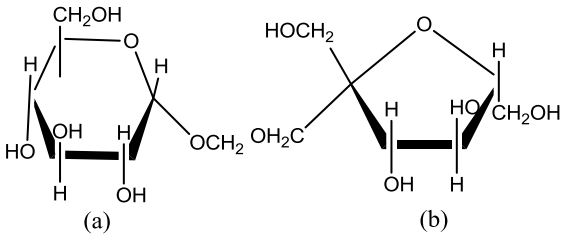
14.BIOMOLECULES

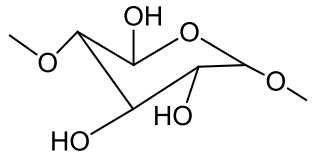
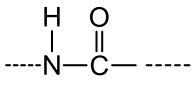
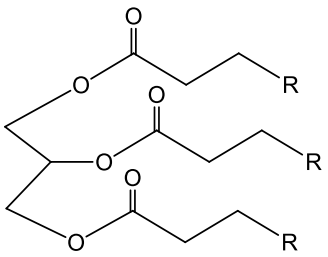
Single Correct Answer Type

1. The correct statement about the following disccharide is



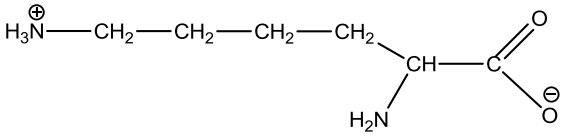
a) Ring (a) is pyranose with α −glycosidic link
b) Ring (a) is furanose with α −glycosidic link
c) Ring (b) is furanose with α −glycosidic link
d) Ring (b) is pyranose with α −glycosidic link

2. The pH value of the solution in which a particular amino acid does not migrate under the influence of an electric field is called the:
a) Eutectic point b) Neutralisation point c) Effusion point d) Isoelectric point
3. The chemical extracted from the plant Rauwolfia serpentine is:
a) Aspirin b) Quinine c) Bithional d) Reserpine
4. Among the following the achiral amino acid is:
a) Ethylalanine b) Methylglycine
c) 2-Hydroxymethylserine d) Tryptophan
5. Which of the following biomolcules is insoluble in water?
a) α-Keratin b) Haemoglobin c) Ribonuclease d) Adenine
6. The chemical substance which acts as emulsifier is:
a) Phosphoric acid b) Fatty acid c) Bile acids d) Mineral acids (HCl)
7. Mark the incorrect statement about ATP
a) It is a nucleotide
b) It contains the purine adenine
c) The enzyme-catalysed hydrolysis of ATP to ADP and AMP is accompanied by absorption of energy
d) Energy is stored in the cell in the form of ATP
8. Which of the following statements is incorrect?
a) α-D-glucose and β-D-glucose are enantiomers
b) D-Glyceraldehyde and L-glyceraldehyde are epimers
c) The reserve carbohydrate of animals is glycogen
d) Few aldohexoses which react with phenylhydrazine to give identical osazones are epimers
9. In addition to an aldehyde group, glucose contains:
a) One secondary and four primary OH groups
b) One primary and four secondary OH groups
c) Two primary OH and three secondary OH groups
d) Three primary OH and two secondary OH groups
10. Thymine is:
a) 5-Methyluracil b) 4-Methyluracil c) 3-Methyluracil d) 1-Methyluracil
11. Which of the following carbohydrates cannot be directly utilised by the human body as a source of energy?
a) Glucose b) Sucrose c) Glycogen d) Cellulose
12. Which base is present in RNA but not in DNA?
a) Uracil b) Cytosine c) Guanine d) Thymine
13. The human body does not produce:
a) Enzymes b) DNA c) Vitamins d) Hormones
14. During aerobic respiration, one molecule of glucose produces:
a) 2 ATP molecules b) 50 ATP molecules c) 38 ATP molecules d) 36 ATP molecules

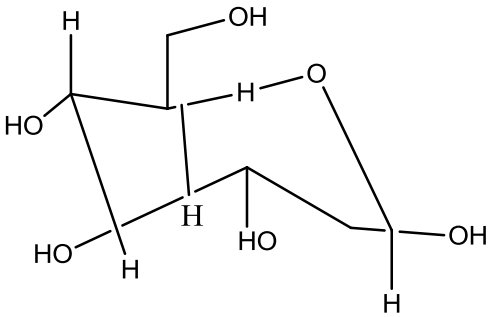
15. α- and β-Glucose differ in the orientation of the $(-OH)$ group around:
    a) C_1 b) C_2 c) C_3 d) C_4
16. Which of the following chemical units is certainly to be found in an enzyme?
    a) 
    b) 
    c) 
    d) 
17. Sanger's reagent is used for the identification of:
    a) N-terminal of a peptide chain b) C-terminal of a peptide chain
    c) Side chain of amino acids d) Molecular weight of the peptide chain
18. Which of the following statements is incorrect?
    a) Vitamins are included in diet because they are not synthesised in the human body
    b) Most vitamins function as coenzymes
    c) A person with diabetes mellitus suffers from hypoglycemia
    d) Hypoglycemia can affect the brain due to low blood sugar level
19. The hormone which controls the processes of burning of fats, proteins, and carbohydrates and liberates energy in the body is:
    a) Thyroxine b) Adrenaline c) Insulin d) Cortisone
20. Which statement is incorrect about the peptide bond?
    a) $(C-N)$ bond length in proteins is longer than the usual bond length of $(C-N)$ bond
    b) Spectroscopic analysis shows planar structure of $(CO-NH)$ group
    c) $(C-N)$ bond length in proteins is smaller than usual bond length of $(C-N)$ bond
    d) None of the above
21. Which structural feature distinguishes proline from other natural α-amino acids?
    a) It is optically inactive b) It contains aromatic group
    c) It is a dicarboxylic acid d) It has a secondary amine
22. The number of chiral carbons in β-D (+)-glucose is:
    a) 5 b) 6 c) 3 d) 4
23. If the sequence of bases in one strand of DNA is ATGACTGTC then the sequence of bases in its complementary strands is:
    a) TACTGACAG b) TUCTGUCCUG c) GUAGTUAUG d) None of the above
24. Lysine is least soluble in water in the pH range:
    a) 3 to 4 b) 5 to 6 c) 6 to 7 d) 8 to 9
25. Enzymes belong to which class of compounds?
    a) Polysaccharides b) Polypeptides
    c) Polynitrohetcrocyclic compounds d) hydrocarbons
26. The helical structure of protein is stabilised by:
    a) Dipeptide bonds b) Hydrogen bonds c) Ether bonds d) Peptide bonds
27. The RNA which takes part in the synthesis of proteins is:
    a) m-RNA b) r-RNA c) t-RNA d) All the above
28. The vitamin absorbed from the intestine along with fats are:
    a) A, D b) A, B c) A, C d) D, B
29. Check the incorrect statement
    a) Adenine and guanine are both purine bases and are found both in DNA and RNA

b) Genetic information is based upon the nucleotide sequence in DNA
c) The genetic code consists of triplets of nucieotide; each triplet codes an amino acid
d) Transfer RNA carries the code for the synthesis of proteins

30. Chargaff's rule states that in an organism:
    a) The amount of adenine (A) is equal to that of thymine (T) and the amount of guanine (G) is equal to that of cytosine (C)
    b) The amount of adenine (A) is equal to that of guanine (G) and the amount of thymine (T) is equal to that of cytosine (C)
    c) The amount of adenine (A) is equal to that of cytosine (C) and the amount of thymine (T) is equal to that of guanine (G)
    d) The amounts of all the bases are equal
31. Which of the following is a female sex hormone?
    a) Adrenaline b) Estrone c) Cortisone d) Testosterone
32. Cellulose is a straight-chain polysaccharide composed of only:
    a) D-Glucose units joined by α-glycosidic linkage
    b) D-Glucose units joined by β-glycosidic linkage
    c) D-Galactose units joined by α-glycosidic linkage
    d) D-Galactose units joined by β-glycosidic linkage
33. The reason for double helical structure of DNA is the operation of:
    a) Electrostatic attractions b) Van der Waals forces
    c) Dipole-dipole interactions d) Hydrogen bonding
34. The total number of basic groups in the following form of lysine is



    a) 1 b) 2 c) 3 d) 4
35. The correct statement in respect of protein haemoglobin is that it
    a) Functions as a catalyst for biological reactions
    b) Maintains blood sugar level
    c) Acts as an oxygen carrier in the blood
    d) Forms antibodies and offers resistance to diseases
36. The nucleic acid base having two possible binding sites is:
    a) Thymine b) Cytosine c) Guanine d) Adenine
37. The pair in which both the species have iron is:
    a) Nitrogenase, cytochromes b) Carboxypeptidase, haemoglobin
    c) Haemocyanin, nitrogenase d) Haemoglobin, cytochromes
38. The sequence in which amino acids are linked to one another in a protein molecule is called its:
    a) Primary structure b) Secondary structure c) Tertiary structure d) Quaternary structure
39. Which carbohydrate is an essential constituent of plant cells?
    a) Starch b) Cellulose c) Sucrose d) Vitamins
40. At pH = 4, glycine exists as:
    a) $H_3\overset{\oplus}{N}-CH_2COO^{\ominus}$ b) $H_3\overset{\oplus}{N}-CH_2COOH$ c) H_2NCH_2COOH d) $H_2NCH_2COO^{\ominus}$
41. Methyl-α-D-glucoside and methyl-β-D-glucoside are:
    a) Epimers b) Anomers
    c) Enantiomers d) Conformational diastereomers
42. Which functional group participates in the disulphide bond formation in proteins?
    a) Thioether b) Thiol c) Thioester d) Thiolactone
43. The following carbohydrate is

