terms other than these

Answer: A

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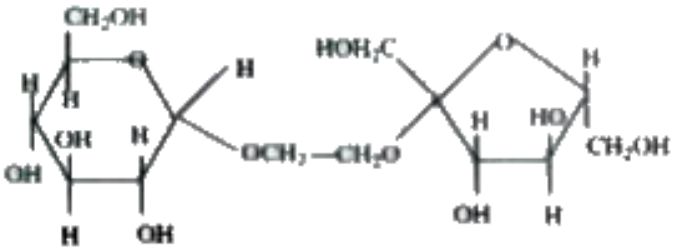
11. The correct statement about the following disaceharide is



A. ring (i) is pyranose with α-glucosidic link

B. ring (i) is furanose with α-glucosidic link

C. ring (ii) is furanose with α-glucosidic link

D. ring (ii) is pyranose with β-glucosidic link

Answer: A

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12. Which of the following is/are true regarding mutarotaion?

A. It occurs with glucose because an equilibrium is estabilised in solution between the cyclic hemiacetals

B. In mutarotation specific rotation initially decrease and then reaches to a constant value

C. All disacharides show mutarotation in solution

D. Glycosides of anomers of D-glucose do not show mutarotation

Answer: A::D

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13. What is/are true regarding epimers and epimerization?

A. Epimes are a pair of diasteromers

B. A compound can have more than two epimers

C. Epimers rotate the plane polarized light in opposite directions

D. An aldose on treatment with $Br_2 - H_2O$ followed by workup with pyridine in presence of acid catalyst forms a pair of epimeric aldonic acid

Answer: A::D

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14. What is /are true regarding (+) maltose-a disaccharide?

A. It is reducing sugar

B. It has one glycosidic linkage and a free hemiacetal end

C. It forms osazone with phenylhydrazine

D. It shows mutarotation in aqueous solution

Answer: A::B::C::D

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15. The correct statement is/are

A. Guncotton is cellulose trinitrate

B. Pyroxylin is a partially nitrated cellulose

C. Cellulose on treatment with excess of acetic anhydride in presence of sulphuric acid catalyst, converted into the triacetate of glucose

D. Cellulose is a nonreducing carbohydrate

Answer: A::B::C::D

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16. What is /are true regarding amylose?

A. $(+)-$ Maltose is the only disaccharide obtained on hydrolysis of amylose

B. Amylose on complete hydrolysis gives $D-(+)-$ glucose as only monosaccharide

C. Amylose has α-1.4-glycosidic linkage

D. Amylose is a reducing carbohydrate

Answer: A::B::C

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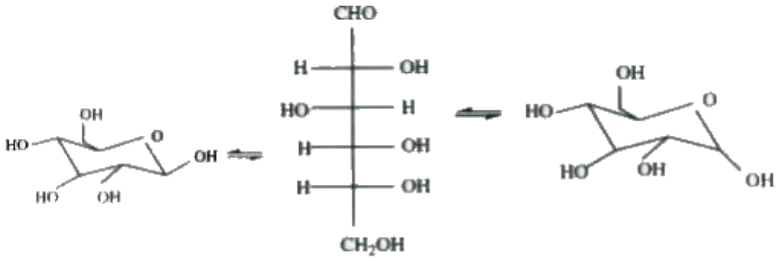
17. $D(+)$ Glucose has melting point $140^\circ C$ and specific rotation $[a]_D^{25}$ is $112^\circ C$. Another D(+) Glucose has melting point $150^\circ C$ and specific rotation $[a]_D^{25}$ is $+18.7^\circ C$. The two form have significantly different optical rotation but when an aqueous solution of either form is allowed to stand, it rotation changes. The specific rotation of one form decreases and rotation of other increases until both solution show the same value $+52.7^\circ$. The change in rotation towards an equilibrium value is called mutarotation



$[\alpha]_D^{25} = +18.7^\circ C \quad [\alpha]_D^{25} = +112^\circ C$

Mutarotation is characteristic feature of

A. Epimer

B. Enantiomer

C. Anomer

D. Ring chain isomer

Answer: C

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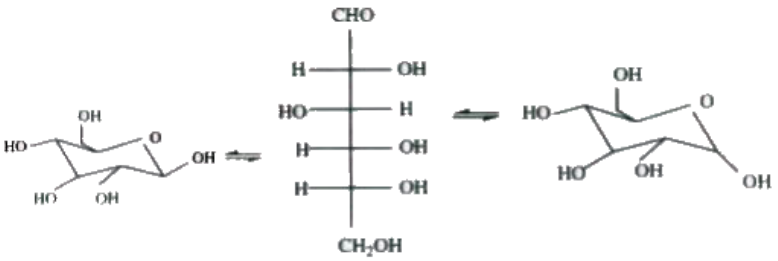
18. $D(+)$ Glucose has melting point $140^\circ C$ and specific rotation $[a]_D^{25}$ is $112^\circ C$. Another D(+) Glucose has melting point $150^\circ C$ and specific rotation $[a]_D^{25}$ is $+18.7^\circ C$. The two form have significantly different optical rotation but when an aqueous solution of either form is allowed to stand, it rotation changes. The specific rotation of one form decreases and rotation of other increases until both solution show the same value $+52.7^\circ$. The change in rotation towards an equilibrium value is called mutarotation



$[\alpha]_D^{25} = +18.7^\circ C \quad [\alpha]_D^{25} = +112^\circ C$

What percentage of $\beta - D - (+)$ glucopyranose found at equilibrium in the aqueous solution?

A. 0.5

B. $\approx 10\,\%$

C. 0.38

D. 0.64

Answer: D

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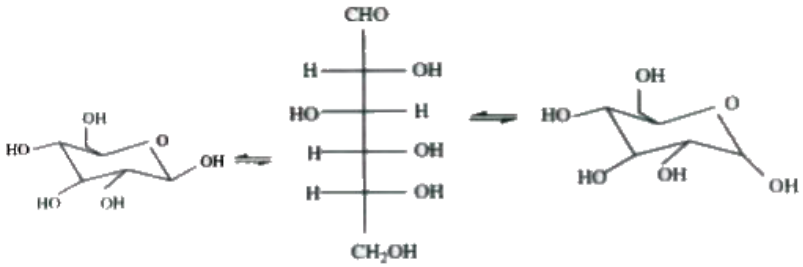
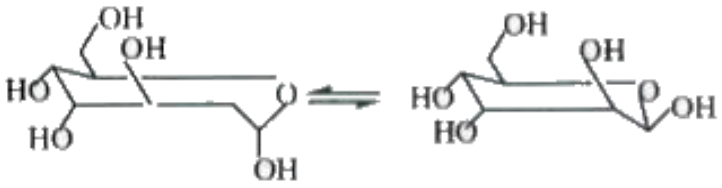
19. $D(+)$ Glucose has melting point $140^\circ C$ and specific rotation $[a]_D^{25}$ is $112^\circ C$. Another D(+) Glucose has melting point $150^\circ C$ and specific

rotation $[a]_D^{25}$ is $+18.7^\circ C$. The two form have significantly different optical rotation but when an aqueous solution of either form is allowed to stand, it rotation changes. The specific rotation of one form decreases and rotation of other increases until both solution show the same value $+52.7^\circ$. The change in rotation towards an equilibrium value is called mutarotation



