CHEMISTRY

PHYSICAL, INORGANIC, AND ORGANIC CHEMISTRY

BIOMOLECULES

Board level

1. Where does the water present in the egg go after boiling the egg ?

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2. Why cannot vitamin C be stored in our body ?

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3. Classify the following into monosaccharides and disaccharides: Ribose, $2-$ deoxyribose, maltose,galactose, fructose,and lactose.

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4. Write the names and the structures of monomers of following polymer :

(i) Natural rubber

(ii) Terylene.

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5. What are polymers ?

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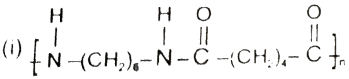
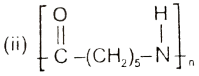
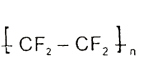
6. Write the names of monomers of the following polymers :

(i)  (ii)  (iii) 

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7. How do you explain the amphoteric behaviour of amino acids ?

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8. Glucose or sucrose are soluble in water but cyclohexane or bezene (simple six membered ring compounds) are insoluble in water. Explain.

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9. The melting points and solubility in water of amino acids are generally higher than that of the corresponding halo acids. Explain.

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10. Write two main functions of carbohydrates in plates.

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11. Why are vitamin C essential to us ? Give their important sources.

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12. How are polymers classified on the basis of structure ?

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13. Arrange the following polymers in increasing order of their intermolecular forces :

(i) Nylon 6, 6, Buna-S, Polythene.

(ii) Nylon 6, Neoprene, Polyvinyl chloride.

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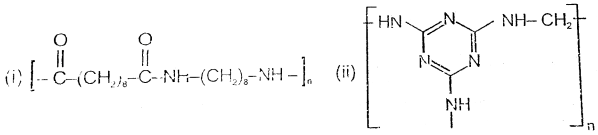
14. Identify the monomer in the following polymeric structure

(i) $\left[-\overset{O}{\overset{||}{C}} - (CH_2)_8 - \overset{O}{\overset{||}{C}} - NH - (CH_2)_8 - NH - \right]_n$

(ii) 

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15. How do you explain the absence of aldehyde group in the pentaacetate of D-glucose ?

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16. What are enzymes ?

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17. What are nucleic acids ? Mention their two important functions.

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18. What are natural and synthetic polymers ? Give two examples of each type.

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19. Distinguish between the terms homopolymer and copolymer and give an example of each.

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20. Write the monomers used for getting the following polymers.

(i) Polyvinyl chloride

(ii) Teflon

(iii) Bakelite.

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21. What happenes when $D-$ glucose is treated with the following reagents?

(i). HI

(ii).Bromine water

(iii). HNO_3

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Ex-1(sec-A)Part-I

1. What are monosaccharides?

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2. What are reducing sugars ?

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3. What do you understand by the term glycosidic linkage?

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4. What are the hydrolysis products of sucrose ?

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5. What is the basic structural difference between starch and cellulose?

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6. Write the reaction of D-glucose with HNO_3.

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7. Give reasons as the evidence in support of cyclic structure of glucose.

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8. What is mutarotation ?

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9. Simple six memebered ring compound (eg. Cyclohexane) are not soluble in water whereas glucose and sucrose are soluble in water. Explain why ?

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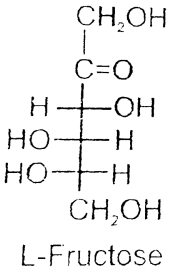
10. The fischer projection of D-fructose is given below, write the fischer projection of L-fructose.



L-Fructose

L- Fructose is enantiomer of D-Fructose.

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Ex-1(sec-B)Part-I

1. The melting point and solubility $(\text{in} H_2O)$ of amino acids are generally high. Explain why ?

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2. What do you mean by the following also give example

(a) Non-essemtial amino acids

(b) Essential amino acids.

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3. Amino acids show amphotric behaviour. Explain why ?

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4. Why an amino acid is usually solid at room temperature.

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5. How will you identify a basic amino acid ?

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6. Whay is the product obtained when glycine hydrochloride reacts with two equivalents of $NaOH$? Write the chemical reactions involved.

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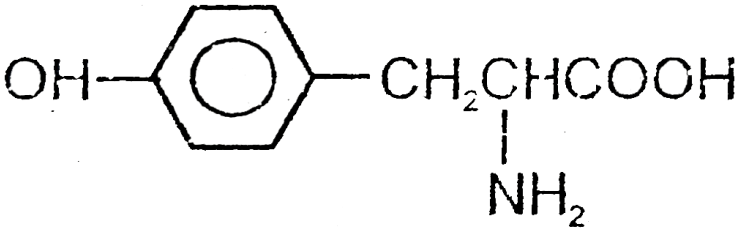
7. Tyrosine is an $\alpha - a \min o$ carboxylic acid shown below :



(a) In it's cationic form

(b) In it's anionic form

(c) In it's dianionic form

(d) In it's Zwitterionic form.

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8. What the denaturation of proteins ?

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Ex-1(sec-C)Part-I

1. What is the difference between Buna-N and Buna-S.

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2. Arrange the following in the increasing order of their intermolecular forces

$\underset{(I)}{\text{Nylon 6}}\quad\underset{(II)}{\text{Neoprene}}\quad\underset{(III)}{\text{Polyvinyl chloride.}}$

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3. Classify the following as addition and condensation polymers : Terylene, Bakelite, polyvinyl chloride, polythene.

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4. What is copolymerisation give two examples.

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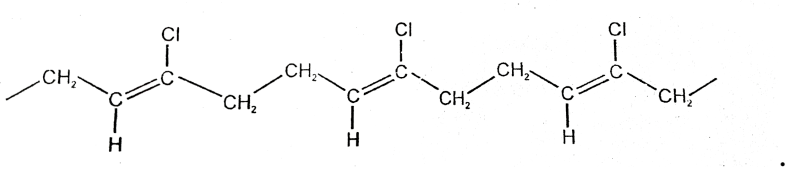
5. The partial structure of neoprene, a polymer is given below. Identify the monomer unit.



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Ex-1(sec-A)Part-II

1. Glycoside linkage is.

A. an acetal linkage

B. an ether linkage

C. an ester linkage

D. an amide linkage

Answer: A

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2. Sucrose on hydrolysis yields a mixture which is.

A. optically inactive

B. dextrorotatory

C. laevorotatory

D. racemic

Answer: C

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3. Hydrolysis of sucrose into $(+)$ glucose and $(-)$ fructose is known as.

A. Muta rotation

B. Inversion

C. Pyrolysis

D. None of these

Answer: B

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4. The letter D in D-glucose signifies.

A. dextro rotatory

B. mode of synthesis

C. its configuration

D. its diamagnetic nature

Answer: C

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5. Cellulose on hydrolysis yields

A. $\beta - D - F - \text{Fructose}$

B. $\alpha - D - \text{Glucose}$

C. $\beta - D - \text{Glucose}$

D. $\alpha - D - \text{Fructose}$

Answer: C

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6. Glucose when treated with CH_3OH in the presence of dry HCl gives α and β-methylglucosides because it contains

A. an aldehydic group

B. $a - CH_2OH$ group

C. a ring structure

D. five $-OH$ group

Answer: C

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7. Which of the following can be used for detection of traces of iodine ?

A. Glucose in aqueous solution

B. Starch in aqueous solution

C. Cellulose and arabinose

D. Lactose in aqueous solution

Answer: B

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8. What of the following pair form the same osazone ?

A. Glucose and fructose

B. Glucose and galactose

C. Glucose and arabinose

D. Lactose and maltose

Answer: A

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9. The term inverted sugar refers to an equimolar mixture :

A. D-Glucose and D-galactose

B. D-Glucose and D-fructose

C. D-Glucose and D-mannose

D. D-Glucose and D-ribose

Answer: B

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10. $\alpha - D$ glucose and $\beta - D$-glucose differ from each other due to the difference in one of the carbon atoms, with respect to its.

A. Number of OH groups

B. Configuration

C. Conformation

D. Size of hemiacetal ring

Answer: B

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11. Find true and False from the following statements regarding carbohydrates

S_1: All monosaccharides whether aldoses or ketoses are reducing sugars

S_2: Bromine water can be used to differentiate between aldoses and ketones

S_3: A pair of diasteromeric aldoses which differ only in configuration at $C-2$are anomers.

S_4: Osazone formation destroys the configuration of $C-2$ of an aldose, but does not affect the configuration of the rest of the molecule.

A. $TTTT$

B. $TFTF$

C. $TTFT$

D. $FTTT$

Answer: C

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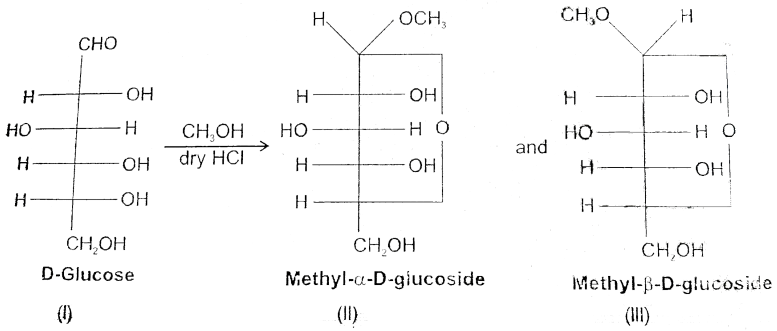
12. D-glucose, on treating with methanol in presence of dry HCl gives methyl glucosides according to the following reaction.



Mention true (T) and False from the following statements

S_1 : The glucosides do not reduce fehling's solution

S_2 : The glucosides do not react with hydrogen cyanide or hydroxylamine

S_3 : Behaviour of glucosides as stated in S_1 and S_2 indicates the absence of free $-CHO$ group

S_4 : The two forms of glucosides are enantiomers.

A. $TTFF$

B. $FTTT$

C. $TTTF$

D. $TFTF$

Answer: C

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13. In Ketohexose the possible optical isomers are

A. 12

B. 4

C. 16

D. 8

Answer: D

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14. Which of the following indicates the presence of $5-OH$ groups in glucose.

A. Penta-acetyl derivative of glucose

B. Cyanohydrin formation of glucose

C. Reaction with fehling's solution

D. Reaction with Tollen's reagent

Answer: A

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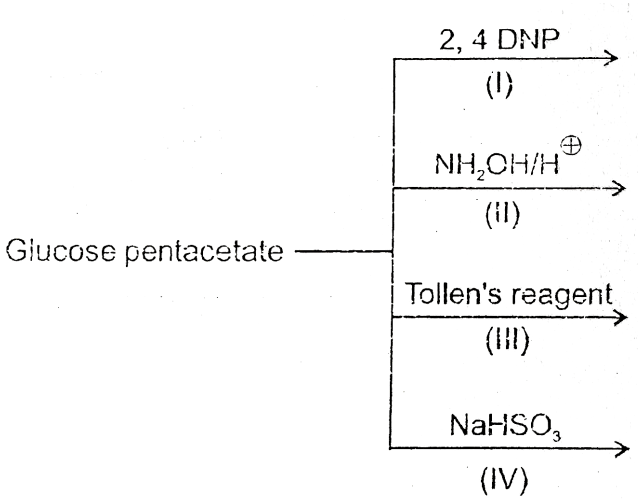
15. Observe the following laboratory test for glucose pentacetate and mention $+ve$ or $-ve$ from the code given below.



A. $+ + + +$

B. $- - - -$

C. $+ - + -$

D. $+ + - -$

Answer: B

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16. $\alpha - D(+)$ glucopyranose is.

A. acetal

B. ketal

C. hemiacetal

D. hemiketol

Answer: C

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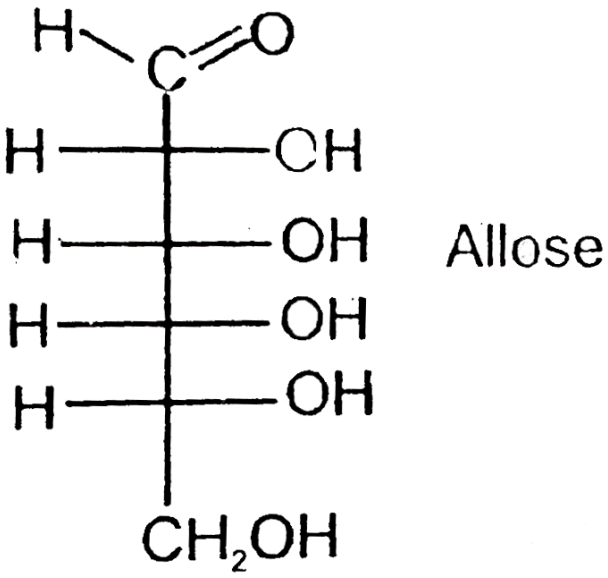

Allose

17.

Given monosacharide is a//an.

A. Aldopentose

B. Aldohexose

C. Ketopentose

D. Aldoheptose

Answer: B

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Ex-1(sec-B)Part-II

1. Which of the following α-amino acids is not optically active?

A. Alanine

B. Glycine

C. Phenylalanine

D. Cysteine

Answer: B

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2. The name of the dipeptide

$$H_2N\underset{CH_3}{\underset{|}{C}}HCONHCH_2COOH.$$

A. Glycylgylcine

B. Glycylalanine

C. Glycine alanine

D. Alanylglycine

Answer: D

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3. The force of attraction between the neighbouring peptide chains is

A. Vander Waal's force

B. Covalent bond

C. Hydrogen bond

D. Peptide linkage

Answer: C

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4. Which of the following is a basic amino acid ?

A. $H_2N - \underset{\underset{NH}{||}}{C} - NH(CH_2)_3 - \overset{\overset{NH_2}{|}}{C}H - COOH$

B. $HOH_2C - \underset{\underset{COOH}{|}}{C}H - NH_2$

C. $\underset{\underset{COOH}{|}}{CH_2} - CH_2 - \overset{\overset{NH_2}{|}}{C}H - COOH$

D. $HOOC - CH_2 - \overset{\overset{NH_2}{|}}{C}H - COOH$

Answer: A

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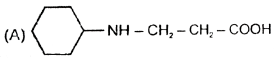
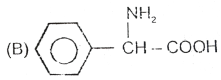
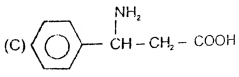
5. Which of the following is $\alpha -$ amino acid ?