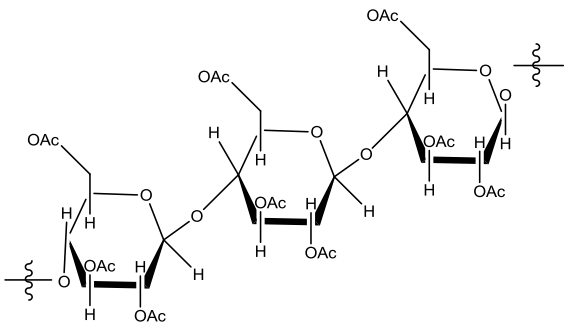


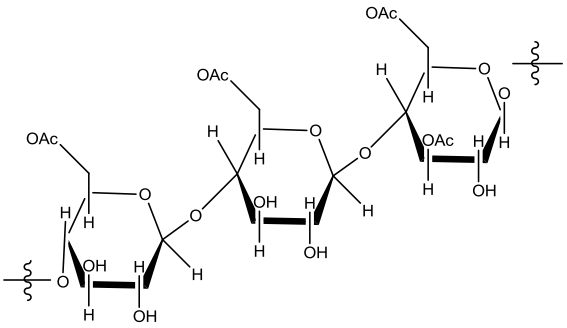
a) A ketohexose b) An aldohexose c) An α −furanose d) An α −pyranose

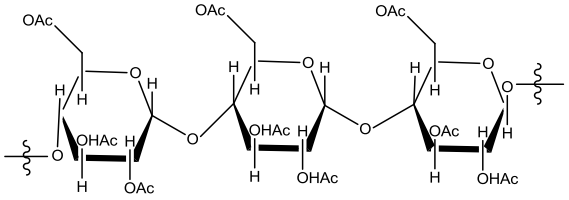
44. Hydrolysis of lactose with dilute acid yields:
    a) Equimolar mixture of D-glucose and D-glucose
    b) Equimolar mixture of D-glucose and D-galactose
    c) Equimolar mixture of D-glucose and D-fructose
    d) Equimolar mixture of D-glucose and D-galactose
45. To separate a mixture of monosaccharides, you would use
    a) Centrifuge b) Chromatograph c) Mass spectrometer d) Electrolytic cell
46. An alteration in the base sequence of nucleic acid molecule is:
    a) Replication b) Mutation c) Duplication d) Dislocation
47. The first sex attractant pheromone identified was that of
    a) Cat b) Dog c) Gypsy moth d) Human
48. Check the incorrect statement
    a) Proteins, like fats and carbohydrates, are primarily used for supplying heat and energy to the body
    b) Proteins differ from fats and carbohydrates in that they contain nitrogen
    c) Amino acids in proteins have L-configuration
    d) Enzymes are proteins
49. In both DNA and RNA, the heterocyclic base and phosphate ester linkages are at:
    a) C_5 and C_2, respectively, of the sugar molecule
    b) C_2 and C_5, respectively, of the sugar molecule
    c) C_1 and C_5, respectively, of the sugar molecule
    d) C_5 and C_1, respectively, of the sugar molecule
50. The two forms of D-glucopyranose obtained from the solution of D-glucose are called
    a) Isomer b) Anomer c) Epimer d) Enantiomer
51. The Ruff degradation used to reduce the carbon chain in an
    a) Alcohol b) Alkene c) Ketose d) Aldose
52. Lactose is made up of:
    a) Galactose unit and glucose unit b) Glucose unit and fructose unit
    c) Both glucose units d) Glucose and arbinose unit
53. Which of the following has magnesium?
    a) Chlorophyll b) Haemocyanin c) Carbonic anhydrase d) Vitamin B_{12}
54. The enzyme which hydrolyses triglycerides to fatty acids and glycerol is called:
    a) Maltose b) Lipase c) Zymase d) Pepsin
55. The main structural feature of proteins is:
    a) Ether linkage b) Ester linkage c) Peptide linkage d) All the three above
56. α-D (+)-glucose and β-D (+)-glucose are:
    a) Enantiomers b) Geometrical isomers c) Epimers d) Anomers
57. Isoprene units prevail in all the following except
    a) Natural rubber b) Vitamin A c) Terpenes d) Vitamin E
58. Vitamin A is called:
    a) Ascorbic acid b) Retinol c) Calciferol d) Tocopherol
59. The Kiliani's synthesis is used to increase the carbon chain in:

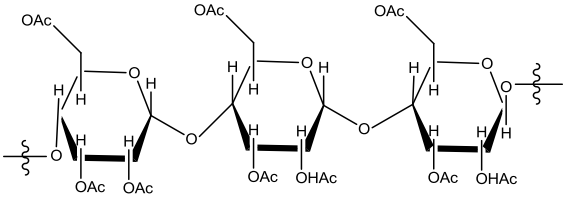
a) Acid b) Alcohol c) Aldose d) Ketose

60. Sucrose on hydrolysis gives:
    a) Glucose + Glucose b) Glucose + Galactose c) Glucose + Fructose d) Glucose + Lactose
61. The function of enzymes in the living system is to:
    a) Transport oxygen b) Provide immunity
    c) Catalyse biochemical reactions d) Provide energy
62. The pyrimidine bases present in DNA are:
    a) Cytosine and adenine b) Cytosine and guanine c) Cytosine and thymine d) Cytosine and uracil
63. The functional group which is found in amino acid is:
    a) $-COOH$ b) $-NH_2$ c) $-CH_3$ d) Both (a) and (b)
64. Biotin is an organic compound present in yeast. Its deficiency in diet causes dermatitis and paralysis. It is also known as:
    a) Vitamin H b) Vitamin B_1 c) Vitamin B_{12} d) Vitamin D
65. Which of the following is a plant growth inhibiter?
    a) Heteroauxin b) Gibberellins c) Cytokinnis d) Abscisic acid (ABA)
66. Which is the correct statement?
    a) Starch is a polymer of α-glucose
    b) Amylose is a component of cellulose
    c) Proteins are composed of only one type of amino acids
    d) In cyclic structure of furanose, there are four carbon atoms and one oxygen atom
67. Which of the following statements is true for protein synthesis (translation)?
    a) Amino acids are directly recognised by m-RNA
    b) The third base of the codon is less specific
    c) Only one codon codes for an amino acid
    d) Every t-RNA has more than one amino acid attachment
68. The hormone that helps in the conversion of glucose into glycogen is:
    a) Cortisone b) Bile acids c) Adrenaline d) Insulin
69. The efficiency of an enzyme to catalyse a reaction is due to its capacity to:
    a) Reduce the activation energy of the reaction
    b) Form strong enzyme-substrate complex
    c) Decrease the bond energies of all the substrate molecules
    d) Increase the free energy of the catalyst-substrate reaction
70. A decapeptide (mol. wt. 796) on complete hydrolysis gives glycine (mol. wt. 75), alanine and phenylalanine. Glycine contributes 47% to the total weight of the hydrolysed products. The number of glycine units present in the decapeptide is
    a) 3 b) 4 c) 5 d) 6
71. Subunits present in haemoglobin are
    a) 2 b) 3 c) 4 d) 5
72. Glucose reacts with excess of phenylhydrazine and forms
    a) Glucosazone b) Glucose phenylhydrazone
    c) Glucose oxime d) Sorbitol
73. Cellulose upon acetylation with excess acetic anhydride/H_2SO_4 (catalytic) gives cellulose triacetate whose structure is

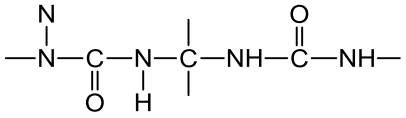
a) 

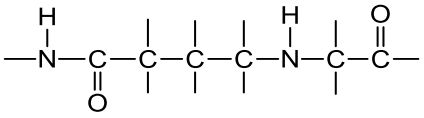
b) 

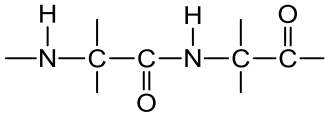
c) 

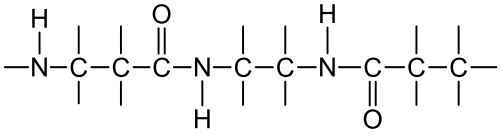
d) 

74. The number of tripeptides formed by three different amino acids is:
    a) Three b) Four c) Five d) Six
75. The α-amino acid which contains the aromatic side chain is:
    a) Proline b) Tyrosine c) Valine d) Tryptophan
76. Which of the following structures represents the peptide chain?

a) 

b) 

c) 

d) 

77. The term anomer of glucose refers to:
    a) Isomers of glucose that differ in configurationat carbons one and four (C-1 and C-4)
    b) A mixture of D-glucose and L-glucose
    c) Enantiomers of glucose
    d) Isomers of glucose that differ in configuration at carbon one (C-1)
78. One of the different amino acids which can be synthesised in the body is:
    a) Lysine b) Histidine c) Valine d) Alanine
79. Which of the following pairs give positive Tollen's test?
    a) Glucose , sucrose b) Glucose , fructose
    c) Hexanal, acetophenone d) Fructose, sucrose
80. The deficiency of vitamin C causes:
    a) Scurvy b) Rickets c) Pyrrohea d) Pernicious anaemia
81. Insulin production and its action in human body are responsible for the level of diabetes. This compound belongs to which of the following categories:
    a) A coenzyme b) A hormone c) An enzyme d) An antibiotic
82. Glucose reacts with acetic anhydride to from:
    a) Monoacetate b) Tetra-acetate c) Penta-acetate d) Hexa-acetate
83. Vitamin B_1 is:
    a) Riboflavin b) Cobalamin c) Thiamine d) Pyridoxine
84. In DNA, the complementary bases are:
    a) Uracil and adenine: cytosine and guanine
    b) Adenine and thymine: guanine and cytosine
    c) Adenine and thymine: guanine and uracil
    d) Adenine and guanine: thymine and cytosine
85. Carbohydrates are stored in human body as the polysaccharide:
    a) Starch b) Glucose c) Glycogen d) Galactose

86. Glucose molecule reacts with X number of molecules of phenylhydrazine to yield osazone. The value of X is:
a) Three b) Two c) One d) Four

87. During the process of digestion, the proteins present in food materials are hydrolysed to amino acids. The two enzymes involved in the process are:
Proteins $\xrightarrow{\text{Enzyme (A)}}$ Polypeptides
$\xrightarrow{\text{Enzyme (B)}}$ Amino acids
a) Invertase and zymase b) Amylase and maltase c) Diastase and lipase d) Pepsin and trypsin