$[\alpha]_D^{25} = +18.7^\circ C \quad [\alpha]_D^{25} = +112^\circ C$

For mannose the mutarotation can be shown in brief as follow



A. α-form

B. $\beta -$ form

C. open chain

D. none of these

Answer: B

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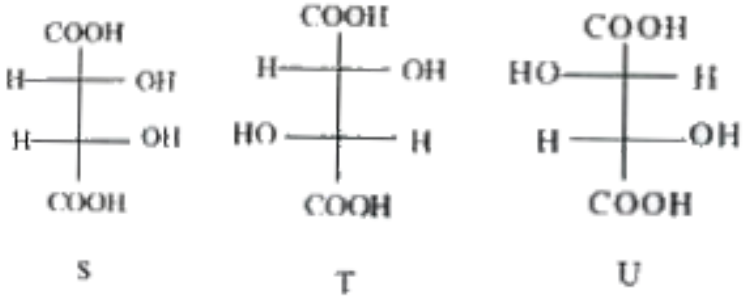
20. P and Q are isomers $C_4H_4O_4$ of dicarboxylic acid both decolorise Br_2/H_2O. On heating P forms the cyclic anhydride. Upon treatment with dilute alkaline $KMnO_4$, P as well as Q could produce one or more than one form S, T and U



Compounds formed from P and Q are respectively

A. Optically active S and Optically active pair (T,U)

B. Optically inactive S and Optically inactive pair (T,U)

C. Optically active pair (T,U) and optically active S

D. Optically inactive pair (T, U) and optically inactive S

Answer: B

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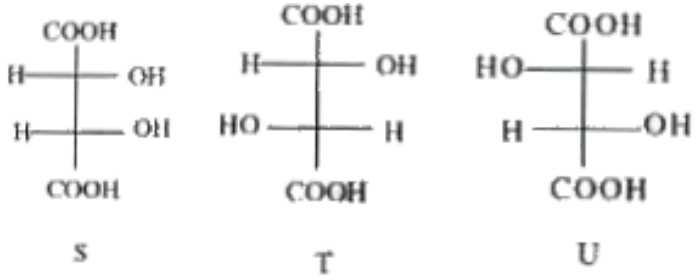
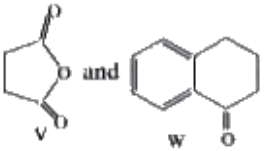
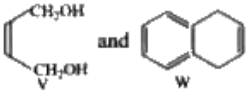
21. P and Q are isomers $C_4H_4O_4$ of dicarboxylic acid both decolorise Br_2/H_2O. On heating P forms the cyclic anhydride. Upon treatment with dilute alkaline $KMnO_4$, P as well as Q could produce one or more than one form S, T and U

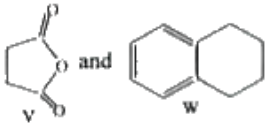


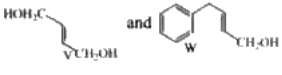
In the following reaction sequences V and W are respectively

$$Q = \frac{H_2/Ni}{D} V$$

A. 

B. 

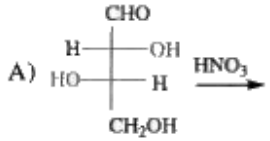
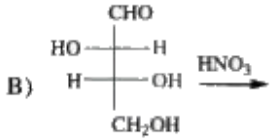
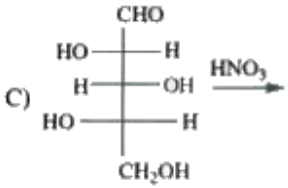
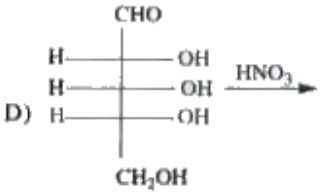
C. 

D. 

Answer: A

View Text Solution

22. Match the following columns

List - I	List - II
A) 	p) Meso
B) 	q) Optically active
C) 	r) Diastereomers
D) 	s) Epimers

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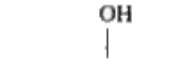
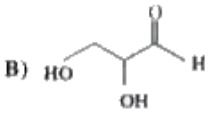
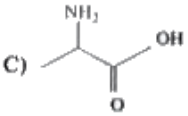
23. Match the following columns

List - I	List - II
A) 	p) Carbohydrate
B) 	q) Amino acid
C) 	r) Positive Tollen's test
D) 	s) Ninhydrin test

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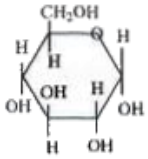
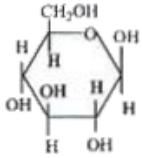
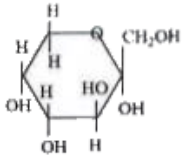
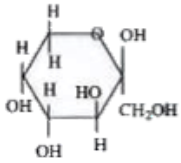
24. Match the following columns

List - I	List - II
A) 	p) β-D-fructopyranose
B) 	q) α-D-fructopyranose
C) 	r) α-D-glucopyranose
D) 	s) β-D-glucopyranose

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25. Number of ATP molecules involved in the synthesis of each molecule of Glucose in photosynthesis process_____

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26. How many of them are non reducing sugars among the following: Glucose, Fructose, Maltose, Lactose, sucrose, mannose, starch, cellulose_____

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27. When glucose is reacted with bromine water the major product is 'x', in that 'x' no. of carboxylic groups _____

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28. In lactose Number of mono saccharide units are present _____

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29. Number of Functional groups are present is saccharides (comonly) _____

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30. In the formation of Raffinose how many water molecules are eliminated (by the combination of glucose, fructose, and glactose)_____

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Practice Sheet 4

1. Sugars are characterized by the preparation of Osazone derivatives. Which sugars have identical osazones

A. glucose and fructose

B. Glucose and Arabinose

C. Glucose and Lactose

D. Glucose and maltose

Answer: A

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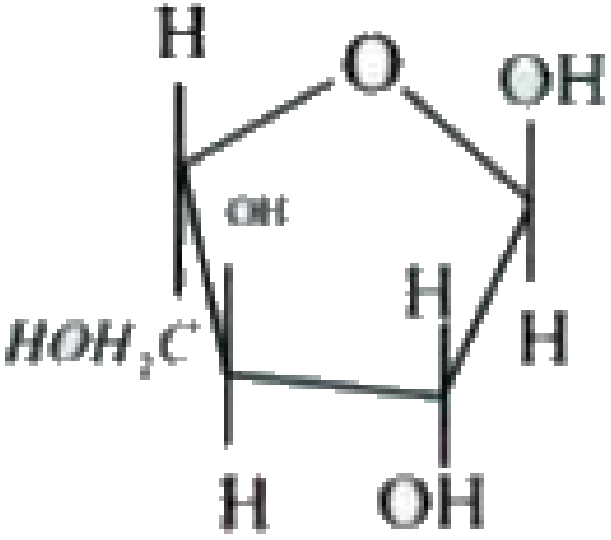
2. Which set of terms correctly identifies the carbohydrate shown ?