A. 

B. 

C. 

D. $CH_3 - CH_2 - \underset{\underset{COOH}{|}}{CH} - CH_2 - NH_2$

Answer: B

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Ex-1(sec-C)Part-II

1. Starch is polymer of

A. $\alpha - D -$ Glucose

B. $\beta - D -$ Glucose

C. $\alpha - D -$ Glucose and $\beta - D -$ Glucose

D. $\alpha - D -$ Fructose

Answer: A

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2. Nylon-66 is made by using

A. Phenol

B. Benzaldehyde

C. Adipic acid

D. Succinic acid

Answer: C

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3. Polymer which has amide linkage is

A. Nylon-66

B. Terylene

C. Teflon

D. Bakelite

Answer: A

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4. Ziegter-Natta catalyst is

A. $K[PtCl_3(C_2H_4)]$

B. $(Ph_3P)_3RhCl$

C. $Al_2(C_2H_5)_6 + TiCl_4$

D. $Fe(C_5H_5)_2$

Answer: C

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5. Monomer of given polymer $\left[-\overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C}} - CH_2 - \right]$ is :

A. 2-Methylpropene

B. Styrene

C. Propylene

D. Ethene

Answer: A

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6. Which of the following is a nitrogen containing polymer ?

A. Polyvinyl chloride

B. Bakelite

C. Nylon

D. Terylene

Answer: C

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7. Buna-S is a polymer of :

A. Butadiene only

B. Butadiene and nitryl

C. Styrene only

D. Butadiene and styrene

Answer: D

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8. Condensation product of caprolactum is :

A. nylone-6

B. nylon-6,6

C. nylon-60

D. nylon-6,10

Answer: A

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Ex-1(sec-D)Part-II

1. The sugar present in DNA is :

A. Glucose

B. Deoxyribose

C. Ribose

D. Fructose

Answer: B

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2. The pentose sugar in DNA and RNA has the :

A. Open chain structure

B. Pyranose structure

C. Furanose structure

D. None of the above

Answer: C

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3. Which of the following is not a primidine base ?

A. Uracil

B. Guanine

C. Cytosine

D. Thymine

Answer: B

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4. The relationship between the nucleotide triplets and the amino acid is called.

A. Translation

B. Transcription

C. Replication

D. A genetic code

Answer: D

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5. Which of the following statement about DNA is not correct ?

A. It has a double helix structure

B. It undergoes replication

C. The two strands in a DNA molecule are exactly similar

D. It contains the 2-deoxyribose pentose sugar.

Answer: C

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6. Which of the following statement about RNA is not correct ?

A. It has a single strand

B. It does not undergo replication

C. It does not contain any pyridimine base

D. It controls the synthesis of proteins

Answer: C

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7. Oils and fats are esters of higher fatty acids with :

A. Ethanol

B. Glycol

C. Glycerol

D. Methanol

Answer: C

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8. The chief constituents of coil membrances are :

A. Simple triglycerides

B. Waxes

C. Phospholipids

D. Proteins

Answer: C

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9. The fats present in the body act as

A. Food storage only

B. Heat insulator only

C. Shock absorber only

D. All the three above

Answer: D

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10. The most concentrated source of energy in the human body is

A. Fats

B. Sugars

C. Proteins

D. Nuclei acids

Answer: A

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Ex-1(sec-E)Part-II

1. Which of the following is a vitamin ?

A. Glucose

B. Keratin

C. Maltose

D. Riboflavin

Answer: D

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2. Vitamin B_6 is known as

A. Pyridoxine

B. Thiamine

C. Tocophercol

D. Riboflavin

Answer: A

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3. The best source of vitamin A is :

A. Oranges

B. Beans

C. Carrots

D. Wheat

Answer: C

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4. Vitamin D is called :

A. Ascorbic acid

B. Calciferol or ergocalciferol

C. Thiamine

D. Riboflavin

Answer: B

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5. Which of the following is found in cod-liver oil ?

A. Vitamin C

B. Vitamin E

C. Vitamin A

D. Vitamin B_1

Answer: C

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6. Vitamin E is also called :

A. Cyanocobalamin

B. Tocopherol

C. Lactoflavin

D. Ascorbic acid

Answer: B

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7. The best source of vitamin C is :

A. Code liver oil

B. Egg yolk

C. Citrus fruits

D. Fish liver oil

Answer: C

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8. Milk contains vitamins :

A. A, D and E

B. A, B_{12} and D

C. C, D and K

D. B_1, B_6 and D

Answer: A

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9. Nervousness anaemia is caused by the deficiency of vitamin

A. B_1

B. B_2

C. B_6

D. B_{12}

Answer: D

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10. Deficiency of vitamin E causes

A. Scurvy

B. Loss of appetite

C. Loss of sexual power and reproduction

D. Beriberi

Answer: C

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11. Which of the following is fat soluble vitamin ?

A. Vitamin A

B. Pyridoxine

C. Riboflavin

D. Thiamine

Answer: A

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12. Which one of the following vitamin contains a metal atom ?

A. Vitamin A

B. Vitamin B_2

C. Vitamin B_6

D. Vitamin B_{12}

Answer: D

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13. Identify the vitamin whose deficiency in our food decreases reproductive power :

A. vitamin A

B. vitamin C

C. vitamin D

D. vitamin E

Answer: D

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14. Beri-beri is caused due to :

A. vitamin A

B. vitamin B

C. vitamin C

D. vitamin D

Answer: B

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Ex-1(Assertion/Reasoning)Part-III

1. Statement-1 : Gly-Ala is a structural isomer pf Ala-Gly.

Statement-2 : In Al-Gly, Alanine is the N-terminal amino acid.

A. STATEMENT-1 is true, STATEMENT-2 is true and STATEMENT-2 is correct explanation for STATEMENT-1

B. STATEMENT-1 is true, STATEMENT-2 is true and 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

Answer: B

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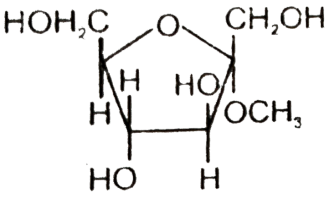
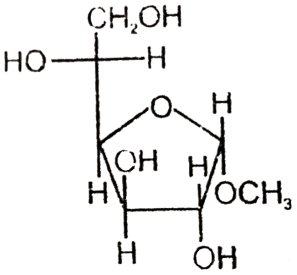
2. Statement-1 : Methyl $\alpha - D$-fructofuranoside (I) undergoes acid catalysed hydrolysis at faster rate than that of methyl $\alpha - D$-glucofuranoside (II)



(I)



(II)

Statement-2 : The intermediate in glycoside hydrolysis is carbocation which 3° in case of I and 2° in case of (II).

A. STATEMENT-1 is true, STATEMENT-2 is true and STATEMENT-2 is correct explanation for STATEMENT-1

B. STATEMENT-1 is true, STATEMENT-2 is true and 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

Answer: A

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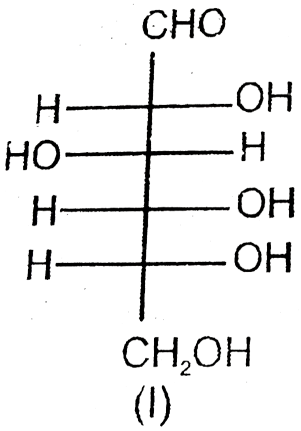
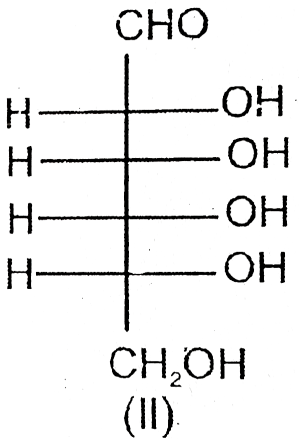
3. Statement-1 : D-glucose (I) yields an optically active saccharic acid on treatment with HNO_3 D-allose (II) yields an optically inactive alderic acid





Statement-2 : Alderic acid produced from allose (II) has plane of symmetry.

A. STATEMENT-1 is true, STATEMENT-2 is true and STATEMENT-2 is correct explanation for STATEMENT-1

B. STATEMENT-1 is true, STATEMENT-2 is true and 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

Answer: A

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4. Statement-1 : Arginine (I), is the most basic out of twenty common amino acids

$$H_2N - \underset{\underset{NH}{||}}{C} - NH - CH_2CH_2CH_2 - \underset{\underset{NH_2}{|}}{CH} - COOH.$$

Statement-2 : Arginine contains guanidine group whose protonated cation is highly stable due to $+m$ effect.

A. STATEMENT-1 is true, STATEMENT-2 is true and STATEMENT-2 is correct explanation for STATEMENT-1

B. STATEMENT-1 is true, STATEMENT-2 is true and 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

Answer: A

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5. Assertion : $1, 3 -$ Butadiene is the monomer for natural rubber.

Reason : Natural rubber is formed though anionic addition polymerization.

A. STATEMENT-1 is true, STATEMENT-2 is true and STATEMENT-2 is correct explanation for STATEMENT-1

B. STATEMENT-1 is true, STATEMENT-2 is true and 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

Answer: C

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6. Statement-1 : Glucose and fractose cannot give similar osazone on reaction with $Ph - NH - NH_2$.

Statement-2 : Glucose and fructose have similar configuration on C_3, C_4, C_5 carbon.

A. STATEMENT-1 is true, STATEMENT-2 is true and STATEMENT-2 is correct explanation for STATEMENT-1

B. STATEMENT-1 is true, STATEMENT-2 is true and 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

Answer: D

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7. Statement-1 : All monosaccharides are sweet in taste.

Statement-2 : All monosaccharides have the general formula, $C_6H_{12}O_6$.

A. STATEMENT-1 is true, STATEMENT-2 is true and STATEMENT-2 is correct explanation for STATEMENT-1

B. STATEMENT-1 is true, STATEMENT-2 is true and 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

Answer: C

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8. Statement I: Cellulose is not diagested by human beings.

Statement II: Cellulose is a polymer of `beta-D-flucose.

A. STATEMENT-1 is true, STATEMENT-2 is true and STATEMENT-2 is correct explanation for STATEMENT-1

B. STATEMENT-1 is true, STATEMENT-2 is true and 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

Answer: B

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9. Statement-1 : Bakelite is copolymer

Statement-2 : Bakelite is a thermosetting material.

A. STATEMENT-1 is true, STATEMENT-2 is true and STATEMENT-2 is correct explanation for STATEMENT-1

B. STATEMENT-1 is true, STATEMENT-2 is true and 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

Answer: B

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10. Statement-1 : Polybutadiene is an example of chain growth polymer.

Statement-2 : In chain growth polymers, the reactive particles may be free radicals or ions (cations or anions) to which monomers get added by a chain reaction.

A. STATEMENT-1 is true, STATEMENT-2 is true and STATEMENT-2 is correct explanation for STATEMENT-1

B. STATEMENT-1 is true, STATEMENT-2 is true and 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

Answer: A

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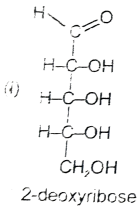
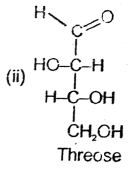
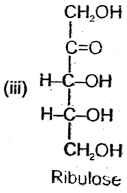
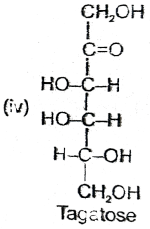
Ex-2(Subjective)Part-I

1. Classify the following monosaccharides in proper aldoses and ketose.









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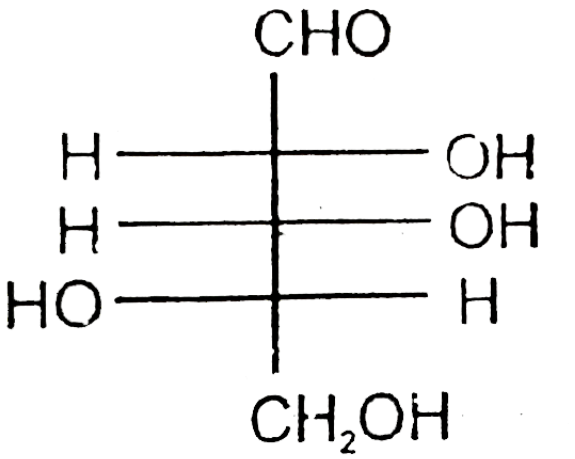
2. Write the anomer the epimer, enantiomer and ketose of the following aldose, also mention whether these are L sugars or D sugars.



L-aldopentose

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3. Draw two anomers of D-fructose.

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4. The specific rotation of two glucose anomers are $\alpha = +110^{\circ}$ and $\beta = 19^{\circ}$ and for the constant equilibrium mixtures is $+52.7^{\circ}$. Calculate the percentage compositions of the anomers in the equilibrium mixture.

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5. Consider an amylose chain of 4000 glucose unit. At how many cleavage require to lower the average length to 400 units.

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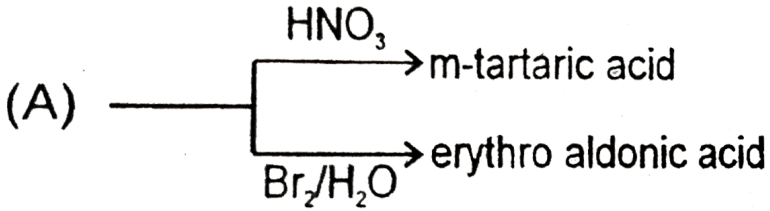

6.

Predict (A) :

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7. $A + 4HlO_4 \rightarrow 3HCOOH + HCHO + OHC - COOH$

$B + 5HlO_4 \rightarrow 4HCOOH + 2HCHO$

Identify A and B.

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8. On reduction of a monosaccharide $A(C_4H_8O_4)$ mixture of two epimeric alcohols B & C is formed.