88. Complete hydrolysis of cellulose gives:
a) L-Glucose b) D-Fructose c) D-Ribose d) D-Glucose

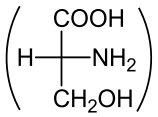
Multiple Correct Answers Type

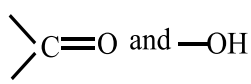
89. Which of the following statement is/ are incorrect?
a) (R) alanine is L-alanine
b) The α-carbon of all L-amino acids has L-configuration
c) The α-carbon of all L-amino acids has D-configuration
d) The α-carbon of all D-amino acids except cysteine has R-configuration

90. Which of the following statements are correct?
a) β-D (+) glucopyranose is more stable than α-D (+) glucopyranose
b) Invert sugar is laevorotatory
c) Dextrose is D (+) glucose
d) Levulose is D (−) fructose

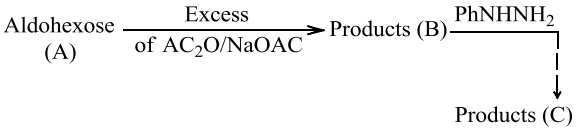
91. Which of the following pairs are C-2 epimers as well as enantiomers?
a) D-Glyceraldehyde and L-Glyceraldehyde b) D-Erythrose and D-Threose
c) D-Ribose and D-Arabinose d) D-Xylose and D-Lyxose

92. D-Glucose and D-fructose both form the same osazone. Which statements are correct about the above reaction?
a) Glucose and fructose are epimers
b) Glucose and fructose are anomers
c) The configurations of the OH group at C-3 and C-4 in glucose and fructose are same
d) The configuration of the OH group at C-4 and C-5 in glucose and fructose are same

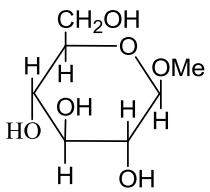
93. Which of the statements are correct about D, L of sugars and amino acids
a) In sugars, symbols D and L refer to the relative configuration of the OH groups at the penultimate C atom w.r.t. to glyceraldehyde taken as standard. D refers to (−OH) group on R.H.S. and L refers to OH group on L.H.S.
In amino acids, symbols D and L refer to the relative configuration of the (NH_2) group w.r.t. D (+) serine taken as standard  [D (+) Serine]. D refers to NH_2 group on R.H.S and L refers to ($-NH_2$) group on L.H.S.
b) In sugars, D refers to dextrorotatory and L refers to laevoratotory
c) In amino acids, D refers to positive and L refers to negative optical rotation
d)

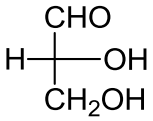
94. The two functional groups present in a typical carbohydrate are:
a) —CHO and —COOH
b)  and —OH
c) —OH and —CHO
d) —OH and —COOH

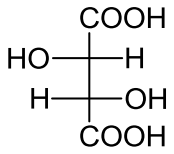
95. Globular proteins are present in:
    a) Eggs b) Muscles c) Keratin d) Blood
96. Which of the following statements are correct?
    a) D-Mannose is a C-2 epimer of D-glucose
    b) D-Allose is a C-3 epimer of D-glucose
    c) D-Gallactose is a C-4 epimer of D-glucose
    d) α-D (+) glucopyranose and β-D (+) glucofuranose are anomers
97. Water soluble vitamins are
    a) Vitamin A b) Vitamin B_5 c) Vitamin B_{12} d) Vitamin C
98. The smallest aldose which is able to form cyclic hemiacetal is/are:
    a) D-glyceraldehyde b) D-Erythrose c) D-Threose d) D-Ribose
99. Which statements are correct about the reactions?
    D-Glucose $\xrightarrow{NaCN/HCN}$ Products
    a) The C chain is increased by one C atom
    b) Two isomeric products, cyanohydrin and its C-2 epimeric cyanohydrin are formed
    c) Epimers formed in products are in unequal amounts
    d) The presents of stereocentres in sugars causes their (C = O) groups to have diastereotopic faces that react at different rates, giving different amounts of diastereomers
100. Which statements are correct about lactose?
    a) ($C_1 - \beta$) (OH) of glucose is linked with ($C_4 - OH$) of galactose
    b) ($C_1 - \beta$) (OH) of galactose is linked with ($C_4 - OH$) of β-glucose
    c) It is hydrolysed both by amylase and lactase
    d) It exhibits mutarotation
101. Which of the statements are correct?
    a) Aldoses react with Benedict's solution and $PhNHNH_2$
    b) Aldoses do not react with $NaHSO_3$
    c) Ketoses react with Fehling's solution and $PhNHNH_2$
    d) Ketoses react with $NaHSO_3$
102. Which statements are correct about sucrose?
    a) On complete methylation with Me_2SO_4/NaOH, it forms an octa-*o*-methyl product
    b) On complete acetylation with Ac_2O/NaOAC, it forms a hexaacetate product
    c) On complete methylation with Me_2SO_4/NaOH, it forms hexa-*o*-methyl product
    d) On complete acetylation with Ac_2O/NaOAC, it forms octa-acetate product
103. Which statements are correct about the reaction?

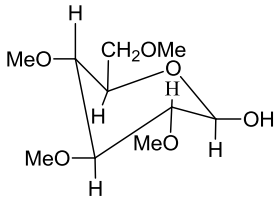


    a) Products (B) are α- and β-penta acetates
    b) Products (B) are α- and β-tetra acetates
    c) Products (C) are phenyl hydrazones of products (B)
    d) Products (B) do not react with $PhNHNH_2$
104. Which of the following carbohydrates are D-isomers?

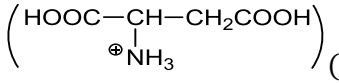
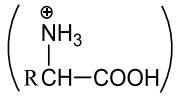
a)


b)


c) 

d) 

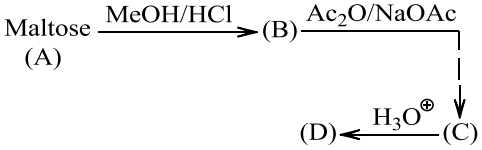
105. The structure of aspartic acid is given below

 (A) The pK_{a_1}, pK_{a_2}, and pK_{a_3} of (A), respectively, are: 1.88, 3.65, and 9.60. pK_{a_1} corresponds to the ionisation of the COOH group, of 

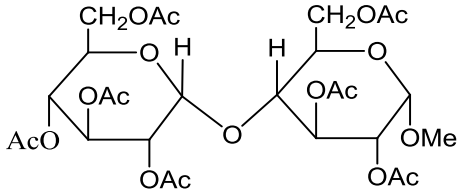
pK_{a_2} corresponds to the ionsation of  (ammonium ion). What is the pH at isoelectric points (pI)?

a) $\frac{pK_{a_1} + pK_{a_2}}{2}$ b) $\frac{pK_{a_1} + pK_{a_3}}{2}$ c) $\frac{pK_{a_2} + pK_{a_3}}{2}$ d) $\frac{pK_{a_1} + pK_{a_2} + pK_{a_3}}{3}$

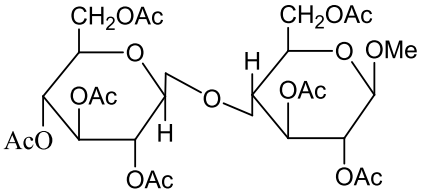
106. Which of the following exhibit mutarotation?
   a) Glucose b) Maltose c) Fructose d) Galactose
107. Which statements are correct about lactose?
   a) IUPAC name of lactose is β-D-galactopyranosyl-β-D-glucopyranoside
   b) IUPAC name of lactose is β-D-glucopyranosyl β-D-galactopyranoside
   c) On methylation with MeOH/HCl, it gives methyl-β-D-glactopyranosyl-β-D-glucopyranoside
   d) On methylation with MeOH/HCl, it gives methyl-β-D-glucopyranosyl-β-D-galactopyranoside
108. Which statement(s) is/are correct about sucrose?
   a) $(C_1 - \alpha)$ (OH) of glucopyranose is linked with $(C_2 - \beta)$ (OH) of fructofuranose
   b) $(C_1 - \alpha)$ (OH) of glucopyranose is linked with $(C_2 - \beta)$ (OH) of fructopyranose
   c) It reduces Fehling's solution
   d) It exhibits mutarotation
109. Which of the following statements are false?
   a) Glucose is the only aldose that mutarotates
   b) Ketose also mutarotates
   c) Glycosides mutarotate
   d) There is a relationship between the ability of a sugar to mutarotate and to reduce Tollens or Fehling's reagents
110. Which of the following statements are correct about α amino acids
   a) All the amino acids which constitute proteins have D-configuration
   b) Isoelectric point of glycine is 6.1
   c) Valine is an essential amino acid
   d) In α-amino acids, the basic group is $(-COO^{\ominus})$ and acidic group is 
111. A mixture of two amino acids having pI 9.60 and 5.40 can be separated
   a) By adjusting the pH of the solution a 9.60 b) By adjusting the pH of the solution at 5.40
   c) By adjusting the pH of the solution at 7.0 d) By adjusting the pH of the solution at 14.0
112. Which of the following pairs are C-2 epimers?
   a) Allose, Altrose b) Glucose, Mannose c) Gulose, Indose d) Galactose, Talose
113. Which of the following contain disulphide linkages?
   a) Oxytocin b) Vasopressin c) Insulin d) Haemoglobin
114. Which statements are correct about the reaction of maltose?