(1) Pentose (2) Hexose (3) Aldose (4) Ketose (5) Pyranose (6) Furanose

A. 1, 3 and 6

B. 1, 3 and 5

C. 2, 3 and 5

D. 2, 3 and 6

Answer: A

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3. Which is true about the acidic character of hydroxyl groups of sugar and hydroxyl group of an alcohol

A. the OH's of sugar are more acidic than that of a typical alcohol

B. the OH's of sugar are less acidic than that of a typical alcohol

C. both have similar acidic character

D. the OH's of sugar are neutral while that of an alcohol is acidic

Answer: A

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4. When an aqueous solution of D-glucose is treated with a base, it is converted into D-fructose and D-mannose, this conversion (isomerisation)

involves

A. enolization

B. tautomerization

C. both a and b

D. none of the two

Answer: C

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5. When $\alpha - D$ glucose is dissolved in water it undergoes a partial conversion to $\beta - D$ glucose to exhibit mutarotation. This conversion stops when 66.6% of glucose is in β from K_C for the mutarotation $\alpha - D$ -glucose $\Leftrightarrow \beta - D -$ glucose, is

A. 1

B. 2

C. 3

D. 4

Answer: B

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6. The number of chiral carbons are present in cyclic form of Allose and acyclic form of Galactose are

A. 5, 4

B. 4, 5

C. 3, 4

D. 4, 3

Answer: A

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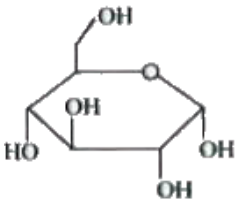
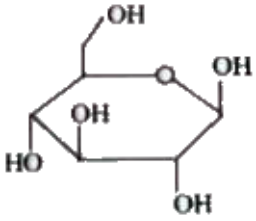
7. Which of the following structures represent α-D-` glucopyranose

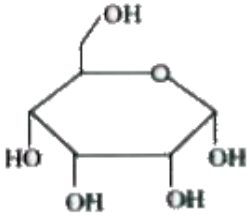
A.



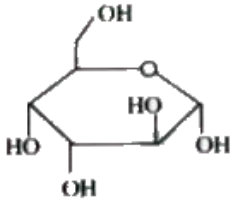
B.



C.



D.



Answer: A

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8. A sample of water containing some dissolved table sugar and common salt is passed through an organic cation exchange resin. The resulting solution contain

A. both sugar and common salt

B. only sugar

C. only pure water

D. sugar, glucose and fructose

Answer: D

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9. Glucose reacts with PCl_5 product is

A. Penta-Chloro glucose

B. Chloro glucose

C. hexa chloro glucose

D. glucaric acid

Answer: A

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10. Reduction of hexose A (Molecular formula $C_6H_{12}O_6$) with sodium borohydride gives compounds B and C. Compound B is optically inactive, where as compound C is optically active. Which of the following is compound A (D-psicose is C_3-epimer of D-fructose, D-mannose is the C_2-eptimer of D-glucose)

A. D-fructose

B. D-glucose

C. D-mannose

D. D-psicose

Answer: D

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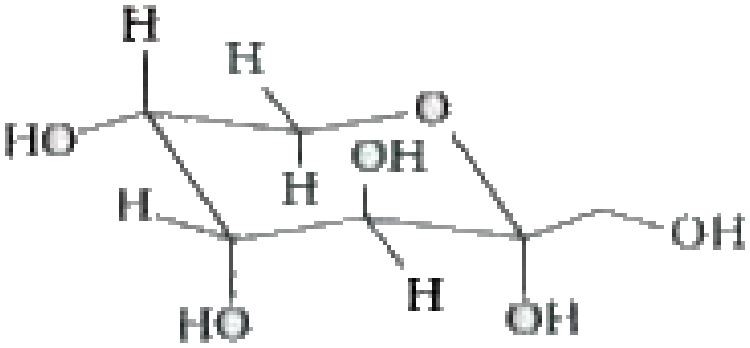
11. The following carbohydrate is



A. a ketohexose

B. an aldohexoses

C. an α-hexofuranose

D. a β-hexofuranose

Answer: A

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12. Which of the following statements are correct

A. Fructose reduces Tollen's reagent due to enolisation of fructose followed by conversion to aldehyde by base

B. 

C. Glucose and fructose can be distinguished by ninhdrintest

D. Hydrolysis of sucrose is called esterification

Answer: A::B

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13. Similarities between D(+) Glucose and D(-) Fructose : correct statements:

A. Both are reducing sugars

B. Give same Osazone derivative

C. Give same products with conc. HNO_3

D. Give same products on fermentation

Answer: A::B::C

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14. Glucose does not react with

A. Br_2 / H_2O

B. NH_2OH

C. HI

D. $NaHSO_3$

Answer: D

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15. Consider the following statements, correct statements

A. Monosaccharide are optically active polyhydroxy carbonyl compounds

B. Fructose does not reduce Fahiling's solution

C. $\alpha - D(+) -$ glucose and $\beta - D(+) -$ glucose are anomers

D. D-glucose and D-mannose are C-2 epimers

Answer: A::C::D

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16. The number of correct statements are

A. $\alpha - D -$ glucopyranose and $\beta - D$ glucopyranose are anomers

B. When pure $\alpha - D$-glucopyranose is dissolved in water its optical rotation slowly changes

C. Methyl glucosides donot react with Fehling's or Tollen's reagent

D. $\alpha - D$- Methyl glucoside and $\beta - D -$ methyl glucosider are diastereomers

Answer: A::B::C::D

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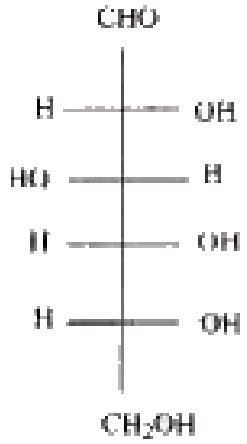
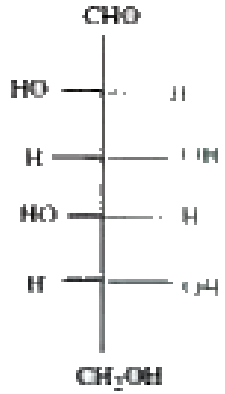
17. Which two of the following aldohexoses give the same osazone derivative

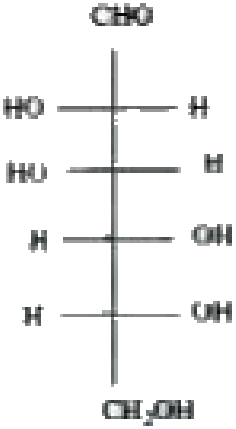
A.



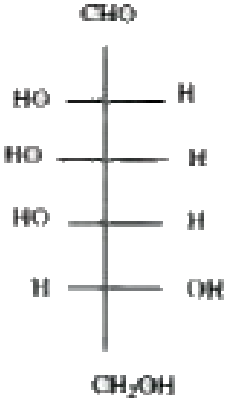
B.