(a) Monosaccharide has aldehyde or ketone group ?

(b) Determine the structures of A, B and C.

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9. On which side of neutrality $(pH - 7)$, the isoelectric point of the following amino acids will lie ?

(a) $H - \underset{\underset{NH_2}{|}}{CH} - COOH$

(b) $H_2N - \underset{\underset{CH_2 - CH_2 - COOH}{|}}{CH} - COOH$

(c) $H_2N - \underset{\underset{(CH_2)_4 - NH_2}{|}}{CH} - COOH.$

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10. Glutomic acid (A) has isoelectric point 3.22

(a) What is the most likely structure of the compound at its isoelectric point ?

(b) What is the most likely structure of monosodium glutamate.

$H_2N - \underset{\underset{(A)}{CH_2 - CH_2 - COOH}}{\overset{|}{CH}} - COOH.$

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11. A polypeptide (Mol. wt $= 360$) formed by glycine (Mol. wt $= 75$) amino acid. How many glycine units are used to form it.

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12. $0.89g$ of an $\alpha -$ amino acid (A) gave 0.224 lit. N_2 gas at NTP on reaction with HNO_2. In this process an optically active (B) is formed. A as well as B, gave cyclic compounds C and D on intermolecular dehydration Identify A to D.

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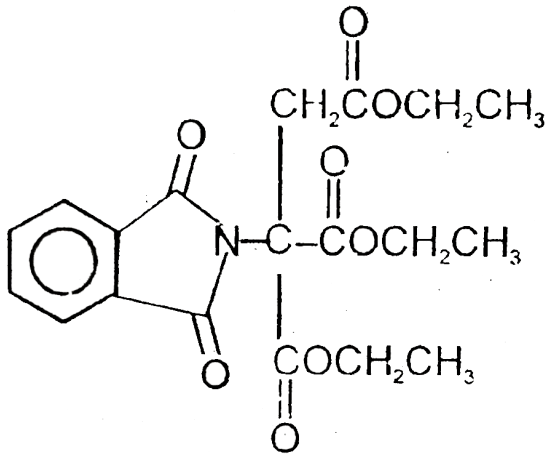
13. Hydrolysis of the following compound A in conc. HCl for several hours at $372K$ gives an amino acid. Identify it. Is it optiacally active ?

(A)



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14. Distinguish between

(a) Glycine and acetamide

(b) $\alpha -$, $\beta -$ & $\gamma -$ amino acids.

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15. An octapeptide (Mol.wt $= 516g$) on complete hydrolysis given glycine and alanine (Mol. Mass $= 89g$). Alanine contributes $41.59\,\%$ to total weight of hydrolysed product. How many number of alanine unit present in octapeptide.

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16. Give the amino acid sequence of the following polypeptides using the data given by partial hydrolysis.

(a) $(Ser, Hyp, Pro, Thr) \xrightarrow{H_3O+} Ser, Thr + Thr, Hyp + Pro, Ser$

$(Ala, Arg, Cys, Val, Leu) \xrightarrow{H_3O+} Ala, Cys + Cys, Arg + Arg, Val + Leu,$

.

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17. Glutamic acid has lower isoelectric point while glutamine $H_2N - \overset{\overset{O}{||}}{C} - CH_2 - CH_2 - \underset{\underset{NH_2}{|}}{\overset{\overset{H}{|}}{C}} - COOH$ has higher isoelectric pH. Explain ?

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18. Give the following conversion acetaldehyde $\rightarrow$ alanine.

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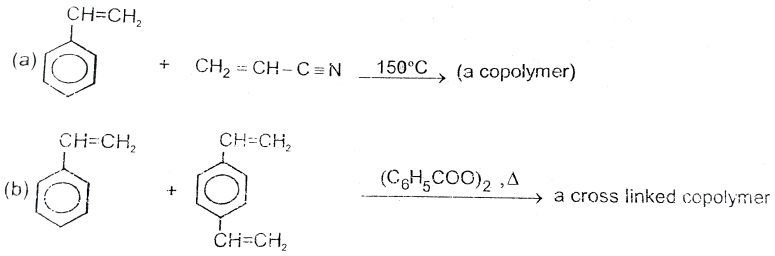
19. Complete the following reactions



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20. Write the structures of monomers of the following polymers

(a) $\left[-CH_2 - \underset{\underset{Ph}{|}}{\overset{\overset{CH_3}{|}}{C}} - CH_2 - \underset{\underset{CN}{|}}{CH} - \right]_n$

(b) $\left[-CH_2 - \underset{\underset{Cl}{|}}{\overset{\overset{Cl}{|}}{C}} - CH_2 - \underset{\underset{Cl}{|}}{\overset{\overset{Cl}{|}}{C}} - \right]$

(c) $\left[-CH_2 - \underset{\underset{Ph}{|}}{\overset{\overset{CH_3}{|}}{C}} - CH_2 - \underset{\underset{CN}{|}}{\overset{\overset{CH_3}{|}}{C}} - \right].$

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Ex-2(Single correct)Part-II

1. Ketones do not reduce Tollen's reagents, but fructose with a keto group reduces it. It is attributed to.

A. Enolisation of keto group of fructose and then, its transformation into aldehyde group in presence of OH^- which is present in Tollen's reagent.

B. $> CHOH$ group which is also oxidised to keto group

C. Both statements are correct

D. None of the statement is correct

Answer: A

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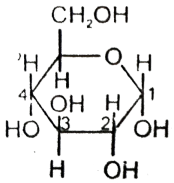
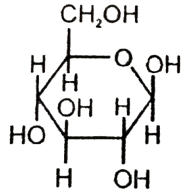
2. Howorth's projection of $\alpha - D$ glucose is :

(A) 

A.

(B) 

B.

C. both

D. none

Answer: A

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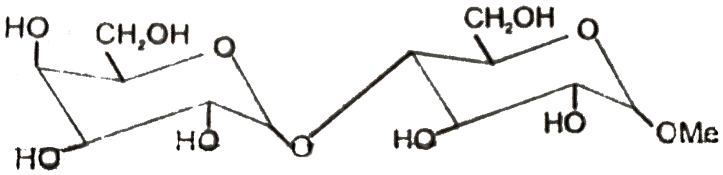

3.

On acid hydrolysis of above disacharide, we get.

A. Two moles of glucose

B. one mole of glucose

C. One mole of galactose

D. one mole of glucose and one mole of galactose

Answer: D

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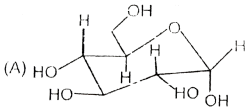
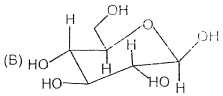
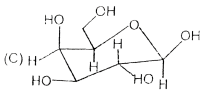
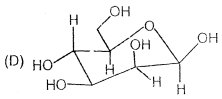
4. Which is correct structure of $\beta - D$-glucopyranose.

A. 

B. 

C. 



D.

Answer: B

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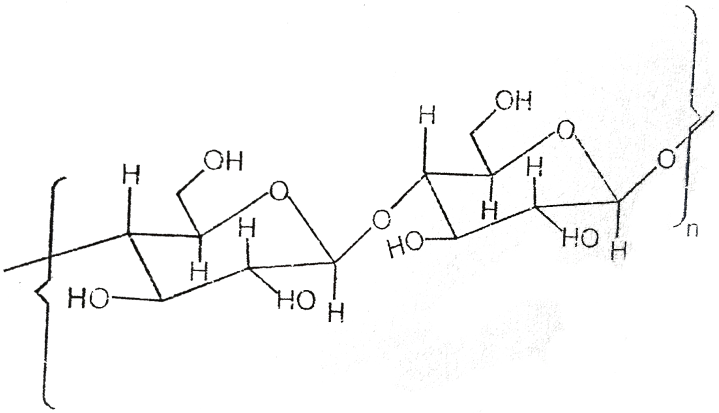
5. The structure of the following polymer is :



A. Starch

B. Sucrose

C. Cellulose

D. Maltose

Answer: C

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6. In osazone formation of three molecules of phenylhydrazine which is the correct statement.

A. All the three molecules react in similar manner

B. Two molecules reacts in similar manner whereas the third reacts in different way

C. All the three molecules react in different way

D. Only two react in same manner but the third molecules remains unreacted

Answer: B

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7. Find the pair which is correctly matched.

A. Sucrose : monosaccharide

B. Fructose : aldose sugar

C. Glucose : mutarotation

D. Sucrose : reducing sugar

Answer: C

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8. Two hexoses form the same osazone find the correct statement about these hexoses

A. Both of them must be aldoses

B. They are epimers at $C-3$

C. The carbon atoms 1 and 2 in both have the same configuration

D. The carbon atoms 3, 4 and 5 in both have the same configuration

Answer: D

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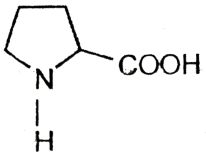
9. Nitrous acid (HNO_2) converts amino acids into hydroxy acids with retention of configuration. Estimation of nitrogen gas evolved in the reaction is the basis of Van slyke estimation of amino acids.

$$R - \overset{NH_2}{\underset{|}{C}}H - COOH \xrightarrow{HNO_2} R - \overset{OH}{\underset{|}{C}}H - COOH + N_2 \uparrow + H_2O$$

Which of the following amino acids cannot be analysed by Van slyke method ?

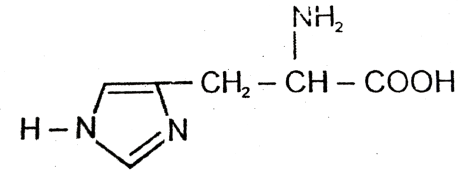
(I) $HS - CH_2 - \overset{NH_2}{\underset{|}{C}}H - COOH$ (cysteine)

II –



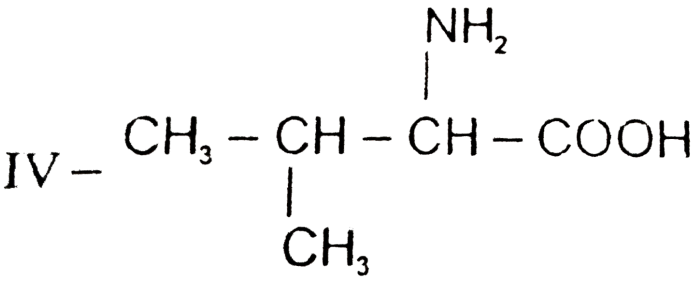
(Proline)

III –



(Histidine)

IV –



A. Only I

B. Only II

C. I and II

D. I,III,IV

Answer: B

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10. $CH_3 - \overset{NH}{\overset{|}{C}}H - COOH \xrightarrow{(X)} CH_2 - \overset{NH_2}{\overset{|}{C}}H_2OH$

The reagent (X) can be.

A. $H_2 / Pd / BaSO_4 /$ quinoline

B. $NaBH_4$

C. $LiAlH_4$

D. CH_3Mgl

Answer: C

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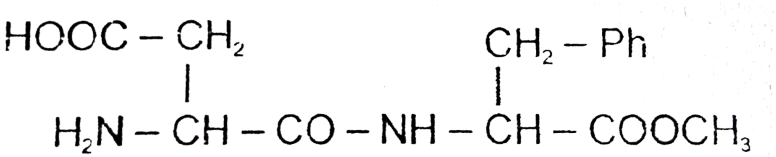
11. 

Aspartame is 160 times as sweet as sucrose and is used as a sugar substitude.

the correct statement is (s) about aspartame is (are).

(I)-It is an ester derivative of dipeptide

II-It can be named as aspartyl pheylalnine methyl ester

III-It is tripepetide

IV-It is having four functional groups.

A. I,II

B. I,II,IV

C. II,III,IV

D. only II

Answer: B

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12. The polymerisation reaction shown below

$$2CH \equiv CH \xrightarrow{CuCl} CH \equiv C - CH = CH \xrightarrow[Cu_2Cl_2 / NH_4Cl]{HCl} CH_2 = \underset{\underset{Cl}{|}}{C} - CH =$$

would produce :

A. PVC

B. neoprene

C. chloroprene

D. Rubber

Answer: D

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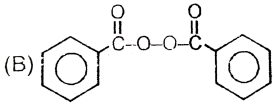
13. Which of the following is radical intiator

A. $R - N = N - R$

B. 

C. $CH_3 - \overset{CH_3}{\underset{CH_3}{C}} - O - O - \overset{CH_3}{\underset{CH_3}{C}} - CH_3$

D. All

Answer: D

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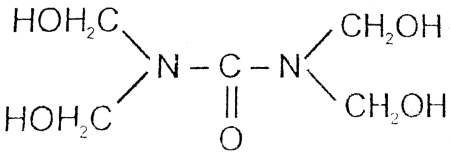

14.

The polymer obtained by the above compound is

A. Bakelite

B. Urea formaldehyde resine

C. Melamine formaldehyde resin

D. Teflon

Answer: B

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15. Which of the following contains isoprene unit ?

A. Natural rubber

B. Polyethylene

C. Nylon-66

D. Dacron

Answer: A

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16. Which of the following polymerises most easily ?

A. $CH_3CH_2C \equiv CH$

B. $CH_2 = CH - CH = CH_2$

C. $CH_3CH_2 - CH = CH_2$

D. $CH \equiv C - C \equiv CH$

Answer: B

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17. Which of the following is condensation polymer ?

A. Polystyrene

B. PVC

C. Polyester

D. Teflon

Answer: C

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Ex-2(More correct)Part-II

1. The correct statement (s) about starach

A. It is a pure single compound

B. It is mixture of two polysacchardes of glucose

C. It involves the $(C_1 - C_4)\alpha -$ glucosidic linkage between two $\alpha - D$ glucose units.

D. It involves branching by $(C_1 - C_6)$ glycosidic linkage.

Answer: B::C::D

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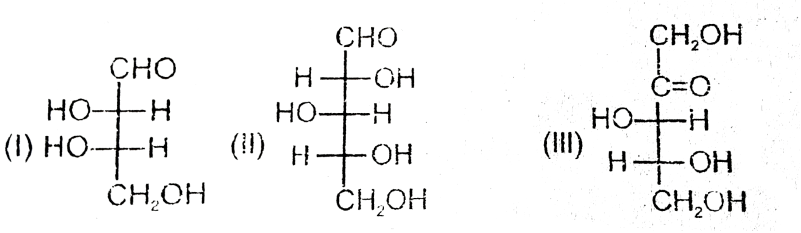
2.