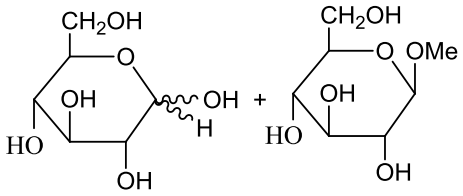
Products (C) are:

a) 

Products (C) are:

b) 

Products (D) are:

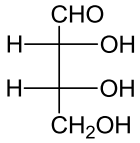
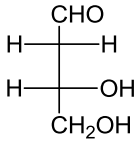
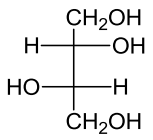
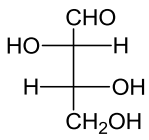
c) 

d) Products (D) are 2 mol α-and β-D-glucose

115. Which of the following statements are correct?
   a) One mole of $PhNHNH_2$ reacts with 3 mol glucose to form osazone
   b) One mole of D-fructose reacts with 3 mol $PhNHNH_2$ to form osazone
   c) One mole of D-2-deoxy glucose reacts with 1 mol $PhNHNH_2$ to form phenylhydrazone
   d) One mole of D-3-deoxy glucose reacts with 3 mol of $PhNHNH_2$ to form osazone

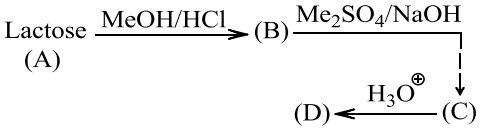
116. The products of the reaction D-glyceraldehyde

$$\xrightarrow[HCl]{Me_2CO} \xrightarrow{H_2C{=}CHMgCl} \xrightarrow{O_3} ?$$

a) 
b) 
c) 
d) 

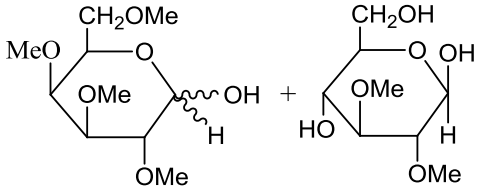
117. Which statements are correct?
   a) Lactose is a disaccharide and is a reducing sugar
   b) α-D-glucopyranose and β-D-glucopyranose are anomers
   c) Methyl-α-D-glucopyranoside has an acetal structure and is a non-reducing sugar
   d) α-D-Glucopyranose has a hemiacetal structure and is a reducing sugar

118. Which statements are correct about the reaction of lactose?

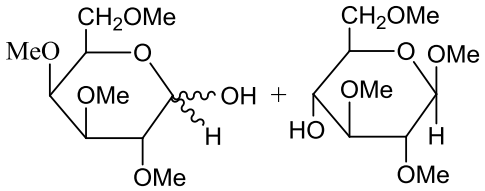


   a) The product (C) is methyl-hepta-*o*-methyl-β-D-galactopyranosyl-β-D-glycopyranoside
   b) The product (C) is methyl-octa-*o*-methyl-β-D-galactopyranosyl-β-D-glycopyranoside

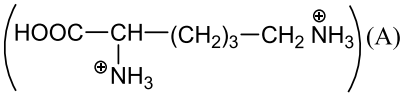
Products (D) are:

c) 

d) Products (D) are:



119. The structure of a basic amino acid, lysine, is given below:

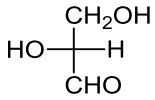


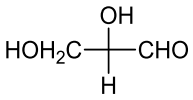
The pK_{a_1}, pK_{a_2}, and pK_{a_3} of (A), respectively, are: 2.18, 8.95, and 10.53

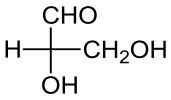
What is the pH at isoelectric points (pI)?

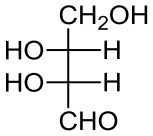
a) $\frac{pK_{a_1} + pK_{a_2}}{2}$ b) $\frac{pK_{a_1} + pK_{a_3}}{2}$ c) $\frac{pK_{a_2} + pK_{a_3}}{2}$ d) $\frac{pK_{a_1} + pK_{a_2} + pK_{a_3}}{3}$

120. Which of the following are D-sugars?

a) 

b) 

c) 

d) 

121. A mixture of three proteins, (A) (pepsin), (B) (haemoglobin), and (C) (lysozyme) was separated by electrophoresis method at pH = 7. The pH at isoelectric point (pI) of the proteins are pI of (A), (B), (C) which are 1.1, 6.7, and 11.0, respectively. Which of the statement are correct?
    a) Pepsin (A) will migrate to the cathode
    b) Lysozyme (C) will migrate to the anode
    c) Haemoglobin will not migrate
    d) At pH =7, (A) and (C) would precipitate out while (B) would remain in the solution
122. Which statements are correct about the mixture of lysine (pI = 9.6) and glycine (pI = 5.97), separated by electrophoresis method or by solubility method?
    a) At pH = 5.97, glycine does not migrate while lysine moves to the cathode
    b) At pH = 5.97, glycine does not migrate while lysine moves to the anode
    c) At pH = 9.6, lysine does not migrate while glycine moves to the anode
    d) At pH = 5.97 of the mixture of the solution, glycine precipitates out while lysine remains in the solution
123. Which statements are correct about sucrose?
    a) IUPAC name of sucrose is α-D-glucopyranosyl-β-D-fructofuranside
    b) IUPAC name of sucrose is β-D-fructofuranosyl-α-D-glucopyranoside
    c) It is hydrolysed both by emulsion and amylase
    d) On hydrolysis, the solution is laevorotatory
124. How many base pairs in the gene are needed to code for the enzyme lysozyme, containing 129 amino acids, found in egg white?
    a) 3×129 b) $(3 \times 129) + (3 \times 2) = 393$ base pairs
    c) $(3 \times 129) + (3 \times 3) = 396$ base pairs d) 4×129
125. Which of the following pairs form same osazone?
    a) Glucose, Fructose b) Glucose, Mannose c) Ribose, Arabinose d) Mannose, Fructose

Assertion - Reasoning Type

This section contain(s) 0 questions numbered 126 to 125. Each question contains STATEMENT 1(Assertion) and STATEMENT 2(Reason). Each question has the 4 choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct.

a) Statement 1 is True, Statement 2 is True; Statement 2 **is** correct explanation for Statement 1

b) Statement 1 is True, Statement 2 is True; Statement 2 **is not** correct explanation for Statement 1

c) Statement 1 is True, Statement 2 is False

d) Statement 1 is False, Statement 2 is True

126

Statement 1: ATP is the main source of energy of many anaerobic reactions

Statement 2: Anaerobic reactions occur in the presence of oxygen

127

Statement 1: Sucrose is a disaccharide.

Statement 2: Sucrose is dextrorotatory.

128

Statement 1: Vitamin B_5 is also called as pyridoxin

Statement 2: Deficiency of vitamin B_5 causes dermatitis and dementia

129

Statement 1: Carboxypeptidase is an exopeptidase

Statement 2: It cleaves N-terminal bond

130

Statement 1: D-3-Deoxyglucose has four chiral C atoms

Statement 2: It exists in eight stereoisomers

131

Statement 1: A triester of glycerol with stearic acid on boiling with Aq. NaOH gives solid cake with soapy touch

Statement 2: Free glycerol is liberated which is a syrupy liquid

132

Statement 1: Cellulose is not digested by human beings

Statement 2: Cellulose is a polymer of β-D-glucose

133

Statement 1: There is a relationship between the ability of a sugar to mutarotate and to reduce Tollens reagent

Statement 2: The reducing of Tollens reagent and mutarotation both depend on the presence of free carbonyl form

134

Statement 1: DNA undergoes replication.

Statement 2: DNA contains cytosine and thymine as pyrimidine base.

135

Statement 1: α -amino acids exists as dipolar ions or zwitter ions.

Statement 2: α -amino acids are the building blocks of proteins.

136

Statement 1: D-Fructose with dil. NaOH undergoes a reversible isomerisation and is converted to a mixture of D-glucose, D-mannose and D-fructose

Statement 2: This reaction is known as LobrydeBruyn-van-Ekenstein rearrangement

137

Statement 1: Sequence of bases in DNA is TGAACCCTT and sequence of bases in m-RNA is CATTAAACC

Statement 2: In DNA, nitrogenous bases have hydrogen bonds

138

Statement 1: Glucose and fructose are reducing sugars.

Statement 2: Glucose and fructose contain a free aldehydic and ketonic group adjacent to a > CHOH group respectively.

139

Statement 1: Glycosides mutarotate

Statement 2: The anomeric OH is etherified and the equilibrium with the free carbonyl form is destroyed

140

Statement 1: ATP moleculs are energy rich molecules

Statement 2: ATP consists of a purine base adenine, pentose sugar ribose and a string of three phosphate groups

141

Statement 1: Disruption of the natural structure of a protein is called denaturation.

Statement 2: The change in colour and appearance of egg during cooking is due to denaturation.

142

Statement 1: β-D-Glucopyranose is the most abundant naturally occurring aldohexoses

Statement 2: All the ring substituents in the chain conformation are equatorial

143

Statement 1: Glucose is used in silvering of mirrors

Statement 2: Glucose is less acidic than a monohydric alcohol

144

Statement 1: D-2-Deoxyglucose reacts with 3 mol $PhNHNH_2$ and forms an osazone

Statement 2: D-2-Deoxyglucose has no $(C-OH)$ group α-to the $(C=O)$ group

145

Statement 1: Insulin is a globular protein

Statement 2: It has two polyperptide chains with 21 and 30 amino acids joined by sulphur bridges connecting cysteine amino acid on the two chains

146

Statement 1: D-Fructose is used for sweetening cold drinks but not hot ones

Statement 2: The sweet form is fructopyranose; on increasing temperature causes a shift in the pyranose⇌ furanose equilibrium towards the less sweet furanose form

147

Statement 1: Thymine occurs in RNA

Statement 2: RNA controls the synthesis of proteins

148

Statement 1: All enzymes are proteins but all proteins are not enzymes

Statement 2: Enzymes are biocatalysts and have stable configuration having an active site

149

Statement 1: Glycine exists as Zwitter ion but *o*- and *p*-amino benzoic acid do not

Statement 2: Due to the presence of $-NH_2$ and $-COOH$ group within the same molecule, they neutralise each other and hence α amino acids exsit as dipolar ions ar Zwitter ions

150

Statement 1: Glucose and fructose both reduce Schiff's reagent

Statement 2: Both have free carbonyl group

Matrix-Match Type

This section contain(s) 0 question(s). Each question contains Statements given in 2 columns which have to be matched. Statements (A, B, C, D) in **columns I** have to be matched with Statements (p, q, r, s) in **columns II**.