C.



D.



Answer: A::C::D

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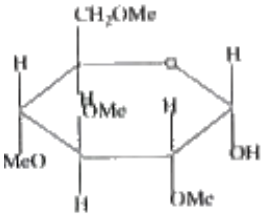
18.

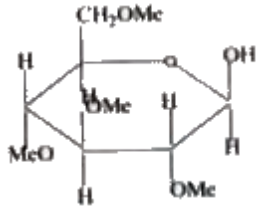
$$D\text{Glucopyranose} \underset{(A)}{\xrightarrow[\text{dry HCl}]{MeOH}} B \xrightarrow[Me_2SO_4/OH^-]{\text{Excess of}} C \xrightarrow{\text{Dil.HCl}} \underset{\substack{\downarrow HNO_3\,(\text{oxidation}) \\ \text{2,3-Dimethoxy succinic acid (E)} + \text{2, 3, 4-Tri metho}}}{D}$$

Compound (B) is :

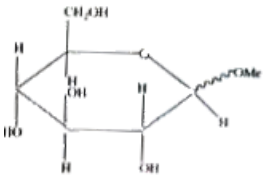
A.



B.



C.



D. Both a and b

Answer: C

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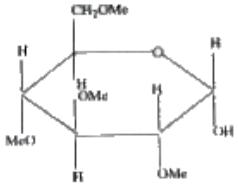
19.

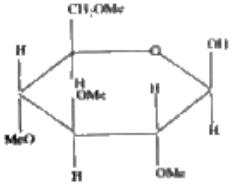
$$D\text{Glucopyranose} \underset{(A)}{\xrightarrow[\text{dry HCl}]{MeOH}} B \xrightarrow[Me_2SO_4/OH^-]{\text{Excess of}} C \xrightarrow{\text{Dil.HCl}} \underset{\substack{\downarrow HNO_3\,(\text{oxidation}) \\ \text{2,3-Dimethoxy succinic acid (E)+2,3,4-Tri methox}}}{D}$$

Compound (C) is :

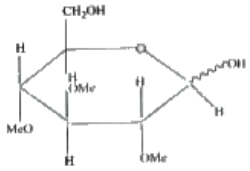
A.



B.



C.



D. Both a and b

Answer: D

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20.

$$D\text{Glucopyranose} \underset{(A)}{\xrightarrow[\text{dry HCl}]{MeOH}} B \xrightarrow[Me_2SO_4/OH^-]{\text{Excess of}} C \xrightarrow{\text{Dil.HCl}} \underset{\substack{\downarrow HNO_3\,(\text{oxidation}) \\ \text{2,3-Dimethoxy succinic acid (E)} + \text{2, 3, 4-Tri methox}}}{D}$$

Which of the following statements are true about the product E & F ?

(I) The product (E) is obtained by the breakage of C-4 and C-5 bond of compound "D"

(II) The product (E) obtained by the breakage of C-5 & C-6 bond of compound "D"

(III) The product (F) is obtained by the breakage of C-4 and C-5 bond of compound (D)

(IV) The product (F)is obtained by the breakage of C-5 and C-6 bond of compound D

A. I, II

B. I, II, III

C. I, IV

D. I, III

Answer: C

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21. Three carbohydrate molecules A, B and C were analysed by a scientist for their identification Their characteristics are tabulated as

SNO.	Reagent Information	A	B	C
1.	Tollens Reagent	Forms Silver mirror	Forms Silver mirror	No effect
2.	Fehlings Solution	Forms red ppt	Forms red ppt	No effect
3.	Phenyl hydrazine	Osazone yellow ppt	Same Osazone Yellow ppt	No effect
4.	Resorcinol + $HCl_{(aq)}$	No colour	Red or brown ppt	Reddish brown ppt which dissolves in ethanol
5.	Molecular formula	$C_6H_{12}O_6$	$C_6H_{12}O_6$	$C_{12}H_{22}O_{11}$
6.	Hydrolysis in Acidic medium	No hydrolysis	No hydrolysis	Give A and B
7.	Melting Point	419K	375K	458K

Which of the following is not a reducing sugar

A. A

B. B

C. C

D. All of these

Answer: C

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SNO.	Reagent Information	A	B	C
1.	Tollens Reagent	Forms Silver mirror	Forms Silver mirror	No effect
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6.	Hydrolysis in Acidic medium	No hydrolysis	No hydrolysis	Give A and B
7.	Melting Point	419K	375K	458K

Compound C has no free carbonyl group It is a disaccharide named as

A. Sucrose

B. lactose

C. Fructose

D. None

Answer: A

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SNO.	Reagent Information	A	B	C
1.	Tollens Reagent	Forms Silver mirror	Forms Silver mirror	No effect
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5.	Molecular formula	$C_6H_{12}O_6$	$C_6H_{12}O_6$	$C_{12}H_{22}O_{11}$
6.	Hydrolysis in Acidic medium	No hydrolysis	No hydrolysis	Give A and B
7.	Melting Point	419K	375K	458K

Compound A and B have same configuration at

A. C_1 and C_3

B. C_1 and C_2

C. C_2 and C_3

D. C_3 and C_4

Answer: D

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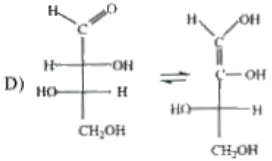
24. Match the following columns

List - I	List - II
A) α -D-Glucopyranose ⇌ β -D-Glucopyranose	p) Lobry De Bruyn Alberdavan Ekenstein transformation
B) Glucose ⇌ Mannose	q) Mutarotation
C Fructose ⇌ Glucose	r) Tautomerisation
D) 	s) Epimerisation

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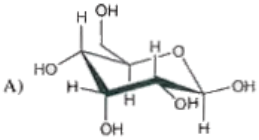
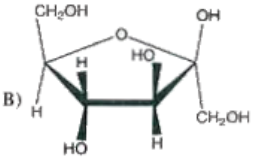
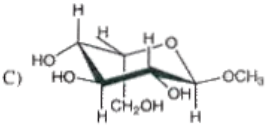
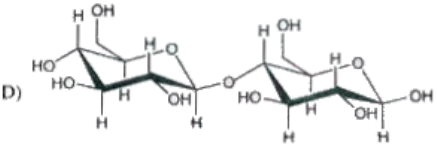
25. Match the following columns

List - I (Structure of Carbohydrate)	List - II (Defining Term)
A) 	p) Aldose
B) 	q) β-anomer
C) 	r) mutarotates in H_2O
D) 	s) form the D-series of sugar
	t) Glycoside

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26. What is the ratio of possible aldohexoses and 2-ketohexoses