The correct statement about the sugars given above are

A. I and II are L-Sugars

B. II and III above D-Sugar

C. I and II and D-sugars

D. I is L-sugar

Answer: B::D

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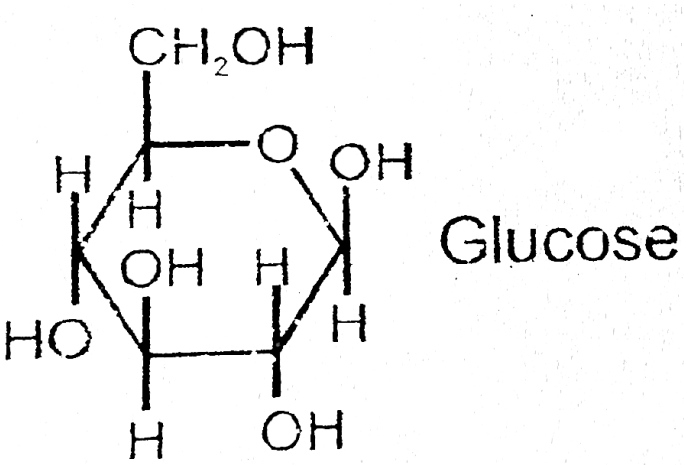

3. Glucose

The correctn statements about above structure of glucose are ,

A. It is a Pyranose form

B. It is a furanose form

C. It is a $\beta -$ anomer

D. It is a D-sugar

Answer: A::C::D

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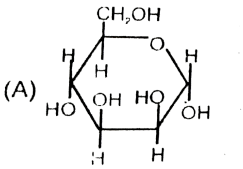
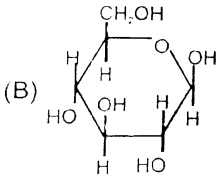
4. D-Mannose differs from D-glucose in its stereochemistry at $C-2$. The pyranose form of D-Mannose is.

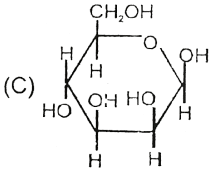
A.



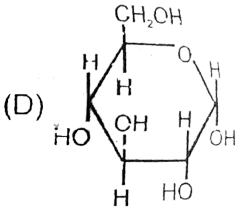
B.



C.



D.



Answer: A::C

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5. The correct statements about anomers are

A. Anomers have different stereochemistry at $C-1$ (anomeric carbon)

B. $\alpha-D$glucopyranose and $\beta-D-$ glucopyranose can be crystallised and purified

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

D. When pure α-D-glucopyranose and one carboxylic acid, group are available for reaction, then only one dipeptide can forms.

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

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6. The correct statements about peptides are

A. A dipeptide has one peptide link between two amino acids.

B. By convention N-Terminus is kept at left and C-terminus at right in the structure of a peptide

C. If only one amino group and one carboxylic acid, group are available for reaction, then only one dipeptide can forms

D. A polypeptide with more than hundred amino acid reciduces (mol. Mass $> 10,000$) is called a protein.

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

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7. Which of the following are polyamide polymer ?

A. Protein

B. nylon-6,6

C. Nylon-6

D. Polystyrene

Answer: A::B::C

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8. Which of the following is/are reducing sugar

A. Sucrose

B. Glucose

C. Fructose

D. methylmaltoside

Answer: B::C

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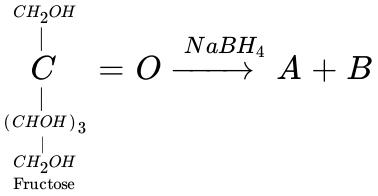
9. 

The product A and B in the a above reaction are

A. Diastereomers

B. $C-2$ epimers

C. Anomers

D. Optically active hexahydroxy compounds

Answer: A::B::D

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10. Which of the following pair is (are) correctly matched

A. $\alpha-D(+)$ glucose and $\beta-D(+)$ glucose $\rightarrow C-2$ epimers

B. Glucose and fructose $\rightarrow C-3$ epimers

C. Glucose $\rightarrow$ mutarotation

D. Sucrose $\rightarrow$ Glucose $+$ fructose

Answer: C::D

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11. Which of these are polysaccharides of glucose ?

A. Starch

B. Cellulose

C. Sucrose

D. Lactose

Answer: A::B

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12. The correct structure of glycine at given pH are :

A. $H_3\overset{\oplus}{N}CH_2 - \underset{\underset{O}{||}}{C} - OH \qquad atpH = 2.0$

B. $H_3\overset{\oplus}{N}CH_2 - \underset{\underset{O}{||}}{C} - O^{\Theta} \qquad atpH = 6.0$

C. $H_2NCH_2 - \underset{\underset{O}{||}}{C} - O^{\Theta}$

D. $H_2NCH_2 - \underset{\underset{O}{||}}{C} - OH \qquad atpH = 12$

Answer: A::B::C

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13. Preparation of nylon from hexamethylene diamene and adipic acid is an example of :

A. addition polymerisation

B. homopolymerisation

C. condensation polymerisation

D. copolymerisation

Answer: C::D

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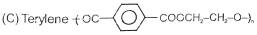
14. Struchures of some common polymers are given. Which one is not correctly represented?

A. Teflon $(CF_2 - CF_2 -)_n$

B. Neoprene $\left(. \begin{matrix} CH_2 - \underset{Cl}{\underset{|}{C}} = CH - CH_2 - CH_2 - \end{matrix} \right)_n$

C. 

D. Nylon-66 $\left[- NH(CH_2)_6 NHCO(CH_2)_4 - CO - \right]_n$

Answer: A::C::D

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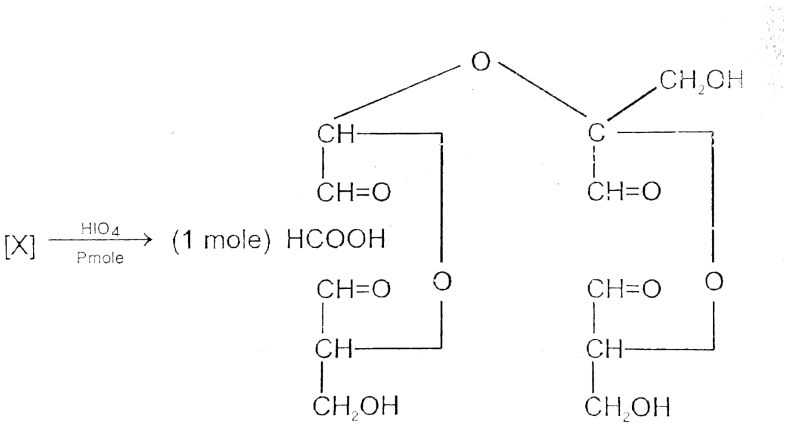
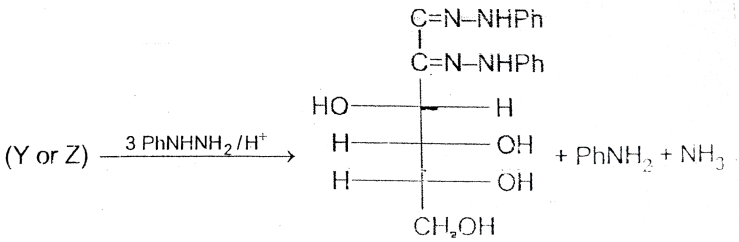
Ex-2(Comprehension)Part-IV

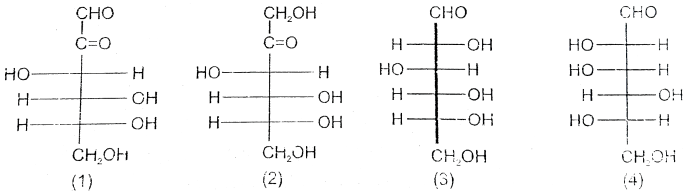


1.



Compounds Y and Z can be :

(1)



A. 1 only

B. 2,3

C. 1,4

D. 2,3,4

Answer: B

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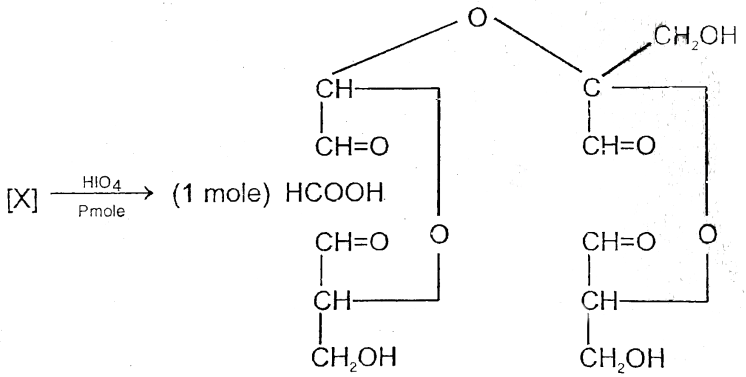
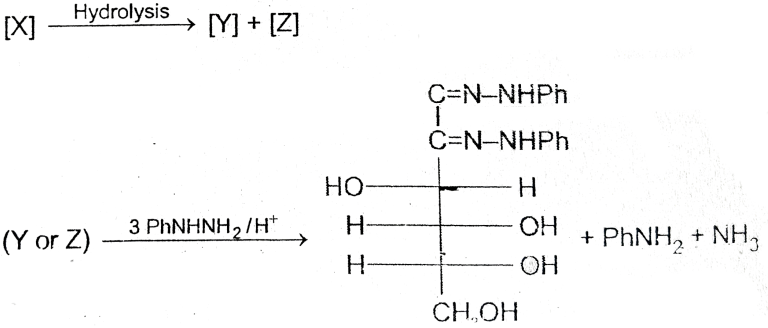


2.



Number of moles (P) of HIO_4 used per moles of compound X is :

A. 2

B. 3

C. 4

D. 5

Answer: B

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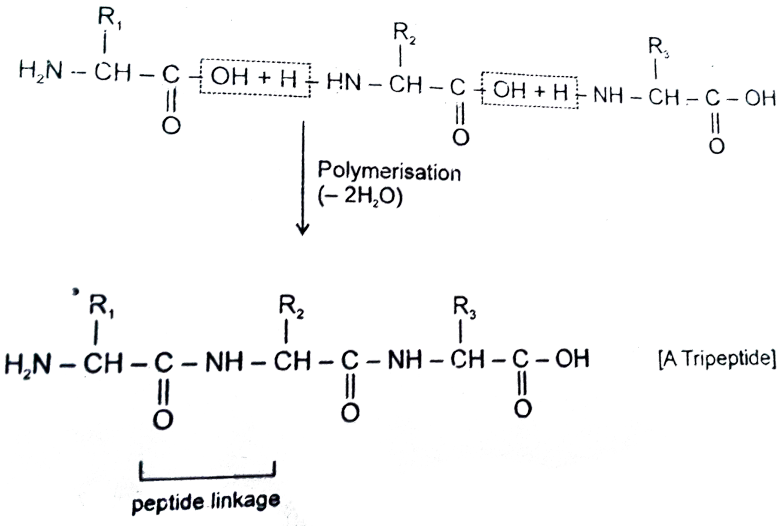
3. Proteins are biomolecules composed of $\alpha -$ amino acids. An $\alpha -$ amino acid has a general formula $R - \underset{NH_2}{\overset{|}{C}} - COOH$. The amino acids polymerise and form an amide linkage (peptide linkage) between two monomeric amino acid units. The polymerisation takes place as follows

$$H_2N - \overset{R_1}{\overset{|}{C}}H - \underset{O}{\overset{||}{C}} - OH + H - HN - \overset{R_2}{\overset{|}{C}}H - \underset{O}{\overset{||}{C}} - OH + H - NH - \overset{R_3}{\overset{|}{C}}H$$

$$\downarrow \text{Polymerisation } (-2H_2O)$$



Two or more similar amino acids can also polymerise, for example a dimer will be like.

$$H_2N - \overset{\overset{R}{|}}{CH} - \underset{\underset{O}{||}}{C} - NH - \overset{\overset{R}{|}}{CH} - \underset{\underset{O}{||}}{C} - OH.$$

In the above trimer, if $R_1 = H, R_2 = CH_3$ & $R_3 = Ph$ then total number of optically active stereoisomers will be :

A. 8

B. 6

C. 4

D. 2

Answer: C

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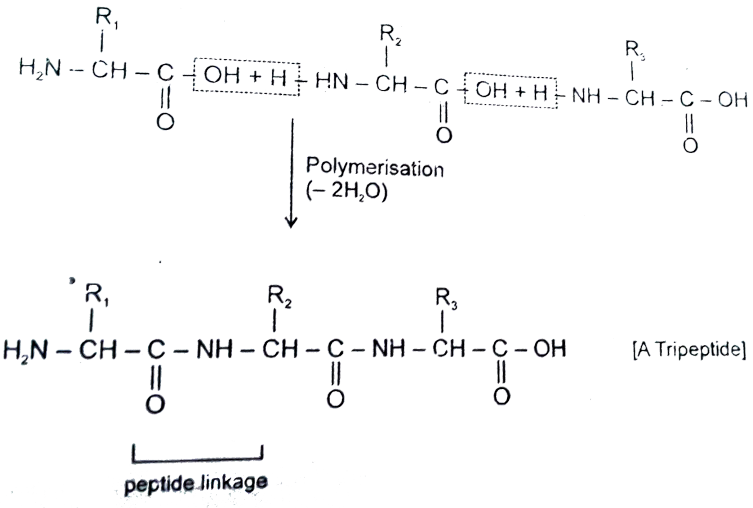
4. Proteins are biomolecules composed of $\alpha -$ amino acids. An $\alpha -$ amino acid has a general formula $R - \underset{\underset{NH_2}{|}}{C} - COOH$. The amino acids polymerise and form an amide linkage (peptide linkage) between two monomeric amino acid units. The polymerisation takes place as follows

$$H_2N - \overset{\overset{R_1}{|}}{CH} - \underset{\underset{O}{||}}{C} - OH + H - HN - \overset{\overset{R_2}{|}}{CH} - \underset{\underset{O}{||}}{C} - OH + H - NH - \overset{\overset{R_3}{|}}{CH}$$

$$\downarrow \text{Polymerisation } (-2H_2O)$$



Two or more similar amino acids can also polymerise, for example a dimer

will be like.