151.

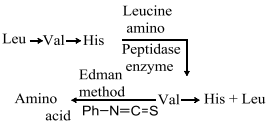
Column-I	Column- II
(A) α-Helix structure	(p) The polypeptide chains lie side by side in an open structure having interchain amide H-bonding that holds the chains together
(B) β-Pleate sheet structure	(q) The polypeptide chain is coiled up into a right handed spiral structure. It is stabilized by Intramolecular H-bonding between $(C = O)$ of one amino acid residue and the $(N - H)$ of the 4th AA residue in the chain. This is also called 3.6_{13} helix, having 3.6 AA in each turn of the helix and 13-membered ring
(C) Parallel pleated sheet structure	(r) This structure has the chains running in opposite directions. The α-C atoms rotate slightly out of the plane of the sheet to minimise repulsions between their bulky (R) groups
(D) Anti-parallel pleated sheet structure	(s) This structure has chains running in the same direction; all with their N-terminal residue

starting at the same end. The (R) groups alternate positions below and above the sheet

CODES :

	A	B	C	D
a)	p	s	r	q
b)	s	r	q	p
c)	q	p	s	r
d)	r	s	p	q

152.

Column-I		Column- II
(A)	$Gly \rightarrow Ala \xrightarrow[carboxypeptidase]{Enzyme} Amino\ acid$	(p) Ala
(B)	$Ala \rightarrow Gly \xrightarrow[Leucine\ amino\ peptidase]{Enzyme} Amino\ acid$	(q) Gly
(C)	$Leu \rightarrow Val \rightarrow His \xrightarrow[DNP]{Sanger\ method} Amino\ acid$	(r) Val
(D)	$Leu \rightarrow Val \rightarrow His \xrightarrow[Hydrazinolysis]{NH_2NH_2} Amino\ acid$	(s) Leu
(E)		(t) Hist

CODES :

	A	B	C	D	E
a)	Q	r	q	s	p
b)	r	s	p	q	p
c)	p	q	r	s	p
d)	s	p	t	q	p

153. Compare vitamin List I with its deficiency disease List II

Column-I		Column- II
(A)	Vitamin-B_{12}	(1) Sterility
(B)	Vitamin-B_6	(2) Haemorrhagic condition
(C)	Vitamin-E	(3) Pernicious anaemic
(D)	Vitamin-K	(4) Skin disease

CODES :

	A	B	C	D

a)	1	2	3	4
b)	2	3	4	1
c)	3	4	1	2
d)	3	4	2	1

154.

Column-I	**Column- II**
(A) Sucrose	(p) $(C_1 - \alpha)$ of glucose → C_4 of glucose
(B) Maltose	(q) $(C_1 - \alpha)$ of glucose → C_4 of glucose and $(C_1 - \alpha)$ of glucose → C_6 of glucose in another chain
(C) Lactose	(r) $(C_1 - \beta)$ of glucose → C_4 of glucose
(D) Starch	(s) $(C_1 - \beta)$ of gatactose → C_4 of glucose
(E) Cellulose	(t) $(C_1 - \alpha)$ of glucose → $(C_2 - \beta)$ of fructose

CODES :

	A	**B**	**C**	**D**	**E**
a)	p	s	q	r	t
b)	t	p	s	q	t
c)	s	q	t	r	t
d)	q	r	p	t	t

155.

Column-I	**Column- II**
(A) Sucrose	(p) Maltase
(B) Maltose	(q) Emulsin
(C) Lactose	(r) Amylase
(D) Starch	(s) Lactase
(E) Cellulose	(t) Invertase

CODES :

	A	**B**	**C**	**D**	**E**
a)	P,q,r,s,t	q,r	q,s	p,r	q,s
b)	q,s	q,s	p,r	p,q	q,s
c)	p,r	p,q	r,s	p,r	q,s

d)	s,t	p,q	p,r	q,s	q,s

156. Match the vitamin of List I with deficiency disease given in List II

Column-I	**Column- II**
(A) Vitamin A	(1) Scurvy
(B) Vitamin B_{12}	(2) Hemorrhagic condition
(C) Vitamin C	(3) Sterility
(D) Vitamin E	(4) Xerophthalmia
(E) Vitamin K	(5) Pernicious anaemia

CODES :

	A	**B**	**C**	**D**	**E**
a)	3	4	5	2	1
b)	3	4	5	1	1
c)	4	5	1	3	1
d)	3	5	4	2	1
e)	4	5	3	1	1

157. Match the List I and List II and pick the correct matching from the codes given below

Column-I	**Column- II**
(A) Thymine	(1) Pyrimidine base
(B) Thiamine	(2) Enzyme
(C) Insulin	(3) Cell – wall component
(D) Pepsin	(4) Hormone
(E) Phospholipids	(5) Vitamin B_1

CODES :

	A	**B**	**C**	**D**	**E**
a)	4	3	1	5	2
b)	5	3	4	1	2
c)	3	2	1	5	2
d)	2	4	1	3	2
e)	1	5	4	2	2

158.

Column-I		Column- II
(A)	β-L (−) Glucopyranose	(p) α-D (−) fructofuranose
(B)	β-D (+) Glucofuranose	(q) α-D (−) fructopyranose
(C)	β-D (−) Fructofuranose	(r) α-L (−) glucopyranose
(D)	β-D (−) Fructopyranose	(s) α-D (+) glucofuranose

CODES :

	A	**B**	**C**	**D**
a)	r	s	p	q
b)	s	p	q	r
c)	q	r	s	p
d)	p	q	r	s

159.

Column-I		Column- II
(A)	D-Glucose	(p) Disaccharide
(B)	D-Fructose	(q) Non-reducing
(C)	Lactose	(r) Osazone
(D)	Sucrose	(s) Reducing
(E)	Starch	(t) Polysaccharide

CODES :

	A	**B**	**C**	**D**	**E**
a)	R,s	r,s	p,r,s	p,q	q,t
b)	p,r	q,t	r,s	p,r	q,t
c)	q,t	s,t	p,r	p,q	q,t
d)	p,q	r,s	q,t	p,r	q,t

160.

Column-I		Column- II
(A)	1° Structure	(p) The structure is a result of the different conformation of polypeptide chain
(B)	2° Structure	(q) The structure is determined by any folding of chain in on itself
(C)	3° Structure	(r) The structure results when two or more polypeptide chains in some proteins are linked together by weak forces of attraction on their

surface groups

(D) 4° Structure

(s) The manner and sequence in which various amino acids are joined to form polypeptide

CODES :

	A	B	C	D
a)	s	p	q	r
b)	r	q	p	s
c)	q	s	r	p
d)	p	r	s	q

161.

Column-I	Column- II
(A) C-2 epimer of D-glucose	(p) D-Allose
(B) C-3 epimer of D-glucose	(q) D-Mannose
(C) C-4 epimer of D-glucose	(r) D-Indose
(D) C-2 epimer of D-altrose	(s) D-Galactose
(E) C-2 epimer of D-gulose	(t)

CODES :

	A	B	C	D	E
a)	r	q	p	s	r
b)	s	r	q	s	r
c)	q	p	s	p	r
d)	p	s	q	r	r

162.

Column-I	Column- II
(A) D-Threose $\xrightarrow[HNO_3]{[O]}$	(p) Meso-Butan-1,2,3,4-tetraol
(B) D-Erythrose $\xrightarrow[HNO_3]{[O]}$	(q) D (−) Tartaric acid
(C) D-Threose $\xrightarrow[[H]]{H_2/Ni}$	(r) Meso-Tartaric acid
(D) D-Erythrose $\xrightarrow[[H]]{H_2/Ni}$	(s) D-Butan-1,2,3,4-tetraol

CODES :

	A	B	C	D
a)	r	s	p	q

b)	s	q	p	r
c)	p	r	q	s
d)	q	r	s	p

Linked Comprehension Type

This section contain(s) 24 paragraph(s) and based upon each paragraph, multiple choice questions have to be answered. Each question has atleast 4 choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct.

Paragraph for Question Nos. 163 to -163

Monosaccharides have – CHO $(\text{or} > C{=}O)$ and – OH groups, so they undergo usual oxidation and reduction. Further, monosaccharides form osazone when treated with excess of phenylhydrazine (3 equivalents). In osazone formation, only the first two carbon atoms are involved. Thus, monosaccharids having identical configuration on rest 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 osazone *D*. Compounds *A* to *D* behaves as below:

(i) $\xrightarrow{HCl} \xrightarrow[CH_3COOH]{Zn} D$- fructose

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

(iii) $B \xrightarrow{HNO_3}$ optically active glyceric acid

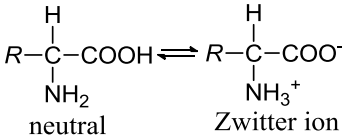
(iv) $C \xrightarrow{HNO_3}$ optically active glyceric acid

163. Compound *A* should be

a) *D*-glucose b) D-fructose c) L-glucose d) L-fructose

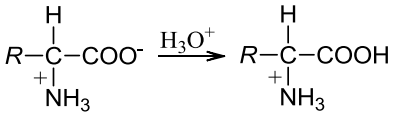
Paragraph for Question Nos. 164 to - 164

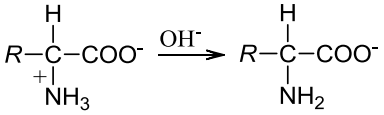
Amino acids contain an – NH_2 as well as a $-COOH$ group. In many non-polar solvents, they exist in its neutral form, but in aqueous solution, they exist as dipolar ions (Zwitter ions)



This explains their several characteristics properties, like composition on heating, solubility in water, large dipole moment

If the pH is lowered significantly, say to pH 1 or 2, then carboxylate ion will be protonated, likewise at a very high pH, the free amino group is exposed by deprotonation of ammonium ion

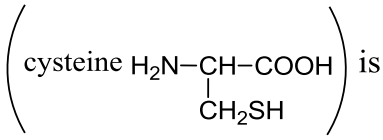




There is a pH corresponding to each amino acid where it remains neutral and neither moves towards cathode nor anode when the electric field is applied. This pH of the solution is referred to as isoelectric point. For example, the isoelectric point of alanine is 6.01, that of isoleucine is 6.02 and so on