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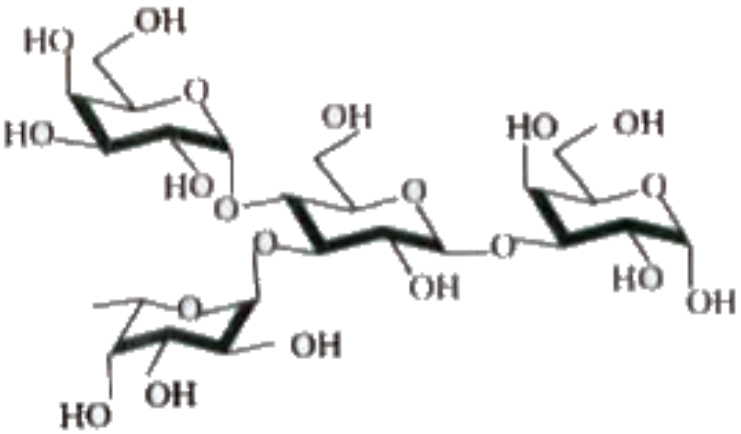
27. Given below is a branched, substituded oligosaccharide in which 'All' represents allyl group. If the number of acetic anhydride molecules require to completely acylate one mole of this compound is 2y, the value of y is



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28. When methyl -D- glucopyranoside is oxidized with periodic acid, how many moles of the oxidizing agent are consumed per mole of sugar

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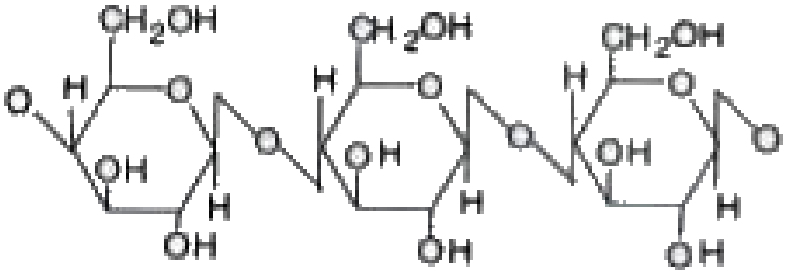
29. The number of correct statements about the following compound



(I) This carbohydrate polymer is composed of $\beta - D - (+)$ Glucose

(ii) It has $\alpha - (1, 4)$ glycosidic linkage

(III) It is a non-reducing carbohydrate

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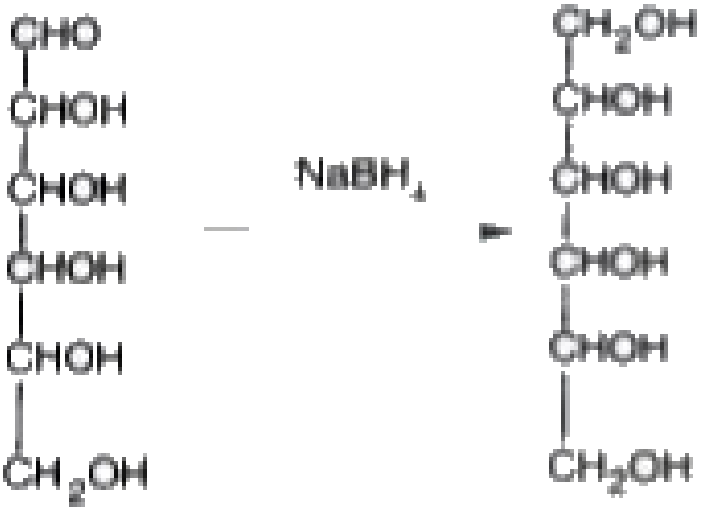
30. Observe the following reaction and find out that how many number of reactant stereoisomers can be reduced to optically inactive meso

products



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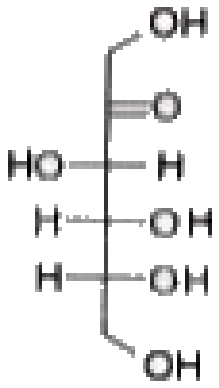
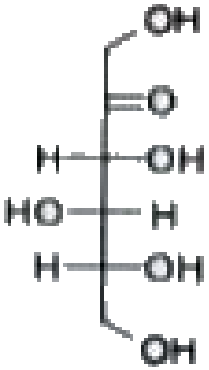
Practice Sheet 5

1. D-tagatose is a 2-ketohexose which forms same osazone as D-galactose.

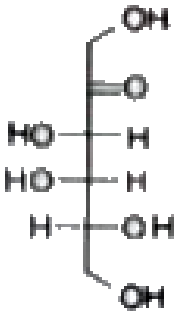
What is the structure of D-tagatose



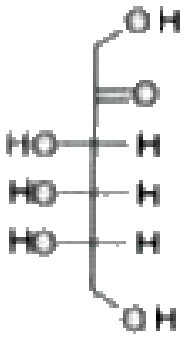
A.



B.



C.



D.

Answer: C

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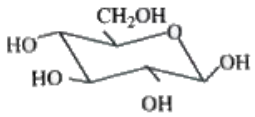
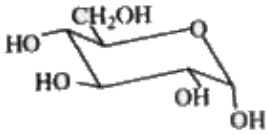
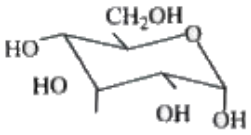
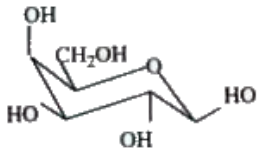
2. The correct chair form structures of $\beta -$ galactose will be

A.


B.


C.


D. 

Answer: D

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3. Killiani-Fischer synthesis of D (+) Arabinose gives

A. D(+) Glucose, D(+) Mannose, D(-) Arabinose

B. D(-) Fructose and D(+) Glucose

C. D(+) Glucose, D (+) Allose, D(+) Arabinose

D. D(+) Glucose and D(+) Mannose

Answer: D

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4. An optically active compound A gave an $[\alpha]_0^{25} = 30^\circ$ while a mixture of A and its enantiomer B, gave $[\alpha]_0^{25} = +15^\circ$. The ratio of A to B in the mixture is

A. 1 to 3

B. 3 to 1

C. 1 to 2

D. 2 to 1

Answer: B

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5. Although D-galactose rotates plane polarized light its oxidation product, galactaric acid, due to HNO_3 does not, it is due to

A. galactaric acid is racemic mixture of D- and L- Isomer

B. Galactaric acid is a meso compound

C. Both are correct

D. None of the above is correct

Answer: B

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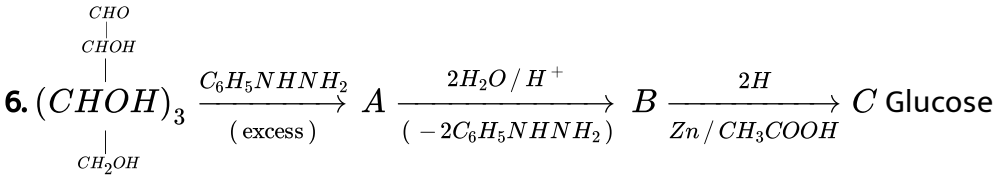
6. 