$$H_2N - \overset{\overset{R}{|}}{CH} - \underset{\underset{O}{||}}{C} - NH - \overset{\overset{R}{|}}{CH} - \underset{\underset{O}{||}}{C} - OH.$$

In the given trimer if $R_1 = H$, $R_2 = CH_3$ and $R_3 = Ph$ then the amino acids present in the trimers are :

A. Glycine,Alanine & Phenyl Alanine

B. Glycine,Leucine & Phenyl Alanine

C. Alanine,Valine & Phenyl Alanine

D. Alanine,Leucine & Lysine

Answer: A

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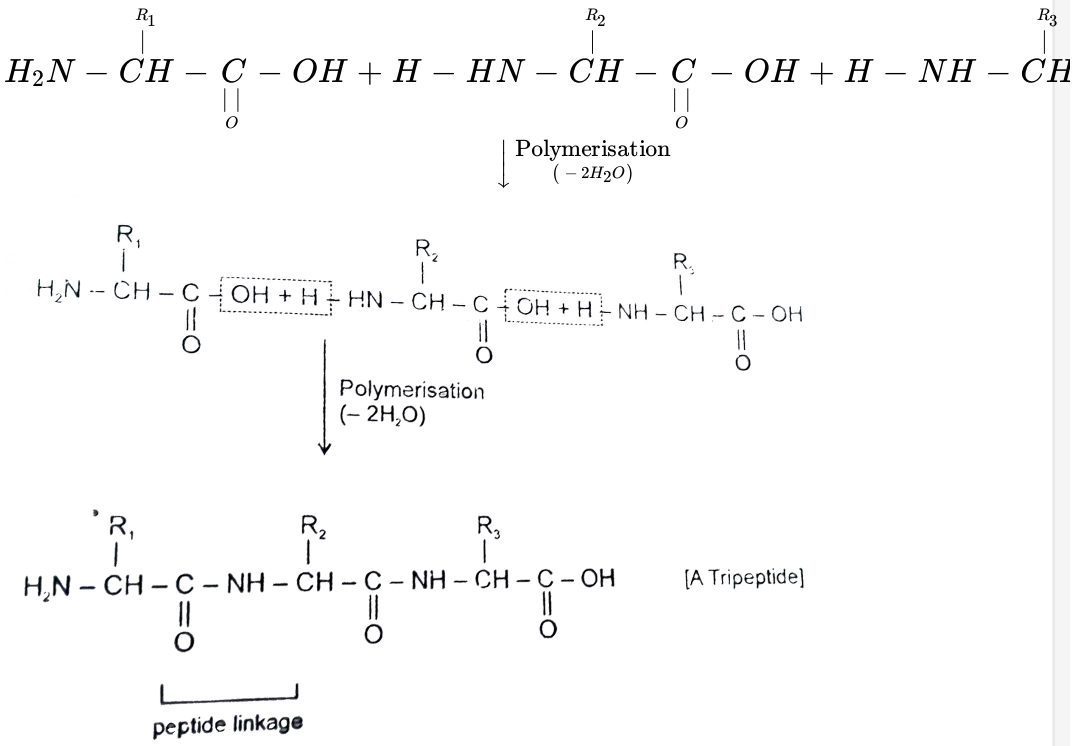
5. Proteins are biomolecules composed of $\alpha -$ amino acids. An $\alpha -$ amino acid has a general formula $R - \underset{\underset{NH_2}{|}}{C} - COOH$. The amino acids polymerise and form an amide linkage (peptide linkage) between two monomeric amino acid units. The polymerisation takes place as follows



Two or more similar amino acids can also polymerise, for example a dimer will be like.

$$H_2N-\overset{\overset{R}{|}}{CH}-\underset{\underset{O}{||}}{C}-NH-\overset{\overset{R}{|}}{CH}-\underset{\underset{O}{||}}{C}-OH.$$

Which statement is incorrect about the given trimer.

A. it will liberated CO_2 with $NaHCO_3$

B. it will liberate N_2 with $NaNO_2/HCl$

C. It will give yellow precipitate with 2,4-Dinitrophenylhydrazine

D. It will rotate plane polarized light

Answer: C

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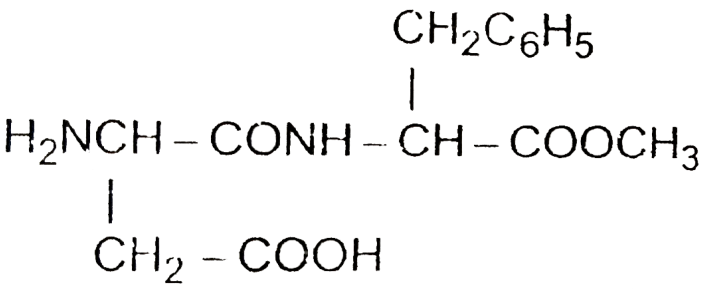
Ex-3(IIT-JEE)Part-I

1. Aspartame, an artificial sweetener, is peptide and has the following structure :



A. Identify the four functional groups

B.

C.

D.

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

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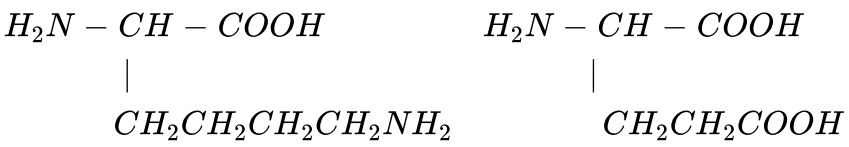
2. Following two amino acids lysine and glutamine form dipeptide linkage.

What are two possible dipeptides ?



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3. Write down the heteroheneous catalyst involved in the polymerisation of ethylene.

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4. Which of the following pair give positive Tollen's Test ?

A. Glucose, sucrose

B. Glucose, fructose

C. Hexanol,Acetophenone

D. Fructose,sucrose

Answer: B

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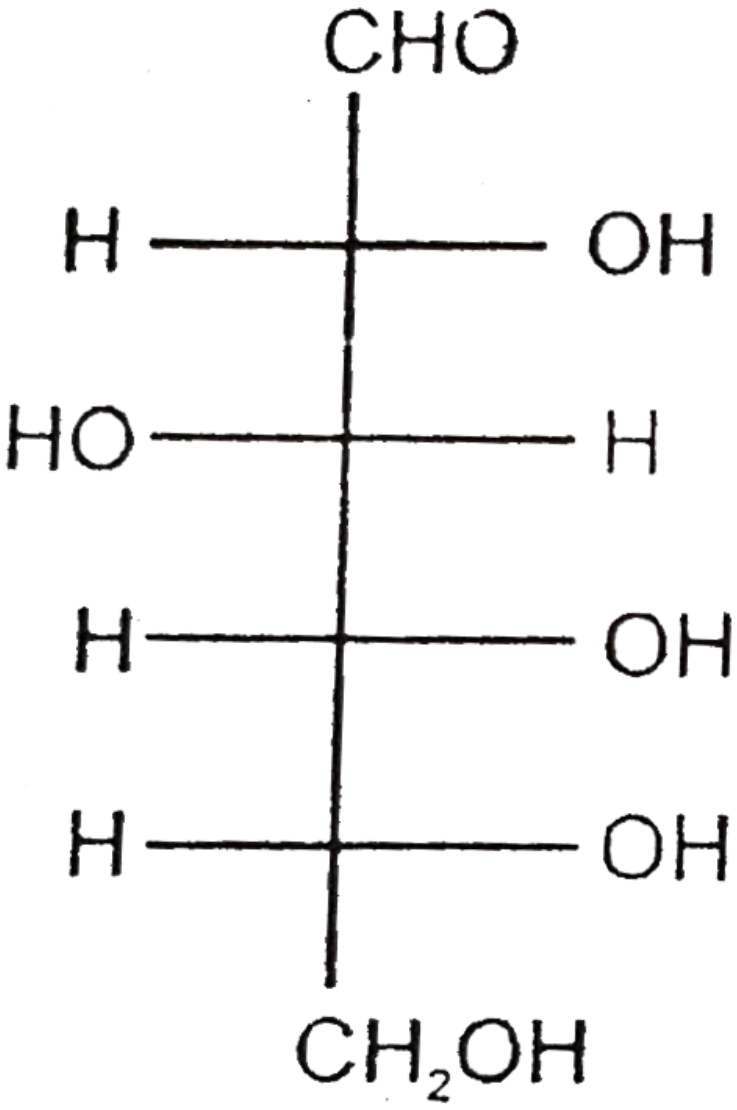
5. The Fischer projection formula of D-glucose is



(i) Give Fischer projection formula of L-glucose

(ii) Give the product of reaction of L-glucose with Tollen's reagent.

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6. The two forms of `D-glucopyranose obtained from solution of D-glucose are known as:

A. Epimers

B. Anomers

C. Enantiomers

D. Geometrical isomers

Answer: B

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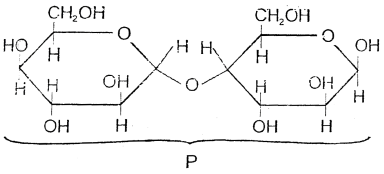
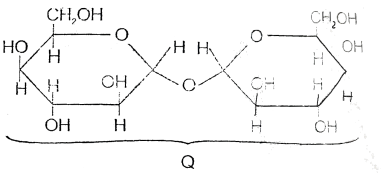
7. Which of the following disaccharide will not reduce tollen's reagent.





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8. Statement I: Glucose gives a reddish-brown precipitate with fehling's solution.

Statement I: Reaction of glucose with fehling's solution gives CuO and gluconic acid.

A. STATEMENT-1 is true, STATEMENT-2 is true and STATEMENT-2 is correct explanation for STATEMENT-1

B. STATEMENT-1 is true, STATEMENT-2 is true and 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

Answer: C

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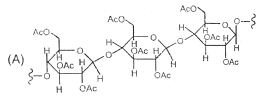
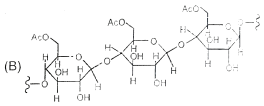
9. Cellulose upon acetylation with excess $anhydride / H_2SO_4$ (catalytic) gives cellulose triacetate whose structure is:

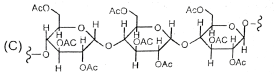
A.



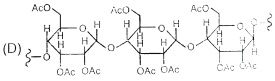
B.



C.



D.



Answer: A

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10. Among cellulose, poly viny chloride), nylon and nutural rubber, the polymer is which the intermolecular force of attraction is weakest is:

A. Nylon

B. Poly vinyl chloride

C. Cellulose

D. Natural Rubber

Answer: D

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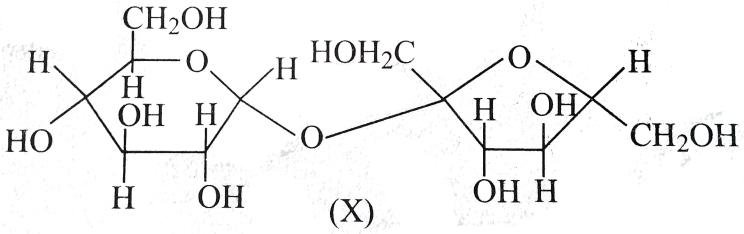
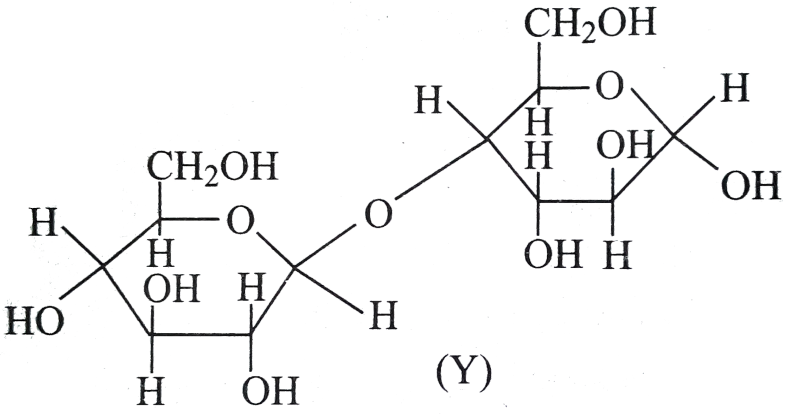
11. The correct statement(s) about the following sugars (X) and $(Y)is/are$:



(X)



(Y)

A. X is a reducing sugar and Y is a non-reducing sugar

B. X is a non-reducing sugar and Y is a reducing sugar.

C. The glucosidic linkages in X and Y are α and β, respectively.

D. The glucosidic linkages in X and Y are β and α, respectively.

Answer: B::C

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12. A decapeptide (Mol. Wt. 769) on complete hydrolysis gives glycine (Mol. Wt. 75), alanine and phenylalanine.

Glycine contributes 47.0% to the total weight of the hydrolysed products. The number of glycine units. Present in the decapeptide is.