Hence, the ionic form of the amino carboxylic group is the effect of pH on the functional group in the side chain of amino acid. The side chain of many amino acids contain a functional group that can also be protonated or deprotonated

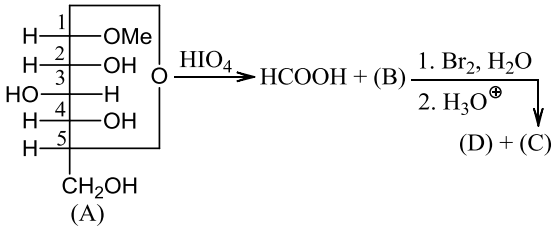
164. For the thiol group of cysteine at pH 8.2, of pK_a is 8.3, the concentration ratio of $RS^{-} vs\ RSH$



is

a) 0.8 b) 0.6 c) 0.9 d) 0.2

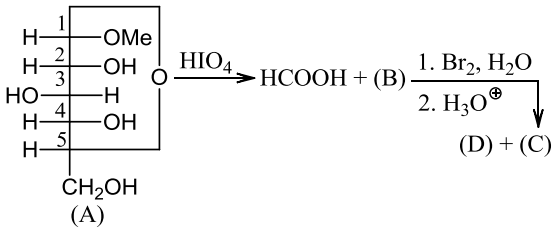
Paragraph for Question Nos. 165 to - 165



165. The name of compound (A) is:

a) Methyl-α-D-glucofuranoside b) Methyl-β-D-glucofuranoside c) Methyl-α-D-glucopyranoside d) Methyl-β-D-glulocopyranoside

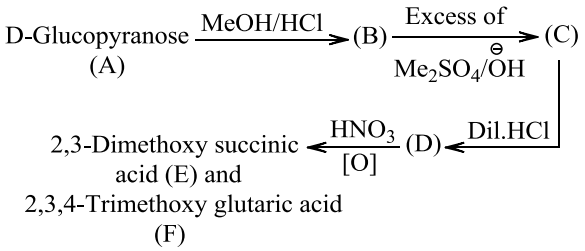
Paragraph for Question Nos. 166 to - 166



166. The name of compound (A) is:

a) Methyl-α-D-glucofuranoside
b) Methyl-β-D-glucococofuranoside
c) Methyl-α-D-glucopyranoside
d) Methyl-β-D-glucopyranoside

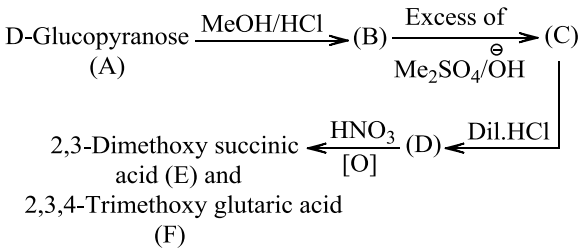
Paragraph for Question Nos. 167 to - 167



167. Which statement(s) is/are correct about (A)?

a) It contains an acetalic linkage
b) It contains a hamiacetalic linkage
c) It has a six-membered cyclic ring
d) It has a δ-hemiacetalic linkage

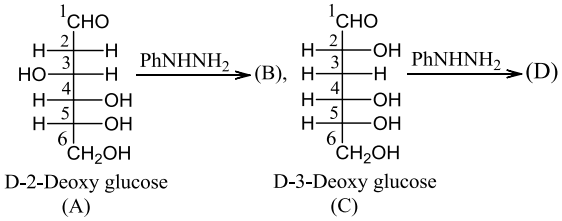
Paragraph for Question Nos. 168 to - 168



168. Which statement(s) is/are correct about (A)?

a) It contains an acetalic linkage
b) It contains a hemiacetalic linkage
c) It has a six-membered cyclic ring and a δ-hemiacetalic linkage
d) It has a five-membered cyclic ring and a γ-hemiacetalic linkage

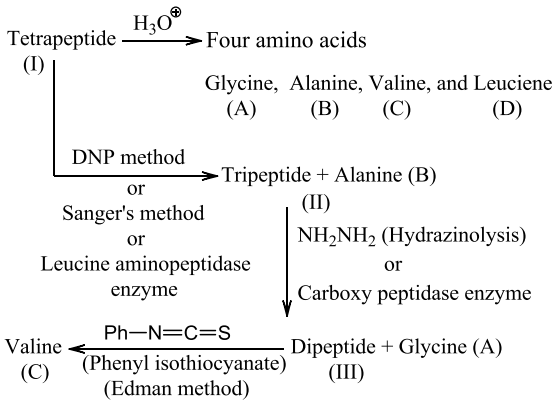
Paragraph for Question Nos. 169 to - 169



169. Compound (B) is

a) Phenylhydrazone of (A)
b) Osazone (A)
c) Both
d) None

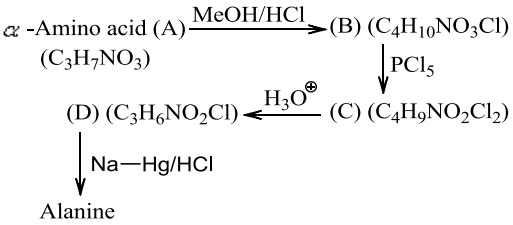
Paragraph for Question Nos. 170 to - 170



170. The dipeptide (III) is:

a) Val → Leu b) Leu→ Val c) Gly→ Ala d) Ala → Gly

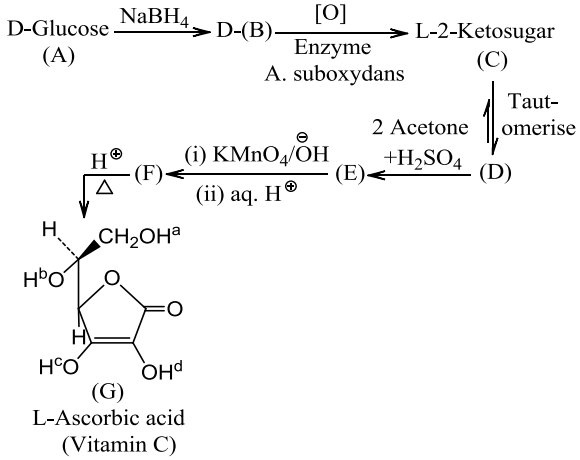
Paragraph for Question Nos. 171 to - 171



171. Compound 'A' has many functional groups

a) 1 b) 2 c) 3 d) 4

Paragraph for Question Nos. 172 to - 172



172. Account for the acidity of L-ascorbic acid ($pK_a = 4.21$). Which of the following is most acidic H? (Marked in the structure as H^a, H^b, H^c, and H^d)

a) H^a b) H^b c) H^c d) H^d

Paragraph for Question Nos. 173 to - 173

D-Glyceraldehyde $\xrightarrow[(ii)Ba(OH)_2+H_2SO_4]{(i)KCN}$ Products (B)

↓ Δ

(D + E) $\xleftarrow{Na/Hg,H_3O^{\oplus}}$ Products (C)

(D) $\xrightarrow[HNO_3]{[O]}$ Dibasic acid (optically active) (F)

(E) $\xrightarrow[HNO_3]{[O]}$ Dibasic acid (optically inactive) (G)

173. Two isomeric products are obtained in (B). they are

a) Diastereomers b) Anomers c) C-2 epimer d) C-3 epimer

: ANSWER KEY :

1)	a	2)	d	3)	d	4)	c	5)	a	6)	c	7)	d	8)	a
5)	a	6)	c	7)	c	8)	a	9)	a	10)	a	11)	c	12)	d
9)	b	10)	a	11)	d	12)	a	1)	b	2)	a	3)	c	4)	a
13)	c	14)	c	15)	a	16)	c	5)	b,c,d	6)	b,d	7)	a	8)	a
17)	a	18)	c	19)	c	20)	a	9)	c	10)	c	11)	a,c		
21)	d	22)	a	23)	a	24)	d								
25)	b	26)	b	27)	d	28)	a								
29)	d	30)	a	31)	b	32)	b								
33)	d	34)	b	35)	c	36)	c								
37)	d	38)	a	39)	b	40)	b								
41)	b	42)	b	43)	d	44)	b								
45)	b	46)	b	47)	c	48)	a								
49)	c	50)	b	51)	d	52)	a								
53)	a	54)	b	55)	c	56)	d								
57)	d	58)	b	59)	c	60)	c								
61)	c	62)	c	63)	d	64)	a								
65)	d	66)	a	67)	b	68)	d								
69)	a	70)	d	71)	c	72)	a								
73)	a	74)	d	75)	d	76)	c								
77)	d	78)	d	79)	b	80)	a								
81)	b	82)	c	83)	c	84)	b								
85)	c	86)	a	87)	d	88)	d								
1)	a,b,c,d	2)	a,b,c,d	3)	a	4)									
5)	a,b,a,b,c	6)	b, c	7)	a,d	8)									
9)	a,c,b,d	10)	b,c	11)	11	12)									
13)	a,b,c,a,b,c,d	14)	a,d	15)	a,d	16)									
17)	a	18)	a,b,c,d	19)	a,b,c	20)	a								
21)	a,c,a,b,c,d	22)	b,c,d	23)	a,b	24)									
25)	a,b,c,a,d	26)	a,d	27)	b,c,d	28)									
29)	a,b,c,d,a,b,d	30)	a,c	31)	c	32)									
33)	a,b,c	34)	a,c,d	35)	a,b,c,d	36)	b								
37)	a,b,c,d	1)	c	2)	b	3)	d								
	4)	c													
5)	d	6)	c	7)	c	8)	a								
9)	b	10)	b	11)	a	12)	d								
13)	a	14)	d	15)	b	16)	b								
17)	a	18)	c	19)	d	20)	a								
21)	a	22)	d	23)	a	24)	b								
25)	d	1)	c	2)	c	3)	c								
	4)	b													

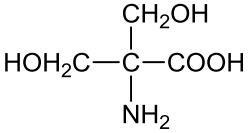
: HINTS AND SOLUTIONS :

1 **(a)**

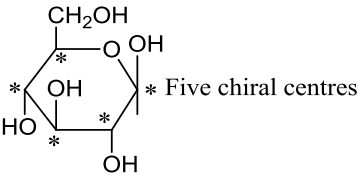
Ring *A* is pyranose (6 membered ring containing one O-atom) with α −glycosidic linkage and ring *B* is furanose with β −glycosidic linkage.