A. Mannose

B. Fructose

C. Arabinose

D. Lactose

Answer: B

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7. Find the average molecular mass of starch given that an aqueous solution of10g/c of starch has an osmatic pressure 5×10^{-3} atm at $25^{\circ} C$ what is the approximate number of glucose units in this sample of starch

A. 312

B. 302

C. 322

D. 332

Answer: B

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8. Which of the following orders of sweetness is correct

A. Sucrose $>$ Glucose $>$ Fructose $>$ maltose

B. Fructose $>$ Sucrose $>$ Glucose $>$ maltose

C. Fructose $>$ Sucrose $>$ maltose $>$ Glucose

D. glucose $>$ fructose $>$ sucrose $>$ Maltose

Answer: B

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9. In the multi step conversion of an Aldose in to next higher Aldose by Kiliani - fischer synthesis the reagent employed in the first step is

A. $C_6H_5NHNH_2$

B. NH_2OH

C. HCN

D. Br_2 / H_2O

Answer: C

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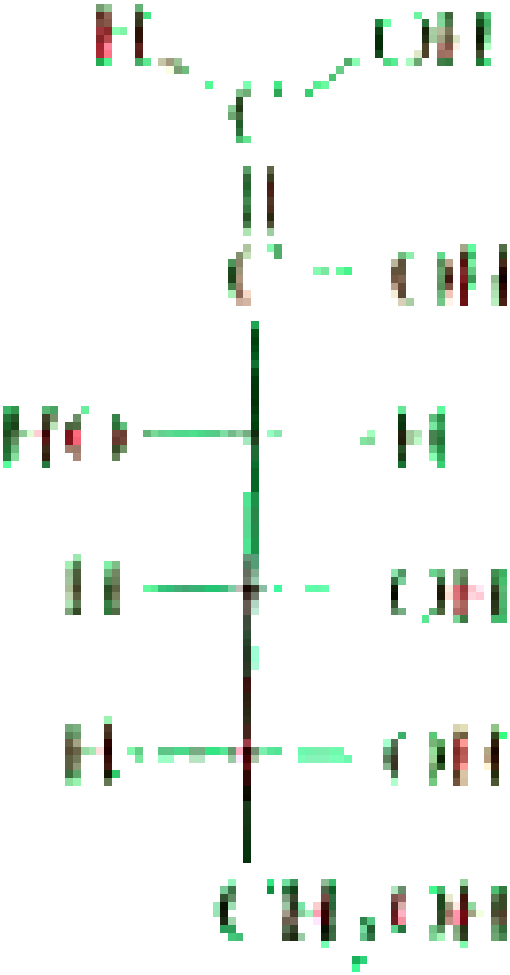

10.

The Fischer projection formula shown above is the enolic form of

A. D-fructose only

B. D-mannose only

C. D-glucose only

D. D-fructose, D-mannose, D-glucose

Answer: D

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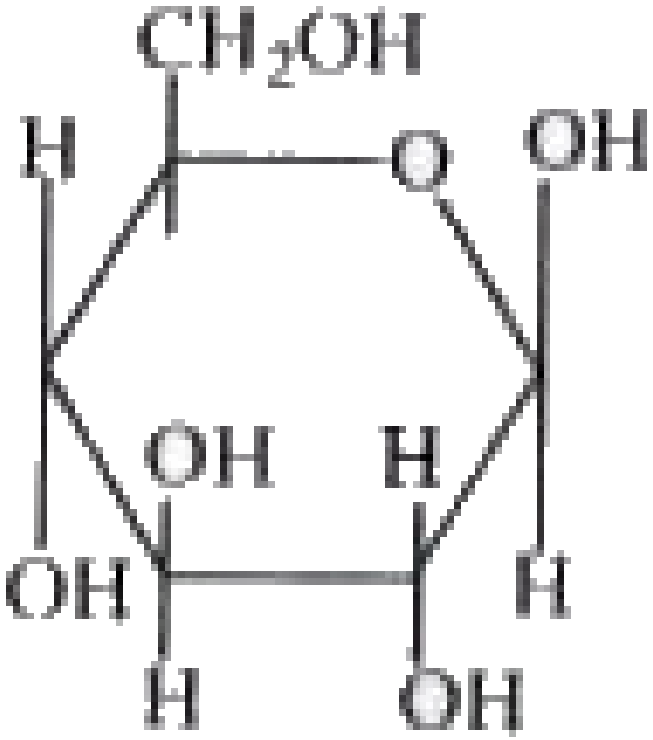
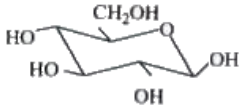
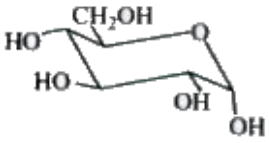
11. The correct chair form of given Haworth Structure will be



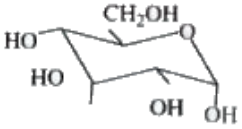
A.



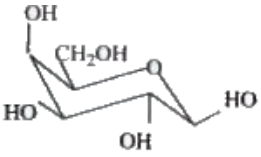
B.



C.



D.



Answer: A

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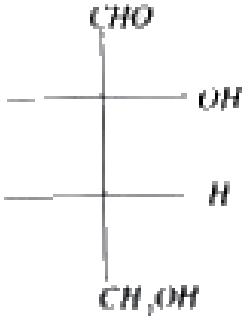
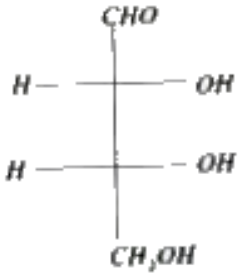
12. The product of the reaction D-Glyceraldehyde $\xrightarrow[HCl]{Me_2CO}$ $\xrightarrow{CH_2=CHMgCl}$ $\xrightarrow{O_3}$ is/are

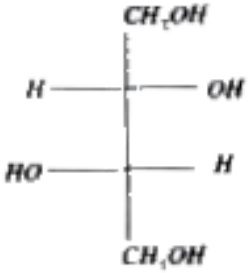
A.



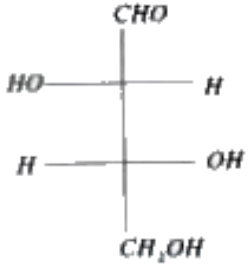
B.



C.



D.



Answer: A::D

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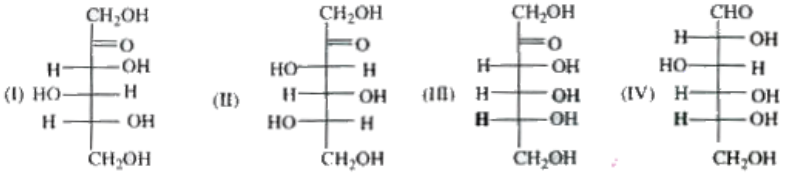
13. Which relationship (s)is/are true



A. $NaBH_4$ Reduce IV to one polyalcohol where as I, II & III two polyalcohols each

B. II and III are diastereomers

C. I and III are epimers

D. I, II, III and IV forms different osazones

Answer: A::B::C::D

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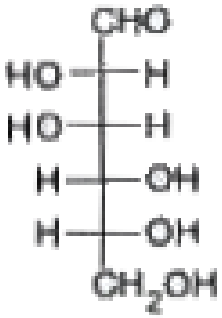
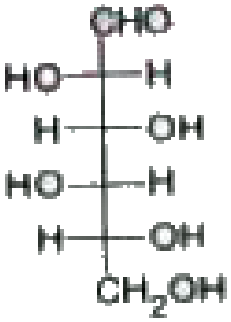
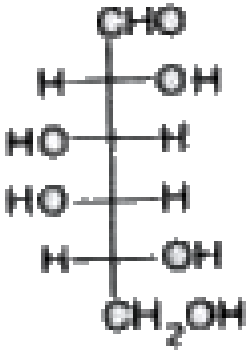
14. Which of the following monosaccharides yields an optically active alditol on $NaBH_4$ reduction?