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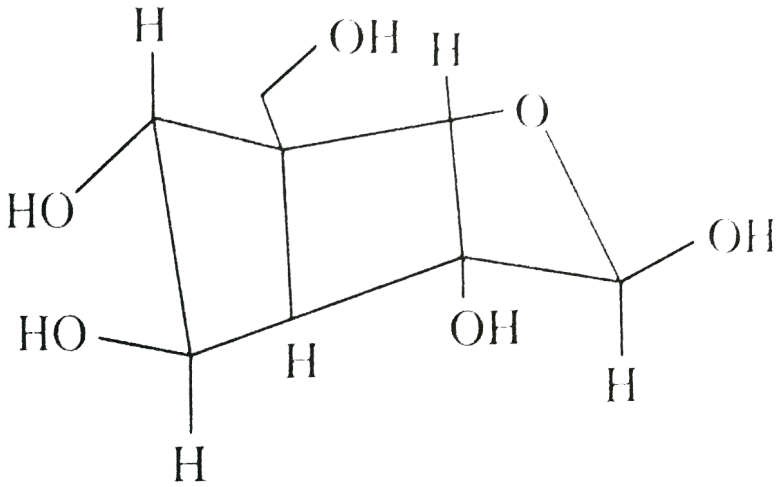
13. The following carbohydrate is:



A. a ketohexose

B. an aldohexose

C. an $\alpha -$ furanose

D. an $\alpha -$ pyranose

Answer: B

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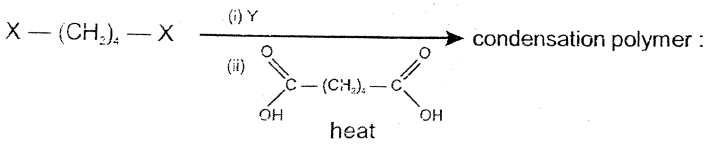
14. The correct functional group X and the reagent//reaction conditions Y in the following scheme are



A. $X = COOCH_3, Y = H_2 / Ni / heat$

B. $X = CONH_2, Y = H_2Ni / heat$

C. $X = CONH_2, Y = Br_2 / NaOH$

D. $X = CN, Y = H_2 / Nl / heat$

Answer: C::D

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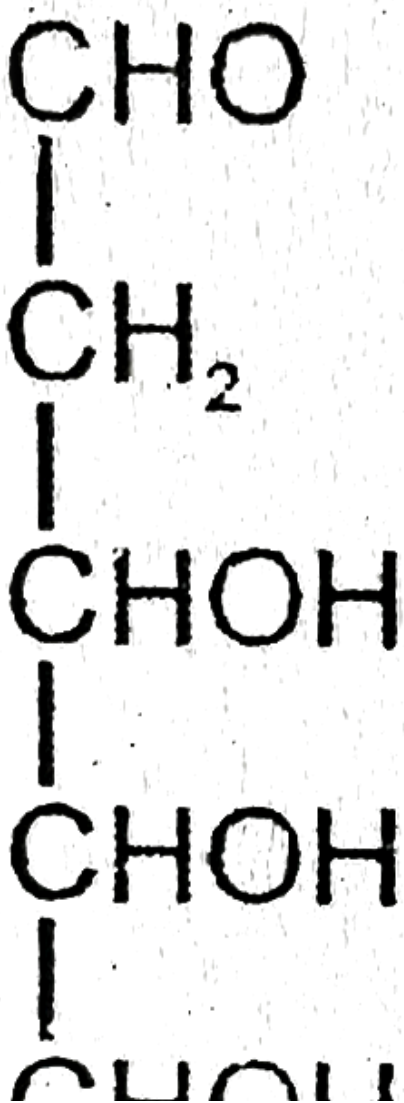
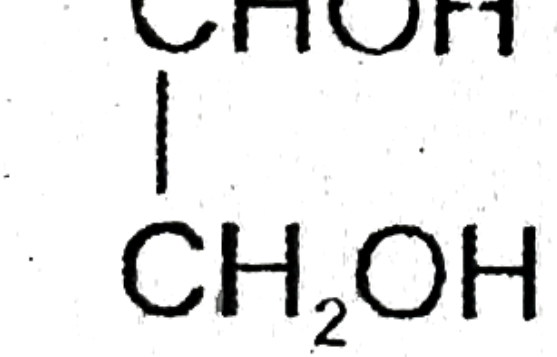
15. When the following aldohexose exists in its D-configuration, the total number of stereisomers in its pyranose form is :





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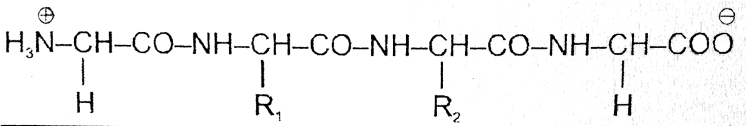
16. The substituents R_1 and R_2 for nine peptides are listed in the table given below. How many of these peptides are positively charged at

$pH = 7.0$?



Peptide	R_1	R_2
I	H	H
II	H	CH_3
III	CH_2COOH	H
IV	CH_2CONH_2	$(CH_2)_4NH_2$
V	CH_2CONH_2	CH_2CONH_2
VI	$(CH_2)_4NH_2$	$(CH_2)_4NH_2$
VII	CH_2COOH	CH_2CONH_2
VIII	CH_2OH	$(CH_2)_4NH_2$
IX	$(CH_2)_4NH_2$	CH_3

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17. The total number of lone-pairs of electrons in melamine is.

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18. A tetrapeptide has $-COOH$ group on alanine. This produces glycine (Gly), valine (Val), phenyl alanine (Phe) and alanine (Ala), on complete

hydrolyses. For this tetrapeptide, the number of possible sequences (primary structures) with $-NH_2$ group attached to a chiral centre is

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Ex-3(IIT-JEE)Part-II

1. A substance forms zwitter ion. It can have functional group.

A. $-NH_2$ $-COOH$

B. $-NH_2,\ -SO_5H$

C. Both (1) and (2)

D. None of these

Answer: C

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2. Monomers are converted to polymers by

A. Hydrolysis of monomer

B. Condensation between monomers

C. Protonation of monomers

D. none

Answer: B

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3. Complete hydrolysis of cellulose gives:

A. D-fructose

B. D-ribose

C. D-glucose

D. L-glucose

Answer: C

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4. Nylon threads are made up of

A. polyvinyl polymer

B. Polyester polymer

C. Polyamide polymer

D. Polyethylene polymer

Answer: C

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5. Which of the following is a polyamide ?

A. Bakelite

B. Terylene

C. Nylon-66

D. Teflon

Answer: C

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6. Which of the following is fully fluorinated polymer?

A. PVC

B. Thiokol

C. Teflon

D. Neoprene

Answer: C

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7. The pyrimidine bases present in DNA are:

A. cytosine and guanine

B. cytosine and thymine

C. cytosine and uracil

D. cyrosine and adenine

Answer: B

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8. The term anomer of glucose refers to:

A. a mixture of (D)-glucose and (L)-glucose

B. enantiomers of glucose

C. isomers of glucose that differ in configuration at carbon one $(C-1)$

D. isomers of glucose that differ in configuration at carbons one and four ($C-1$ and $C-4$).

Answer: C

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9. The secondary structure of ptotein refers to :

A. α-helical backbone

B. hydrophobic interactions

C. sequence of $\alpha-$ amino acids.

D. fixed configuration of the polypeptide backbone.

Answer: D

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10. Bakelite is obtained form phenol by reacting with.

A. CH_3CHO

B. CH_3COCH_3

C. $HCHO$

D. $(CH_2OH)_2$

Answer: C

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11. Buna-N synthetic rubber is a copolymer of:

A. $H_2C = CH - CH = CH_2$ and $H_5C_6 - CH = CH_2$

B. $H_2C = CH - CN$ and $H_2C = CH - CH = CH_2$

C. $H_2C = CH - CN$ and $H_2C = CH - \underset{CH_3}{\overset{|}{C}} - CH_2$

D. $H_2C = CH - \overset{Cl}{\overset{|}{C}} - CH_2$ and $H_2C = CH - CH = CH_2$

Answer: B

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12. The two functional groups present in a typical carbohydrate are :

A. $-CHO$ and $-COOH$

B. $>C=O$ and $-OH$

C. $-OH$ and $-CHO$

D. $-OH$ and $-COOH$

Answer: C

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13. The polymer containing strong intermolecular forces, e.g., hydrogen bonding is:

A. teflon

B. nylon-6,6

C. polystyrene

D. Natural Rubber

Answer: B

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14. The presence or absence of hydroxy group on which carbon atom of sugar differentiates RNA and DNA.

A. 1^{st}

B. 2^{nd}

C. 3^{rd}

D. 4^{th}

Answer: B

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15. Synthesis of each molecule of glucose in photosynthesis involves :

A. 18 molecules of ATP

B. 10 molecules of ATP

C. 8 molecules of ATP

D. 6 molecules of ATP

Answer: A

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Ex-3(IIT-JEE)Part-III

1. In which classes, the polymers are classified on the basis of molecular forces ?

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2. What is the effect of denaturation on the structure of proteins?

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3. Discuss the main purpose of vulcanisation of rubber.

Watch Video Solution

4. Differentiate between globular and fibrous proteins.

Watch Video Solution

5. What is the difference between a nucleoside and a nulceotide ?

Watch Video Solution

6. (a) Name the three major classes of carbohydrates and give an example of each of these classes.

(b) Ans the following :

(i) What type of linkage is responsible for the primary structure of proteins ?

(ii) Name the location where position synthesis occurs in our body.

OR

(a) How are lipids classified ? Given an example of each class.

(b) Explain the following terms :

(i) Mutarotation

(ii) Avitaminosis.

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7. State differences between the following pairs :

(i) Enzymers and Coenzymens

(ii) Primary and Secondary structure of a protein.

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8. Enumerate the reactions of D-Glucose which cannot be explained by its open-chain structure.

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9. How are vitamines classified? Name the vitamin responsible for the coagulation of blood.

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10. Define thermoplastics and thermosetting polymers with two examples of each.

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11. Which are the monomeric repeating units of Nylon-6 and Nylon-6,6 ?

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12. Draw the structures of the monomers of the following polymers :

(i) Teflon

(ii) Polythene

OR

What is the repeating unit in the condensation polymer obtained by combining $HO_2CCH_2CH_2CO_2H$ (succinic acid) and $H_2NCH_2CH_2NH_2$ (ethylene diamine) ?

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13. What do you understand by the term glycosidic linkage?

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14. What are the expected products of hydrolysis of lactose ?

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15. What are reducing sugars?

Watch Video Solution

16. What is a biodegradable polymer ? Give an example of a biodegradable aliphatic polyester.

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17. Explain the following terms :

(i) Invert sugar

(ii) Polypeptides.

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18. Name the products of hydrolysis of sucrose. Why sucrose is not a reducing sugar ?

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19. Giving one example of each of :

(i) addition polymers

(ii) condensation polymers

(iii) copolymers.

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20. What does the designation '6,6' mean in the name nylon-6,6 ?

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21. Amino acids may be acidic, alkaline or neutral. How does this happen ? What are essential and non-essential amino acids ? Name one of each type.

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22. State the significance of primary and secondary structures of proteins.

Watch Video Solution

23. Mention two important uses of each of the following :

(i) Bakelite

(ii) Nylon 6

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24. Explain what is meant by the following :

(i) peptide linkage

(ii) pyranose structure of glucose.

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25. Write the main structural difference between DNA and RNA. Of the four bases, common to both DNA and RNA.

Watch Video Solution

26. Define the following as related to proteins.

(i) peptide linkage

(ii) Denaturation.

Watch Video Solution

27. How can you differentiate between addition and condensation polymerisation ?

Watch Video Solution

28. Draw the structures of monomers for the following polymers. Also draw the structures of the polymers and uses.

(i) Polythene

(ii) Polystyrene

(iii) PVC

Watch Video Solution

29. Differentiate between RNA and DNA ?

Watch Video Solution

30. Define the term, 'homopolymerisation' giving an example.

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31. What is meant by

(i) peptide linkage

(ii) biocatalysts

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32. Draw the structure of the monomer for each of the following polymers :

(i) Nylon 6

(ii) Polypropene.

Watch Video Solution

33. What is essentially the difference between $\alpha -$ glucose and $\beta -$ glucose ? What is mean by pyranose structure of glucose ?

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34. Write the names and structures of the monomers of the following polymers :

(i) Bakelite

(ii) Nylon-6

(iii) Polythene

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Advanced Level(Part I)

1. Carbohydrates contain?

A. $-OH$ group

B. $-CHO$ group

C. $>C=O$ group

D. All

Answer: D

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2. Which of the following monosaccharides is a pentose?

A. Glucose

B. Fructose

C. Arabinose

D. Galactose

Answer: C

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3. On heating glucose with Fehling solution. We get a precipitate whose colour is?

A. Yellow

B. Red

C. Black

D. White

Answer: B

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4. Which of the following compound is found abundantly in nature?

A. Fructose

B. Starch

C. Glucose

D. Cellulose

Answer: D

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

A. Sorbitol

B. Fructose

C. Saccharic acid

D. Gluconic acid

Answer: A

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6. Glucose or fructose is converted into C_2H_5OH in the presence of ?

A. Diastase

B. Matlase

C. Invertase

D. Zymase

Answer: D

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7. Glucose cannot be classified as?

A. Hexose

B. Carbohydrate

C. Aldose

D. Oligo saccharide

Answer: D

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8. Milk sugar is commoly known as

A. Maltose

B. Lactose

C. Fructose

D. Glucose

Answer: B

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9. The commonest disaccharide has the molecular formula?

A. $C_{12}H_{18}O_9$

B. $C_{10}H_{20}O_{11}$

C. $C_{18}H_{22}O_{11}$

D. $C_{12}H_{22}O_{11}$

Answer: D

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10. Starch is changed into disaccharides in pressence of:

A. Diastase

B. Maltase

C. Lactase

D. Zymase

Answer: A

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11. Which carbohydrate is used in silvering of mirros?

A. Sucrose

B. Fructose

C. Glucose

D. Strach

Answer: C

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12. The charing product formed when $C_6H_{12}O_6$ is heated with cone, H_2SO_4 is due to:

A. Oxidation

B. Reduction

C. Dehydration

D. Dehydrogenation

Answer: C

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13. A certain compound gives negative test with ninhydrin and positive test with Benedict's solution, the compound is:

A. Protein

B. Monosachharide

C. Lipid

D. Amino acid

Answer: B

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14. It is best to carry out reaction with sugers in neutral or acidic medium and not is alkaline medium because in alkaline medium sugars undergo?

A. Racimisation

B. Decomposition

C. Inversion

D. Rearrangement

Answer: D

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15. The reagent which forms crystalline osazone derivatives when heated with glucose is?

A. Fehling solution

B. Phenyl hydrazine

C. Benedict solution

D. Hydroxylamine

Answer: B

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16. Consider following reagent:

I. Br_2 water II. Tollen's reagent III. Fesling's solution

which can be used to make distinction between an aldose and a ketose?

A. I,II and III

B. II and III

C. I only

D. II only

Answer: C

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17. The organic compound that will response Fehling's solution test is

A. Ethanol

B. Acetone

C. Maltose

D. Benzaldehyde

Answer: C

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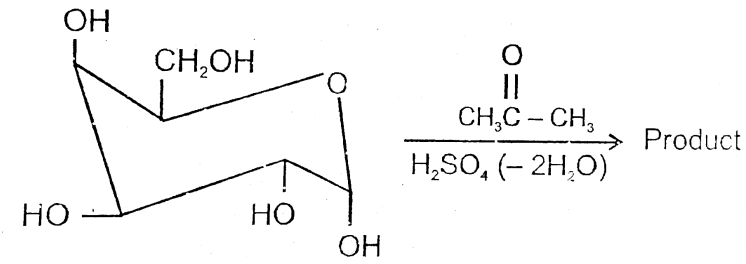
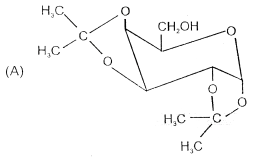
18. In a D-galactopyranose the vicinal hydroxyl groups are cis to each other-



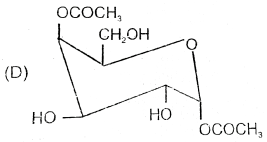
A.



B. $CH_3 - \underset{\underset{OH}{|}}{CH} - CH_3$

C. CH_3COOH

D.



Answer: A

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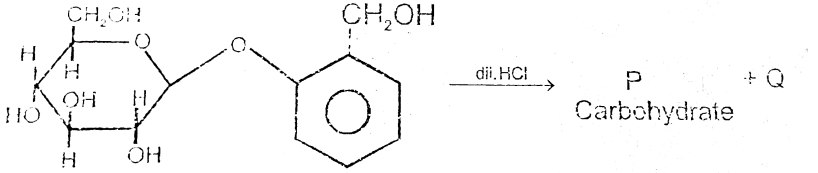
19. Salicin (structure given below) is a glycoside, found in the bark of willow tree, used in relieving pain. Observe the following reaction of salicin.

The correct statement (s) is (are):



Salicin

A. P is D-glucose

B. Q is 2-hydroybenzylalcohol

C. Q can be converted to a modern analgensic (pain killer), aspirin

D. The above reaction occurs through a carbocation

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

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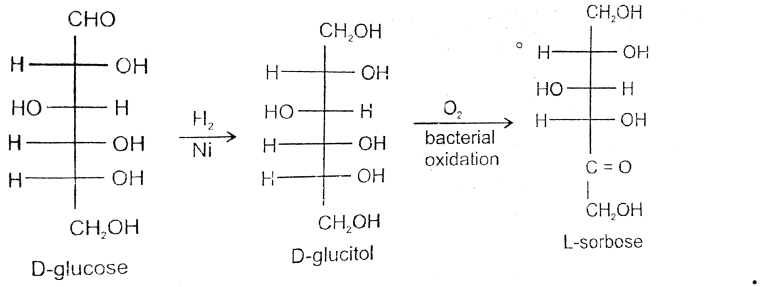
20. L-Sorbose is the staring material for the synthesis of vitamin C. It can be prepared by D-glucose as follows: The correct statement about the above synthesis are-



A. The overall result of synthesis is the tranformation of D-aldohexose to L-ketohexose.

B. The bacteria in second step selectively is the tranformation of D-aldohexose to L-ketohexose. To $C-5$ of D-glucose.

C. The overall result of synthesis is the tranformation of D-glucose to D-fructose.

D. L-Sorbose is a reducting sugar.

Answer: A::B::D

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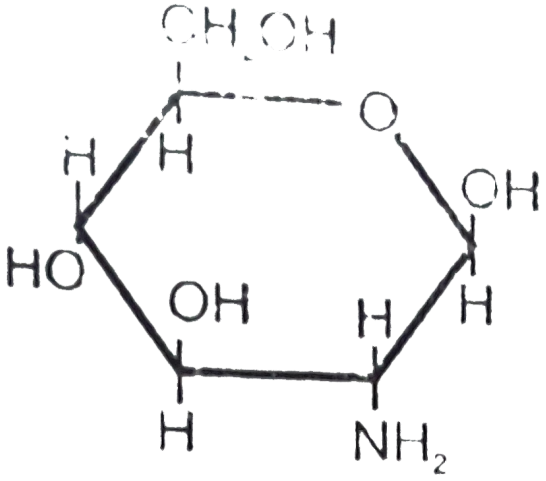
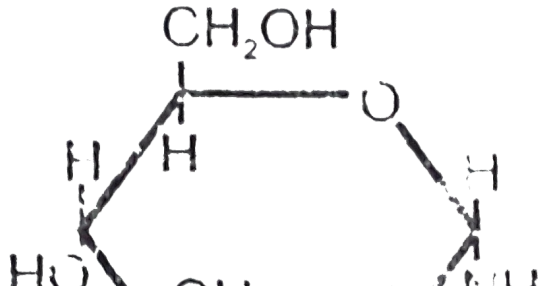
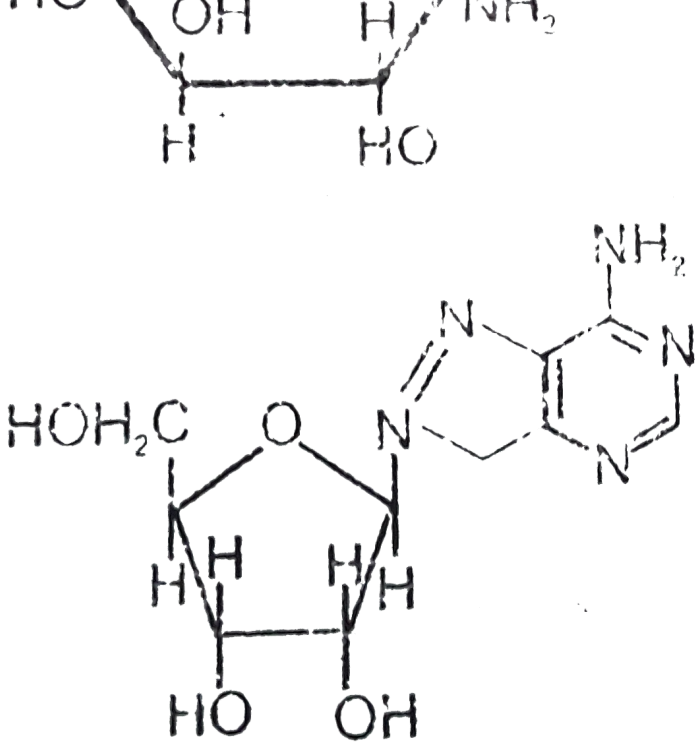
Advanced Level(Part II)

1. Fill in the blanks

A sugar in which an amino group replaces the anomeric $-OH$ is called glucosylamine. Also a sugar in which an amino group replaces a nonanomeric $-OH$ is called an amino sugar. Fill the correct answer (glycosylamine//amino sugar) in the blanks and complete the statements







(i)

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2. Draw fisher projections for the two D-aldoheptose whose stereorientation at C_2, C_3, C_4, C_5 is same as that of $D-$ glucose at C_2, C_3, C_4 and C_5.

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3. How many aldohetoses are three? How many are D-sugars & how many are L-sugars?

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4. Aldoses give positive Tollen's Fehling's and Osazone reactions but fail to respond Schiff's and bisulphite test.

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5. α-glucose is oxidized by HIO_4 more rapidly than its β-anomer at the 1-2 bond.

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6. Reduction of L-glucose with $NaBH_4$ leads to the same alditol glucose as reduction of D-glucose.

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7. Hydrogen gas is not obtained when zinc reacts with

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8. Reduction of D-glucose forms D-sorbitol while that of D-fructose forms a mixture of D-sorbitol and D-mannitol.

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9. Unlike glucose, neither α nor β-methyl glucoside reduces Tollens' reagent or Fehling solution. Why?

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10. $(+)$-Glucose $\xrightarrow{Ac_2O}(A)+B\xrightarrow{AgNO_3/NH_4OH}$ (negative). Given reasons.

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11. Both glucose and fructose are reducing sugars but sucrose is non reducing in nature. Why?

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12. Why is D-fructose used for sweetening cold drinks but not hot ones?

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13. What would be the molecular formula of $(+)$-sugar if $C-1$ of glucose is attached to $C-4$ of fructose and $C-2$ of frutose is attached to $C-4$ of glucose? Would this be a reducing sugar?

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14. When $(+)$ sucrose is hydrolysed, the D-glucose mutarotates downward to $+52.7^{\circ}$. What does this indicate about the structures of $(+)$-sucrose?

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15. Glucose and glycine.

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16. Glucose and fructose

View Text Solution

17. $R-\underset{\underset{NH_2}{|}}{CH}-COO^{-} \xrightarrow{HCI\,(aq)}$

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18. $R - \underset{\underset{\cdot^{+}NH_3}{|}}{CH} - COOH \xrightarrow{NaOH\,(aq)}$

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19. $HOOC - CH_2 - \underset{\underset{\cdot^{+}NH_3}{|}}{CH} - COOH \xrightarrow{NaOH\,(aq)}$

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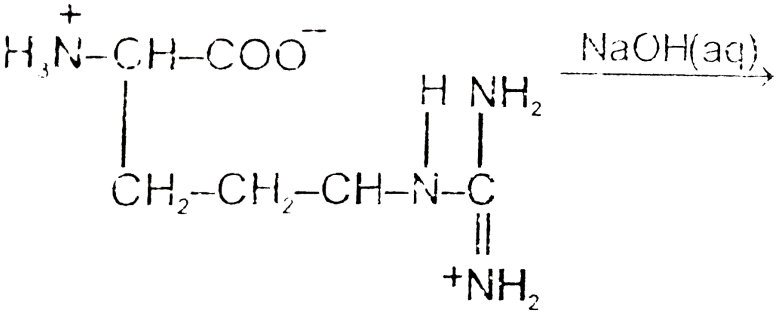

20.

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21. $H_3\overset{+}{N} - \underset{|}{\overset{(CH_2)_4\overset{+}{N}H_3}{CH}} - COOH \xrightarrow{NaOH} A \xrightarrow{NaOH} B \xrightarrow{NaOH} C$

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22. $A \xrightarrow{KCN + NH_4CI} B \xrightarrow{H_3O^+}$ alanine

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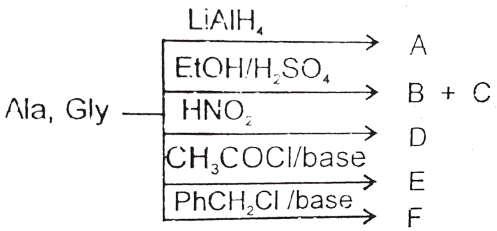
23.



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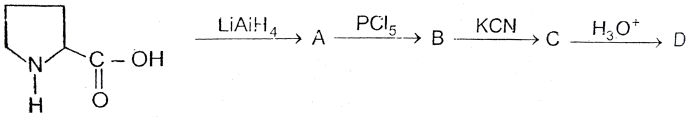
24. 

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25. $CH_3 - \overset{O}{\overset{||}{C}} - \underset{O}{\overset{||}{C}} - OH \xrightarrow[(ii)\,NaBH_4]{(i)\,NH_3/\,\Delta} \underset{C}{\overset{\downarrow\Delta}{A}} \xrightarrow{HNO_2} \underset{D}{\overset{\downarrow\Delta}{B}}$

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26. $CH_3CH = CH_2 \xrightarrow{NBS} A \xrightarrow{KCN} B \xrightarrow{OH^- / \Delta} C \xrightarrow{P/Br_2} D \xrightarrow{NH_3} E \xrightarrow{\Delta} F$

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27. $CH_2CH_2CH_2 - \underset{NH_2}{\overset{O}{\overset{||}{\underset{|}{C}}}} - OH \xrightarrow{\Delta} A \xrightarrow{LAH} B$

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28. Phenyl alanine $+ NaOH \rightarrow A \xrightarrow{\text{1 equiv. HCl}} (B)$.
$\downarrow$ 2 equiv. HCl
C

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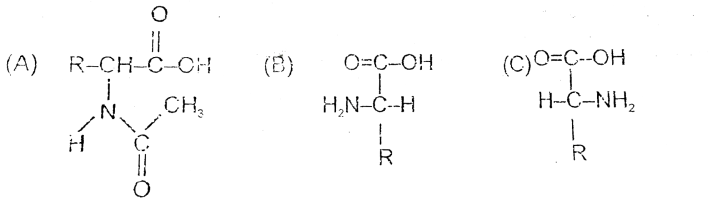
29.



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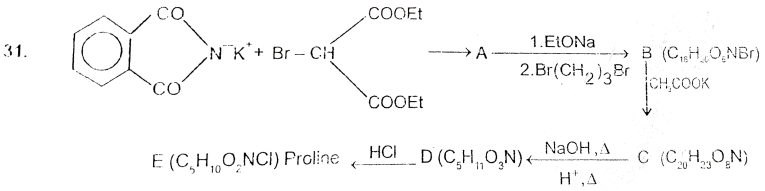
30.



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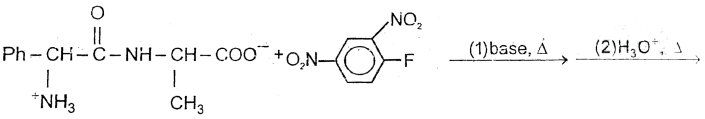
32. 

31.

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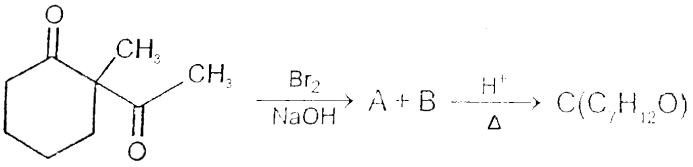
32. (a) Write the structures of alanine at $pH = 2$ and $pH = 10$

(b) Identify A, B and C and given their structures.



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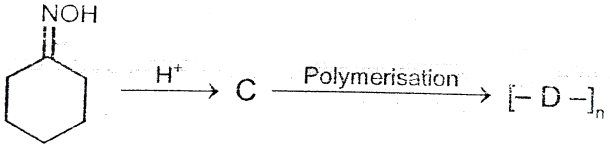
33. Given the structure of each of the prodcuts in the following reaction

(i) Sucrose $\xrightarrow{H^+} A + B$

(ii) 

(ii)

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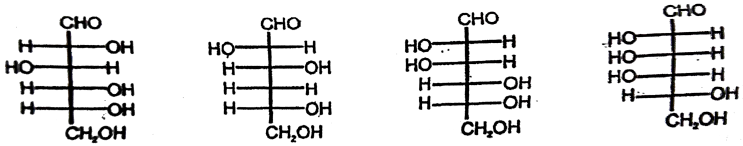
ORGANIC CHEMISTRY(Biomolecules & Polymer)

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



A. 1&4

B. 1&3

C. 2&3

D. 3&4

Answer: 2

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2. A hexapeptide has the composition $Ala, Gly, Phe, Val.$ Both the $N-$ terminal and $C-$ teminal units are Val. Cleavage of the hexapeptide by chymotypsin gives two different tripeptides, both having Val as the N-terminal group. Among the products of random hydrolysis is a $Ala-Val$ dipeptide fragment . What is the primary structure of the hexapeptide?

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

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

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

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

Answer: 1

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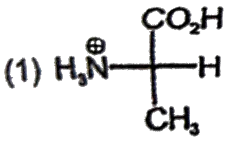
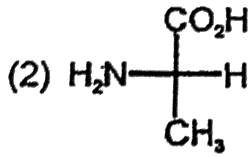
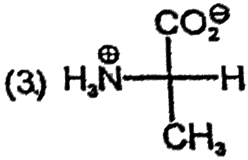
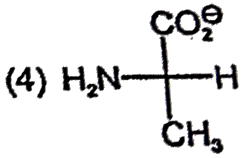
3. Which of the following is the major solute species in a solution of alanine at $pH = 2$?

A. 

B. 

C. 

D. 

Answer: 1

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4. Glucose is a / an

A. Aldohexose

B. Aldopentose

C. Aldotetrose

D. Ketohexose

Answer: 1

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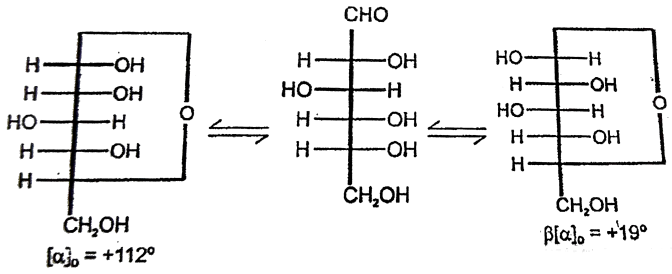
5.



The above process in which α and β form remain in equilibrium with acyclic form and a change in optical rotation is observed which is known as —

A. Mutarotation

B. Epimerisation

C. Saccharic acid

D. Gluconic acid

Answer: 1

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

A. Sorbitol

B. Fructcse

C. Saccharic acid

D. Gluconic acid

Answer: 1

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

A. Glucose and sucrose

B. Glucose and fructose

C. Fructose and sucrose

D. Acetophenone and hexanal

Answer: 2

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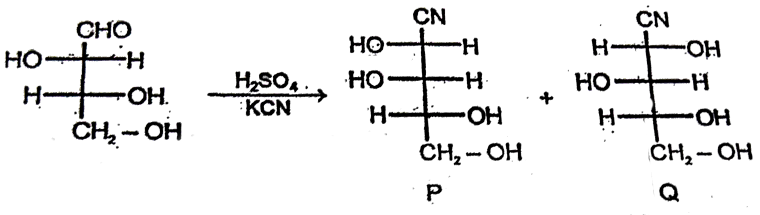
8. Product P & Q may be grouped as



A. Diastereomers

B. Enantiomers

C. Anomers

D. None of these

Answer: A

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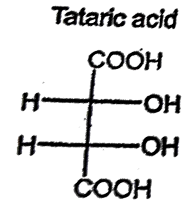
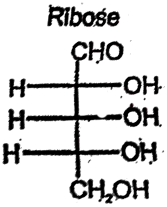
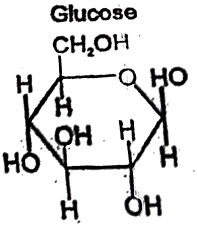
9. How many moles of acetic anhydride (Ac_2O) is needed to react completely with tataric acid, ribose and glucose respectively,



(1) 2,4,5



(2) 2,3,4



(3) 4,5,6

A. 2,4,5

B. 2,3,4

C. 4,5,6

D. 4,5,5

Answer: 1

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10. Glucose reacts with bromine water to products :

A. Glyceraldehyde

B. Gluconic acid

C. Seccharic acid

D. Glucaric acid

Answer: 2

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

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

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

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

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

Answer: C

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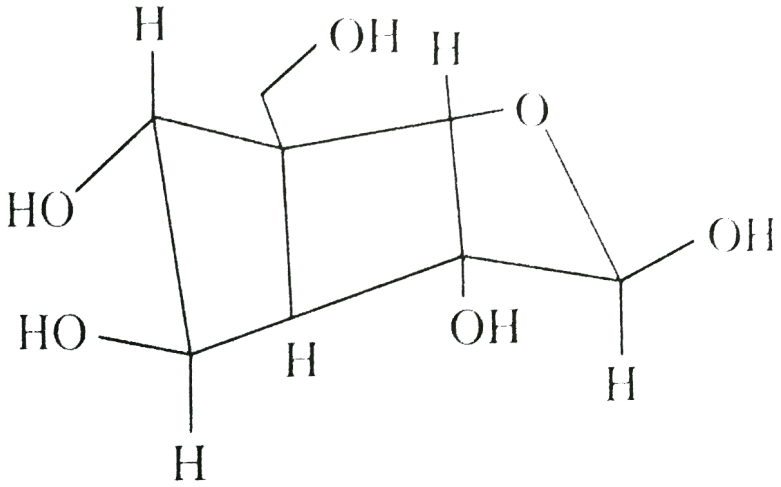
12. The following carbohydrate is:



A. a ketohexose

B. an aldohexose

C. an $\alpha -$ furanose

D. an$\alpha -$ pyranose

Answer: B

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

A. reducing sugar test

B. analysis of products of hydrolysis

C. iodine test

D. Molisch test

Answer: 3

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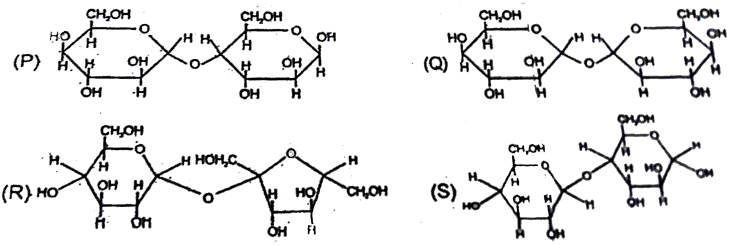
14. Which of the following disaccharides will not reduce tollen's reagent.



A. $P\&Q$

B. $P\&S$

C. $Q\&R$

D. $Q\&S$

Answer: 3

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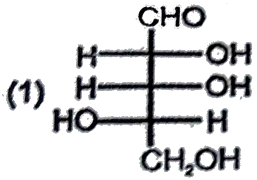
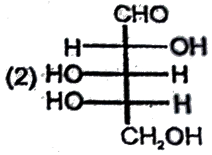
15. $(+)-$ Arabinose is $(2R, 3S, 4S)-$ aldopentose. Which of the following is $(+)$ arabinose ?

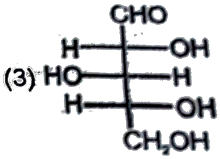
A.



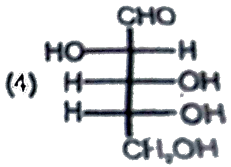
B.



C.



D.



Answer: B

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

A. $2S, 3S$

B. $2R, 3S$

C. $2R, 3R$

D. $2S, 3R$

Answer: 4

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17. Which of the statement is incorrect.

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

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

C. Guanidline is more basic than diethyl amine

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

Answer: A

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18. Which of the following is not reducing sugar.

A. Sucrose

B. Glucose and fructose

C. Fructose

D. maltose

Answer: 1

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

Fructose

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

A. Diastereomers

B. $C-2$ epimers

C. Anomers

D. Optically active hexahydroxy compounds

Answer: 3

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

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

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

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

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

Answer: 4

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

A. 

B. 

C. 

D. 

Answer: C

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

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

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

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

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

Answer: 3

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

A. the $\alpha -$ helix

B. the $\beta -$ tum

C. chair conformations

D. the $\beta -$ pleated sheet

Answer: C

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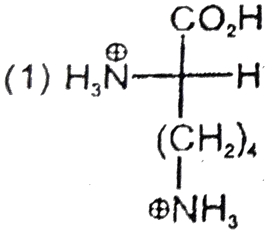
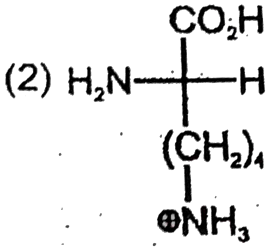
24. Which of the following is the major solute species in a solution of lysine at $pH = 10.5$?

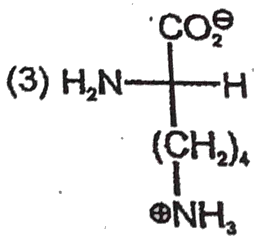
A.



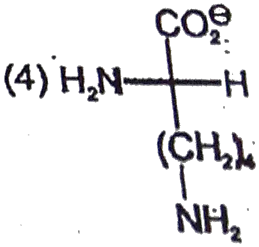
B.



C.



D.



Answer: 4

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

A. Lucite

B. Plexiglass

C. Perspex

D. All of these

Answer: 4

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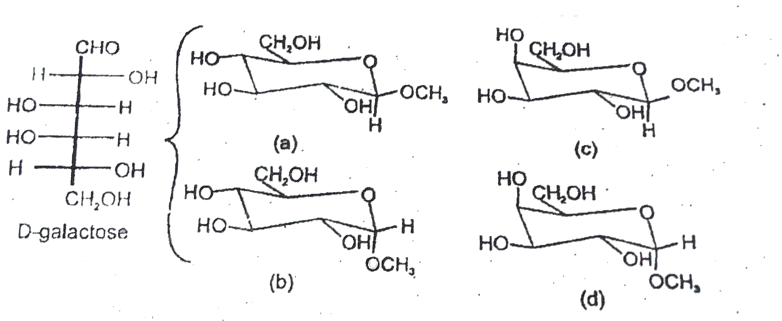
26. Which of the structure represent methyl $\alpha - D -$ galactopyranoside ?



A. a

B. b

C. c

D. d

Answer: 4

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

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

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

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

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

Answer: 3

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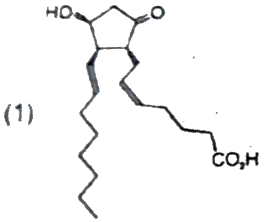
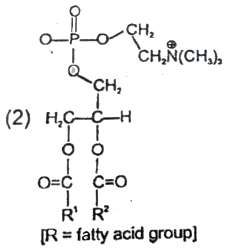
28. Which of the following is vitamin A ?

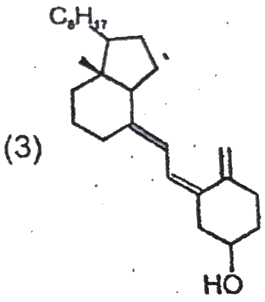
A.



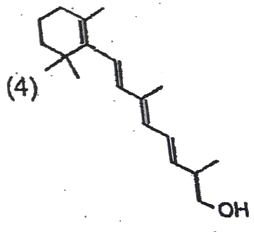
B.



C.



D.



Answer: 4

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

A. AAUCAGUU

B. CCAUCGAA

C. AACUGAUU

D. UUAGUCAA

Answer: 1

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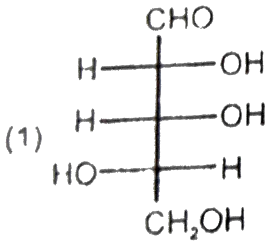
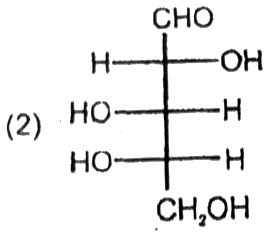
30. Which of the following gives an optically inactive aldaric acid on oxidatin with dilute nitric acid ?

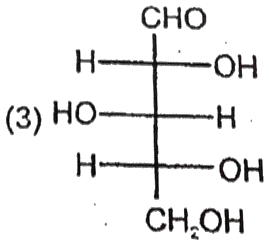
A.



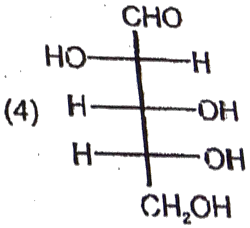
B.



C.



D.



Answer: C

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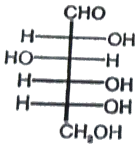
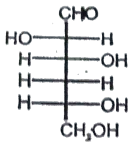
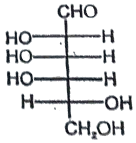
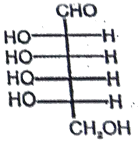
31. Which two of the following compounds, if any, are epimers ?









A. 1&4

B. 1&3

C. $2\&3$

D. $3\&4$

Answer: 4

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32. Which statement is incorrect .

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

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

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

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

Answer: 3

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

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

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

A. $6.62\&9.74$

B. $2.77\&5.6$

C. $2.77\&9.74$

D. $9.74\&6.62$

Answer: 3

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