4 **(c)**

It does not contain a chiral centre



22 **(a)**



Five chiral centres

24 **(d)**

Lysine is a basic amino acid, hence its pI (isoelectric point) lies in the basic range (8 to 9). At pI, amino acid has least solubility in water and this property is exploited in the separation of different amino acids obtained from the hydrolysis of protein

34 **(b)**

Lysine contains two basic groups.

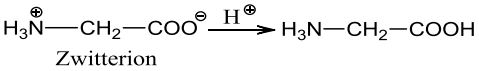
e.g., NH_2

37 **(d)**

Haemoglobin and cytochromes are both conjugated proteins containing Fe (heme) as the prosthetic group

40 **(b)**

At pH = 4 (acidic range), glycine reacts with$H^{\oplus}$ ion

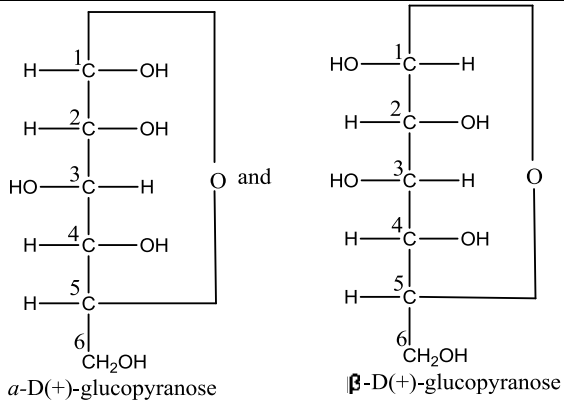


43 **(d)**

Here, the – OH of hemiacetal group is equatorial therefore, it is a β −pyranose of an aldohexose.

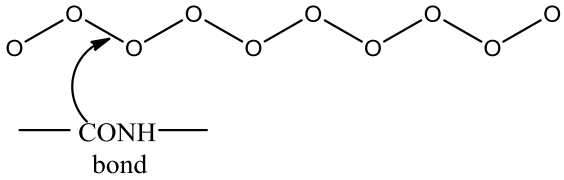
50 **(b)**

Two forms of D-glucopyranose are α − D − (+) −glucopyranose and β − D − (+) −glucopyranose. These are anomers (a pair of stereoisomers which differ in configuration only around first-carbon atom are called anomers).



70 **(d)**

A decapeptide has nine peptide (amide) linkage as



Therefore, on hydrolysis, it will absorb nine water molecules.

Hence, total mass of hydrolysis product

$$= 796 + 18 \times 9 = 958$$

⇒ mass of glycine in hydrolysis product

$$= \frac{958 \times 47}{100} = 450$$

⇒ number of glycine molecule in one molecule of decapeptide

$$= \frac{450}{75} = 6$$

73 **(a)**

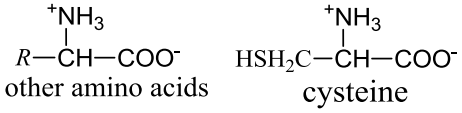
Cellulose is a straight chain polysaccharide composed of D-glucose units which are joined by β −glycosidic linkages between C-1 of one glucose and C-4 of the next glucose. In one unit only three hydroxyl groups are free to form acetate, that's why called cellulose triacetate.

79 **(b)**

Aldehydes and α −hydroxy ketones give positive Tollen's test. Glucose has an aldehyde group and fructose is an α −hydroxy ketone.

89 **(a,b,c)**

Due to the presence of – CH_2SH group in cysteine, the priority order is changed



90 **(a,b,c,d)**

All statements are self-explanatory

94 **(b, c)**

Carbohydrates are polyhydroxy aldehydes and ketones.

96 **(a,b,c)**

They are not anomers, since one glucose is in pyranose form while the other is in furanose form

97 **(a,c)**

Vitamin A, D, E and K are fat soluble while remaining are water soluble

99 **(11)**

A,b,c,d

100 **(b,d)**

Amylase hydrolyses α-linkage. (d) It exhibits mutarotation, since in β-D-glucose C-1 (OH) group is hemiacetalic

102 **(a,d)**

In sucrose there are OH groups, so it forms octa methylated and acetylated products

104 **(a,b,c,d)**

The compound whose numerically largest numbered (as per IUPAC convention) asymmetric carbon has configuration similar to D-glyceraldehyde has D-configuration

106 **(a,b,c,d)**

All of them have hemiacetalic linkage

107 **(a,b,c)**

Since C-1 OH group in β-D-glucose is hemiacetalic, so with MeOH/HCl, this OH group is methylated to form acetal. Thus with β-D-glucose, the word glucopyranoside is named

109 **(a,c)**

1. False, sugars containing hemiacetal show mutarotation

2. True, ketoses exist in hemiketals and possesanomers.

3. False; the anomeric (OH) is etherified and the equilibrium with the free carbonyl is destroyed

4. True, the statement is self explanatory

110 **(b,c,d)**

All statements are self-explanatory

111 **(a,b)**

Every amino acid exists exclusively as dipolar ion when the pH, of the solution is equal to its isoelectric point (pI), hence at this pH it does not migrate to either electrode, while at other pH, an amino acid migrates acid migrates either to cathode or to anode depending upon its pI. Thus, at pH 9.60, amino acid with pI 5.40 will exist as an anion and migrate to anode while that with pI 9.60 will not migrate to any electrode

Similarly, at pH 5.40, amino acid with pI 9.60 will exist as cation and migrate to either electrode

113 **(a,b,c)**

Statements are self explanatory

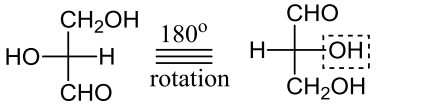
117 **(a,b,c,d)**

All statements are self-explanatory

120 **(a,b,d)**

Write the structure in Fischer projection, with the function group on the top and then find D and L

a.

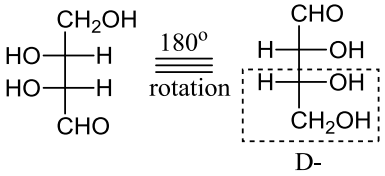


OH group R.H.S.
and hence D-

b.Determine R and S configurations, where R is D and S is L. The order of priorities is: OH $>$ CHO $>$ $C\mathrm{H_2OH}$ $>$ H. So, (b) is R or D

c.Here, (c) is S or L

d.



D-

121 **(a,b,c)**

(A) (with pI $= 1.1$) is in a very acidic range; has more anionic groups at pH $= 7$; and will migrate to the positive electrode (cathode). (B) (pI $=$ 6.7) is present mostly with net zero charge and moves very little or will not migrate (C) (pH$=$ 11.0), the very basic protein, exists mainly in the cationic form and migrates to the negative electrode (anode). At pI, amino acids have least solubities, so (B) (pH $= 6.7$), [pH very close to pH of the mixture (pH $= 7$)], is least soluble and would precipitate out, while (A) and (C) would remain in the solution

124 **(b)**

Three base pairs code for one amino acid and two more triplets are required for 'start' and 'stop' singals, or $(3 \times 129) + (3 \times 2) = 393$ base pairs

126 **(c)**

Statement I is correct, but Statement II is wrong

because anaerobic reaction occurs in the absence of oxygen

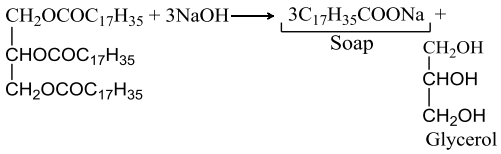
127 **(b)**
Carbohydrates which upon hydrolysis yield two molecules of the same or different monosaccharides are called disaccharides. For example sucrose on acid hydrolysis gives one molecule of glucose and frucotes.

128 **(d)**
Vitamin B_5 is also called as nicotinic acid. Nicotinic acid in the form of nicotinamide is found usually in all living cells in small amounts

129 **(c)**
Statement I is correct but Statement II is wrong because the enzyme cleaves the C-terminal bond

130 **(d)**
D-3-doeoxyglucose has three chiral C atoms and, therefore, has ($2^3 = 8$) eight stereoisomers.

131 **(c)**



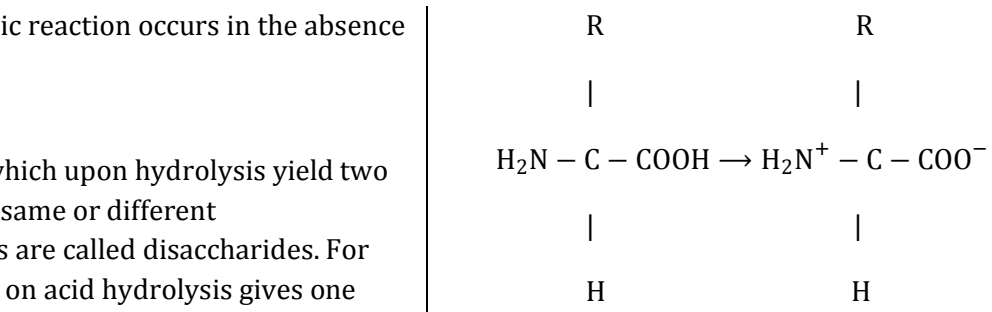
Statement I is correct. Statement II is wrong. Correct explanation. Soap is sodium salt of higher fatty acids

132 **(c)**
Both statements are correct but Statement II is not the correct explanation of Statement I. Correct explanation: Enzymes which hydrolyseβ-glycosidic linkages are not present in human beings

133 **(a)**
Both the statements are correct and Statement II the is correct explanation of Statement I

134 **(b)**
The genetic information of cell is contained in the sequence of base A, T, G and C in DNA molecule. When a cell divides, DNA molecules replicate and make exact copies of themselves so that each daughter cell will have DNA indentical to that of the parent cell.