A.

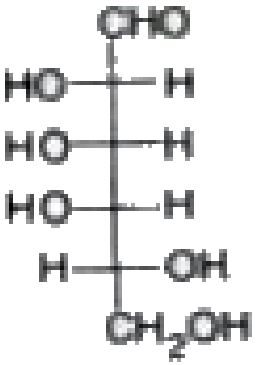


B.



C.

D.



Answer: A::B::D

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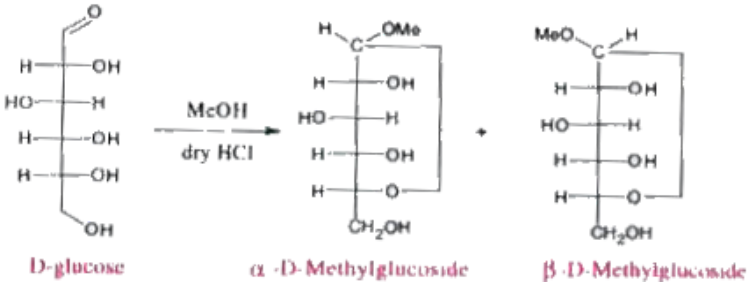
15. Observe the following reaction and mark the correct statements(s)given below:



A. Methyl glucosides do not react with Fehling's or Tollen's reagent

B. The reaction passes through a carbocation

C. The two forms of glucosides are enantiomers

D. The non-reducing character of glucosid indicates the absence of free $-CHO$ group in it

Answer: A::B::C::D

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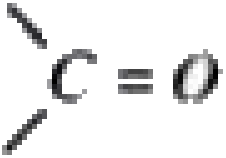
16. Which of the following statements are correct

A. Polysccharides having glycosidic linkage



B. In a typical carbolydrate two functional groups

and -OH are present

C. sucrose on hydrolysis gives glucose & galactose

D. sugar can be detected by Molisch's test

Answer: A::B::D

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17. Monosaccharides have $-CHO$ (or C=O) and $-OH$ groups, so they undergo usual oxidation and reduction. Further, monosaccharides from osazone when treated with excess of phenylhdrazine (3 equivalents). In osazone formation only the first two carbon atoms are involved. Thus monosaccharidxes having identical configuration on reset of C atoms except first two will form same osazone, as is the case with glucose and fructose. A, B and C are three hexoses and form same osazone D. Compounds A to D behave as below

(A) $D \xrightarrow{HCl} \xrightarrow[CH_3COOH]{Zn} D$- Fructose

(B) $A \xrightarrow{Ni.H_2} \xrightarrow{HNO_3} \xrightarrow[H_3O^+]{Na-Hg} B + C$

(C)$B \xrightarrow{HNO_3}$ Optically active glycaric acid

(D) $C \xrightarrow{HNO_3}$ Optically inactive glycaric acid

Compound D is an osazone which can be obtained from

A. only compound

B. two compounds

C. three compounds

D. four compounds

Answer: C

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18. Monosaccharides have $-CHO$ (or C=O) and $-OH$ groups, so they undergo usual oxidation and reduction. Further, monosaccharides from osazone when treated with excess of phenylhdrazine (3 equivalents). In osazone formation only the first two carbon atoms are involved. Thus monosaccharidxes having identical configuration on reset of C atoms except first two will form same osazone, as is the case with glucose and fructose. A, B and C are three hexoses and form same osazone D. Compounds A to D behave as below

(A) $D \xrightarrow{HCl} \xrightarrow[CH_3COOH]{Zn} D$- Fructose

(B) $A \xrightarrow{Ni.H_2} \xrightarrow{HNO_3} \xrightarrow[H_3O^+]{Na-Hg} B + C$

(C) $B \xrightarrow{HNO_3}$ Optically active glycaric acid

(D) $C \xrightarrow{HNO_3}$ Optically inactive glycaric acid

Compound A should be

A. D-glucose

B. D-Fructose

C. L-glucose

D. L-fructose

Answer: B

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19. Monosaccharides have $-CHO$ (or C=O) and $-OH$ groups, so they undergo usual oxidation and reduction. Further, monosaccharides from osazone when treated with excess of phenylhdrazine (3 equivalents). In osazone formation only the first two carbon atoms are involved. Thus monosaccharidxes having identical configuration on reset of C atoms except first two will form same osazone, as is the case with glucose and

fructose. A, B and C are three hexoses and form same osazone D.

Compounds A to D behave as below

(A) $D \xrightarrow{HCl} \xrightarrow[CH_3COOH]{Zn} D$- Fructose

(B) $A \xrightarrow{Ni.H_2} \xrightarrow{HNO_3} \xrightarrow[H_3O^+]{Na-Hg} B + C$

(C) $B \xrightarrow{HNO_3}$ Optically active glycaric acid

(D) $C \xrightarrow{HNO_3}$ Optically inactive glycaric acid

Compound B and C, respectively are

A. D-glucose and D-mannose

B. D-mannose and D-glucose

C. D-glucose and L-glucose

D. D-glucose and L-mannose

Answer: A

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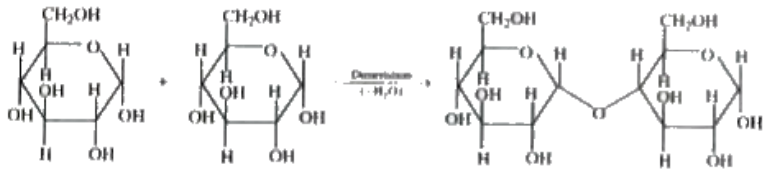

20.

What is true about compound (I)

A. it has an acetal structure

B. it has tertiary hydroxyl group

C. it has a hemiacetal structure

D. it's degree of unsaturation is two

Answer: C

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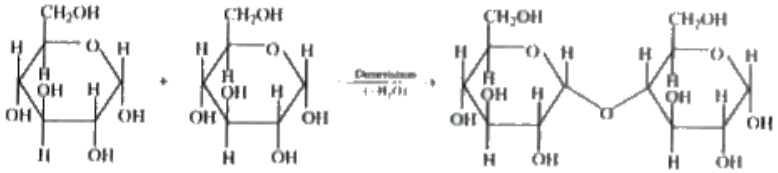

21.

Compound (II) is/has

A. A polysaccharide

B. Oligosaccharide

C. Monosaccharide

D. Hydrogen deficiency index is three

Answer: B

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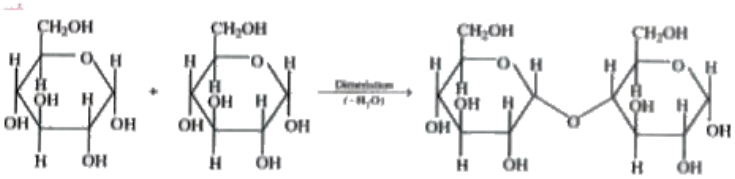
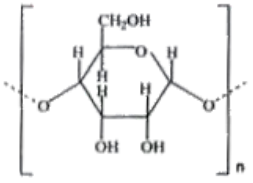
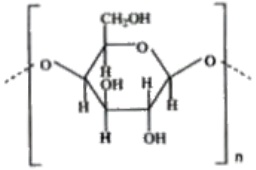
22.

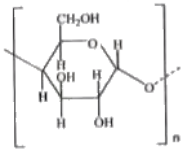


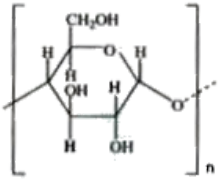
Assuming that polymerisation of (I) takes place in the manner similar to its dimerisation, then the structure of polymer (III) can be correctly represented as

A.



B. 

C. 

D. 

Answer: D

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23. Match the following columns

List - I (Reactant)	List - II (Product)
A) Glucose + OH^-	p) Fructose
B) Fructose + $3C_6H_5NHNH_2$	q) Glucosazone
C) Mannose + OH^-	r) Mannose
D) Glucose + $3C_6H_5NHNH_2$	s) Fructosazone

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24. Match the following columns

List - I	List - II
A) Glucose	p) Reduces Tollen's reagent
B) Fructose	q) Exhibit mutarotation in mild alkaline medium
C) Mannose	r) Produces tetra acetate derivative on treatment with anhydride and pyridine
D) Glucopyranoside	s) Gets oxidized

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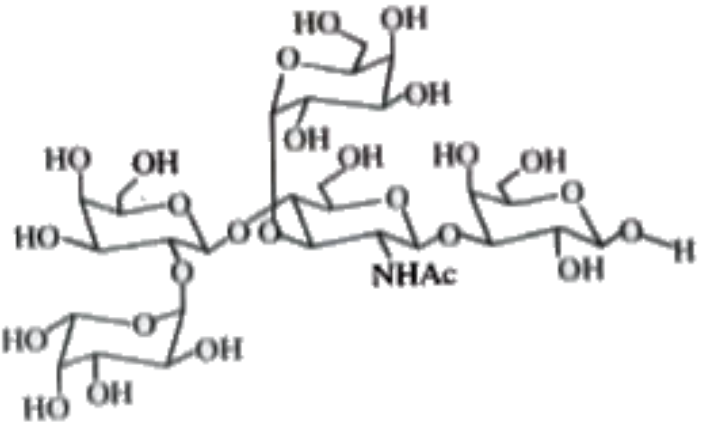
25. How many acetal groups in the following



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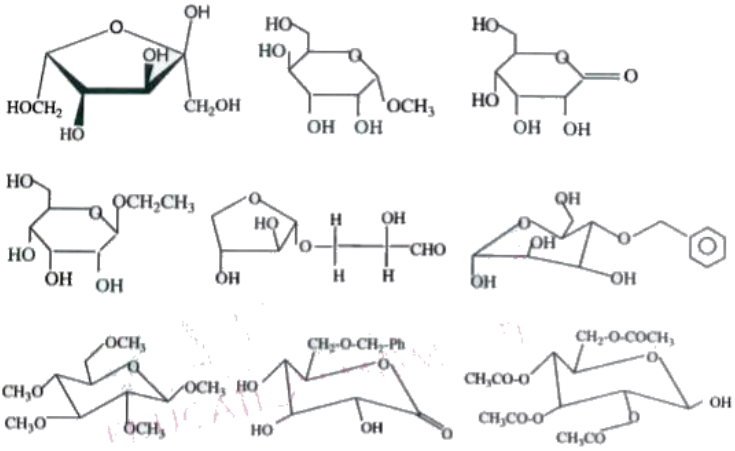
26. How many of following compound can form an acyclic (non-cyclic) structure when treated with a base such as aqueous NaOH



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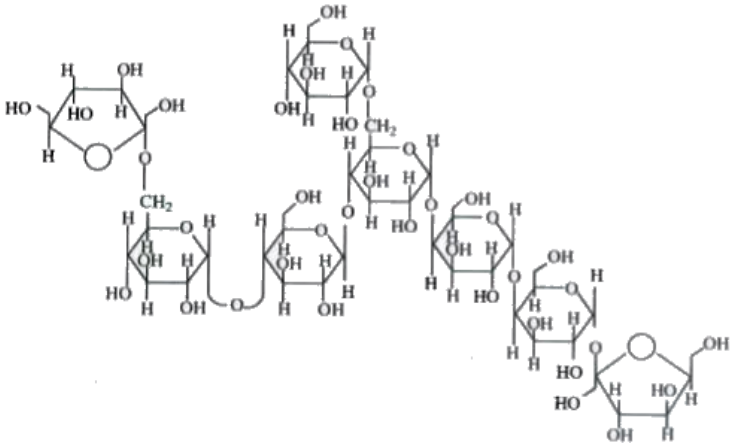
27. How many α-glycosidic link (s) are present in the given Oligosaccharide?



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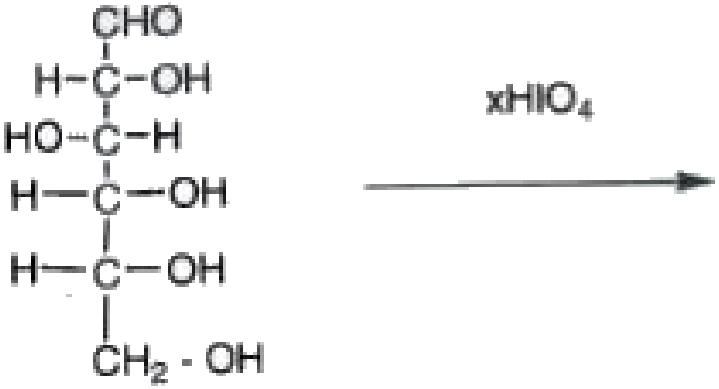

28.

What is the maximum value of (x)

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29. How many of the following are correctly matched

(I) Sucrose- $(C_1 - \alpha)$ of glucose to $(C_2 - \beta)$ of fructose

(II) Lactose $(C_1 - \beta)$ of galactose to C_4 of glucose

(III) Maltose - $(C_1 - \beta)$ of glucose to C_4 of another glucose

(IV) Starch - $(C_1 - \alpha)$ of glucose to C_4 of adjacent glucose and of a glucose to $(C_1 - \alpha)$ of adiacent glucose in one C_6 of its structural components

(V) Cellulose- $(C_1 - \beta)$ of glucose to C_4 of adjacent glucose

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30. How many of the following pairs can form same osazone

(a) D-Glucose and D-Galactose (b) D-Glucose and D-mannose

(c)

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