135 **(b)**



Amino acid A zwitter ion from

A zwitter ion is formed by transfer of a proton from a –COOH groups to an $-NH_2$ group.

137 **(d)**
Sequence of bases in DNA is TGAACCCTT, since according to base-pairing principle, T in DNA faces A in m-RNA, while G faces C and A faces U. Therefore, sequence of bases in m-RNA is ACUUGGGAA

138 **(a)**
Reducing sugar contain a free aldehydic or ketonic group adjacent to a > CHOH group and reduce Tollen's reagent. Schiff's reagent at Benedict's solution.

139 **(d)**
Statement I is wrong and Statement II is the correct explanation of why glycosides do not mutarotate

140 **(b)**
ATP has four negatively charged oxygen very close to each other. So, the repulsive forces between them is high. On hydrolysis of ATP, a $H_2PO_4^-$ ion is eliminated and the number of negatively charged oxygen atoms decreases. Thus, repulsive forces decreases and large amount of energy is set free. When ATP changes to ADP, which in turn changes into AMP energy is released at each step. This is how ATP act as a source of energy

141 **(b)**
Due to denaturation , a protein loses its biological activity. During denaturation, the protein molecule uncoils and from a more random conformation and precipitates from the solution.

143 **(c)**
K_a for glucose is 6.6×10^{-12} and K_a for C_2H_5OH is 7.4×10^{-20}. Thus, glucose is more acidic than a

monohydric alcohol

145 **(a)**
Both statements are correct

146 **(a)**
Both the statements are correct and Statement II the is correct explanation of Statement I

148 **(a)**
Both the statements are correct and Statement II is the correct explanation of Statement I

149 **(b)**
In *o*- and *p*-amino benzoic acid, the lone pair of electrons on the $-NH_2$ group is donated towards the benzene ring. As such, the basic character of $-NH_2$ group and acidic character of – COOH group decreases. Therefore, the weakly acidic – COOH group cannot transfer a H^+ ion to the weakly basic $-NH_2$ group therefore *o*- and *p*-aminobenzoic acids do not exist as Zwitter ion

150 **(d)**
Schiff's reagent is a weak oxidising agent. It does not convert the hemiacetalic ring structure to open chain structure to give free $(C = O)$ group

151 **(c)**
(**a** → **q**) Definition of α-helix structure of protein
(**b** → **p**) Definition of β-pleated sheet structure of protein
(**c** → **s**) Definition of parallel β-pleated sheet structure of protein
(**d** → **r**) Definition of anti-parallel β-pleated sheet structure of protein

152 **(c)**
(a → p) Carboxypeptidase enzyme releases C-terminal amino acid (AA), so Ala is released
(b → q) Leucine aminopeptidase anzyme releases N-terminal AA, so Gly is released
(c → r) Sanger method releases N-terminal AA, so Leu is released
(d → s) Hydrazonlysis releases C-terminal AA, so His is released
(e → q) Enzyme Leucineaminopeptidase releases N-terminal AA, so first Leu is released. Now dipeptide is treated with $(Ph - N = C = S)$ (Edman method) which releases N-terminal AA. So Val is released

153 **(c)**

Vitamin	Deficiency disease
A. Vitamin-B_{12}	1. Pernicious anaemia
B. Vitamin-B_6	2. Skin disease
C. Vitamin-E	3. Sterility
D. Vitamin-K	4. Haemorrhagic condition

155 **(a)**
(a → p,q,r,s,t)
Sucrose contains α- and β-glycosidic linkages. It can be hydrolysed by both the enzymes which hydrolyseα- and β-linkage
Maltose hydrolyses α-linkage
Emulsion hydrolyses β-linkage
Amylose hydrolyses α-linkge
Lactose hydrolyses β-linkage
Invertasehydrolyse sucrose
(**b** → **q,r**) (α-linkage) by maltose and amylose
(**c** → **q,s**)(β-linkage) by emulsion and lactose
(**d** → **p,r**) (α-linkage) by maltose and amylose
(**e** → **q,s**) (β-linkage) by emulsion and lactose

156 **(c)**

List I	List II
A. Vitamin A	1. Xerophthalmia
B. Vitamin B_{12}	2. Pernicious anaemia
C. Vitamin C	3. Scurvy
D. Vitamin E	4. Sterlity
E. Vitamin K	5. Hemorrhagic condition

157 **(d)**

List I	List II
A. Thymine	1. Pyrimidine base
B. Thiamine	2. Vitamin B_1
C. Insulin	3. Hormone
D. Pepsin	4. Enzyme
E. Phospholipids	5. Cell wall component

158 **(a)**
Anomers differ in the configuration at the acetal or hemiacetal C atom of sugar in its cyclic form. Anomer pairs are those in which there is difference of only the word α- or β-, the rest part is exactly the same

159 **(a)**

(**a** → **r, s**) Glucose forms osazone and is reducing
(**b** → **r, s**) Fructose also forms osazone and is also reducing
(**c** → **p, r, s**) Lactose is a dissacharide forms osazone and is reducing
(**d** → **p, q**) Sucrose is a dissacharide and is non-reducing
(**e** → **q, t**) Starch is a polysaccharide and is non-reducing

160 **(a)**
(**a** → **s**) Definition of 1° structure of protein
(**b** → **p**) Definition of 2° structure of protein
(**c** → **q**) Definition of 3° structure of protein
(**d** → **r**) Definition of 4° structure of protein

163 **(b)**
The (ii) series of reactions points out for the presence of a ketonic group in A, hence A must be D-fructose

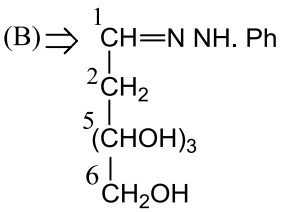
164 **(a)**
For the equilibrium, $RSH \rightleftharpoons RS^- + H^+$
Henderson-Hasselbalch equation,

$$pH = pK_a + \log\frac{[salt]}{[acid]}$$

$$\therefore 8.2 = 8.3 + \log\frac{[RS^-]}{[RSH]}$$

Or $\frac{[RS^-]}{[RSH]} = 0.8$

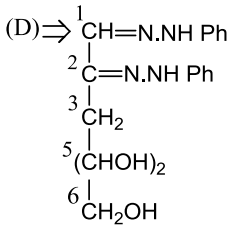
169 **(a)**
i. Compound (A) has no $(C-OH)$ group α to the $(CH=O)$ group. So it forms only phenylhydrazone with 1 mol of $PhNHNH_2$



ii. Compound (B) has $(C-OH)$ group α to the $(CH=O)$ group. So it forms only osazone by reacting with 3 mol $PhNHNH_2$

$\therefore$ 3 mol $PhNHNH_2$ react with 1 mol (C)

1 mol $PhNHNH_2$ react with $\frac{1}{3}$ mol (C)



170 **(a)**
(1) DNP method or Leucineaminopeptidase enzyme releasess N-terminal amino acid

Tetrapeptide→ Alanine + Tripeptide

5. (N-terminal)

Ala → Tripeptide

(N-terminal)

(2) Hydrazinolysis or carboxypeptidase enzyme releases C-terminal amino acid

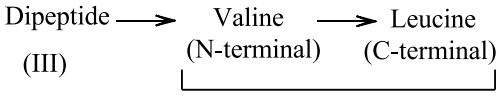
Tripetide→ Dipeptide + Glycine

6. (C-terminal)

Ala → Dipeptide → Gly

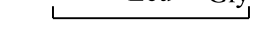
(N-terminal) (C-terminal)

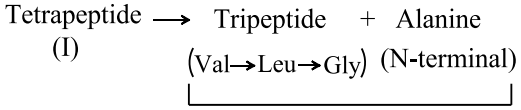
(3) Dipeptide (III) now contains only two amino acids, valine and Leucine. Edman method releases N-terminal amino acid

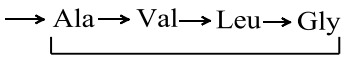


Tripeptide→ Dipeptide + Gly

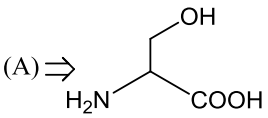
(III) (Val → Leu) (C-terminal)



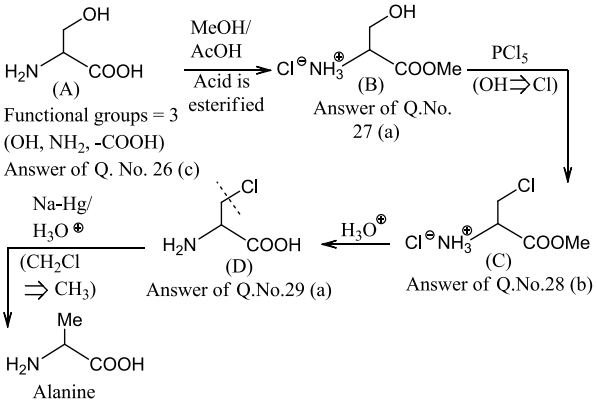




171 **(c)**
α-amino acid type. Total C atoms in (A) = 3, R= Me, but total O atoms in (A)=3, So R = (CH_2OH)

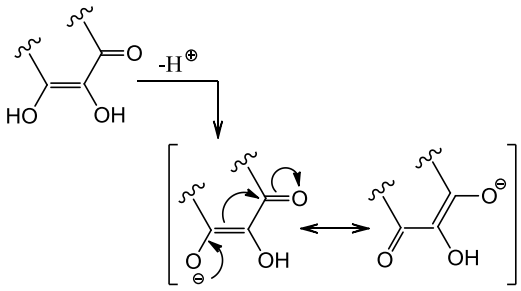


Reactions:



172 **(c)**

The anion formed by the removal of enolic H is stable because the negative charge is stabilised by resonance, i.e., by delocalisation of the negative charge to the O of the (C = O) through (C = C), as shown below



173 **(a,c)**

The sequence from (A) to (D + E) is called Kiliani synthesis: