

MAINS+ADVANCED

TOPIC

BIOMOLECULES &  
POLYMER

SOLUTIONS

BIOMOLECULES &amp; POLYMER

Exercise-I

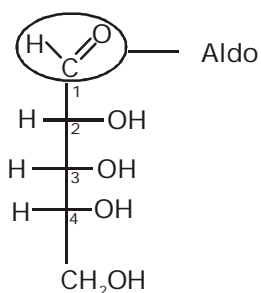
1. (C) - Ribose
  2. (A) - C<sub>1</sub> and C<sub>5</sub>
  3. (A) - Monosaccharide
  4. (C) - Inversion
  5. (A) - Amylase
  6. (C) - Lactose
  7. (C) - Isoelectric point
  8. (D) - 8
  9. (D)  
Regular folding patterns of continuous portion of the polypeptide chain
  10. (D)  
Haemoglobin
  11. (C)  
The peptide linkage
- peptide bond
12. (B)  
Secondary structure of protein
  13. (B)  
Glycine
  14. (D)  
Essential amino acids
  15. (C)  
Proteins
  16. (B)  
Myoglobin or Haemoglobin
  17. (D)  
 $\alpha$ -Amino acids
  18. (A)  
Proteins to peptides
  19. (D)  
Thymine
  20. (B)  
Uracil
  21. (C)  
Fats > Carbohydrates > Protein
  22. (A)  
Slightly acidic medium
  23. (B)  
Night blindness
  24. (D)  
Cheilosis
  25. (C)  
D
  26. (B)  
Cod liver oil
  27. (D)  
maturation of RBC's

28. (A)  
Vit. C
29. (D)  
Vitamin B12
30. (D)  
Vitamin K
31. (C)  
Casein
32. (D)  
Vitamin B<sub>12</sub>
33. (D)  
Phenylalanine
34. (C) K
35. (C)  
deficiency of ascorbic acid
36. (A)  
Adenine with thymine
37. (D)  
phosphoric group
38. (D)  
 $\frac{A+G}{C+T} = 1$
39. (B)  
Essential
40. (B)  
Pentose sugar: Phosphoric acid, pyrimidines and purines
41. (C)  
40%
42. (B)  
Glycogen in liver and muscles
43. (A)  
Sucrose
44. (D)  
Proteins
45. (B)  
Casein of milk
46. (A)  
GUA
47. (C)  
3-7
48. (C)  
Phospho-diester bonds
49. (D)  
Both (B) and (C) are correct
50. (A)  
Nucleotides of DNA
51. (B)  
Phosphate
52. (D)  
Data not sufficient
53. (B)  
nucleotides
54. (A)  
base + sugar
55. (B)  
DNA
56. (A)  
Leucine, methionine, lysine & valine
57. (A)  
Uracil
58. (A)  
Are polymers of nucleotides
59. (B)  
Newly synthesized DNA molecules have one strand from the parent DNA molecule
60. (A)  
Cytosine
61. (A)  
Plexiglass
62. (B)  
Copolymerisation
63. (C)  
2,4,6 -Triamino-1,3,5-triazine

64. (C)  
Nylon - 6
65. (B)  
Nylon 66
66. (A)  
Bakelite
67. (D)  
Thermosett
68. (B)  
Nylon
69. (A)  
Adipic acid + Hexamethylene diamine
70. (D)  
DNA
71. (A)  
Polypeptide
72. (B)  
Proteins
73. (C)  
2- Chloro -1, 3 butadiene
74. (C)  
Glyptal
75. (A)  
Polyisoprene
76. (B)  
Bakelite, polystyrene
77. (C)  
SBR is called natural rubber
78. (D)  
P.M.M.A.
79. (A)
- |   |   |   |   |
|---|---|---|---|
| A | B | C | D |
| d | c | b | a |
80. (A)  
SBR

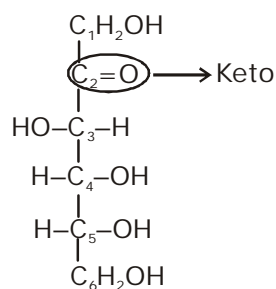
## Exercise-II

1. (A)



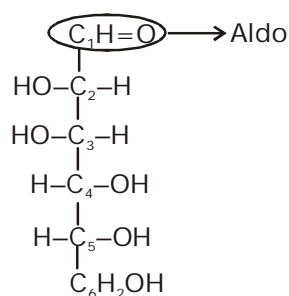
5 C containing so it is Aldopentose

2. (C)



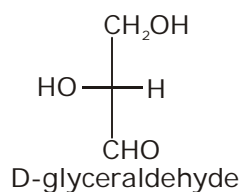
7 C Containing as it is ketoheptose

3. (D)

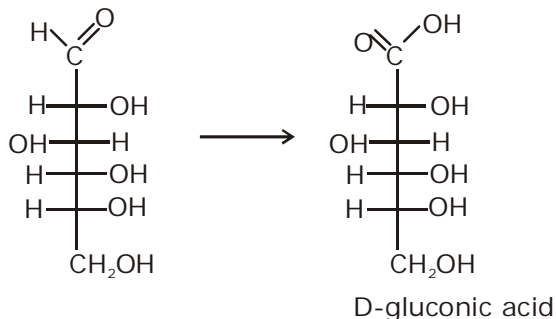
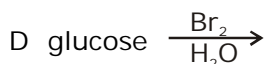


6 C containing so it is Aldohexose

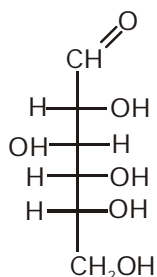
4. (C)



5. (A)

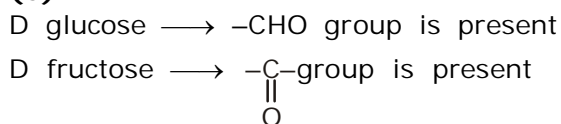


6. (D)



Osazone formation result in a loss of stereogenic centre at C<sub>2</sub> but does not affect other stereogenic carbens

7. (C)

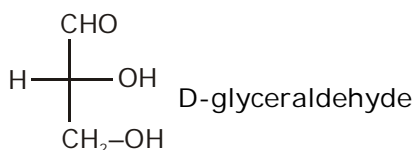


D glucose & D-fructose have same molecular formula so they both are functional isomer.

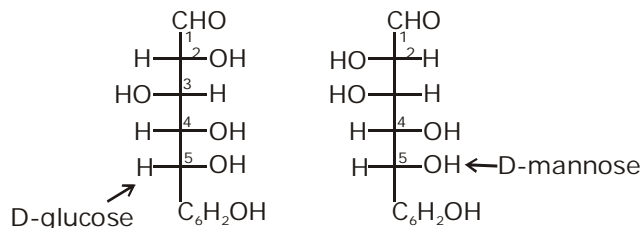
8. (C)

Sucrose  $\Rightarrow$  2 saccharides units are present. So it is oligosaccharide  
 Because oligosaccharide  $\Rightarrow$  2-10 monosaccharide

9. (B)



10. (D)



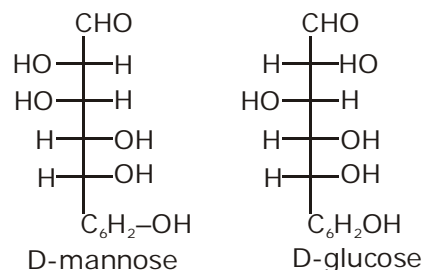
SO C2 epimer of D-glucose is D-mannose

11. (D)

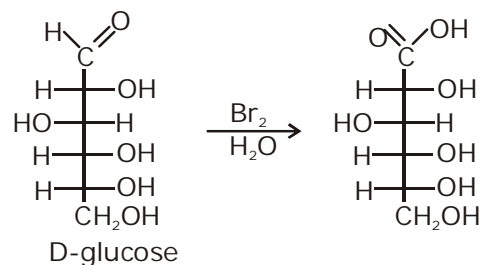
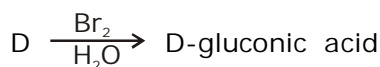
C<sub>3</sub> Epimer of D glucose is D-Aetrose

12. (D)

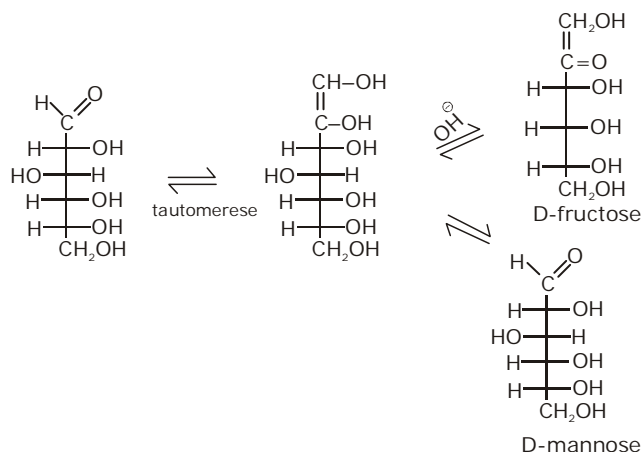
In D-mannose and D-glucose both have 6 carbons and -CHO group so D-mannose and D-glucose both are aldoses



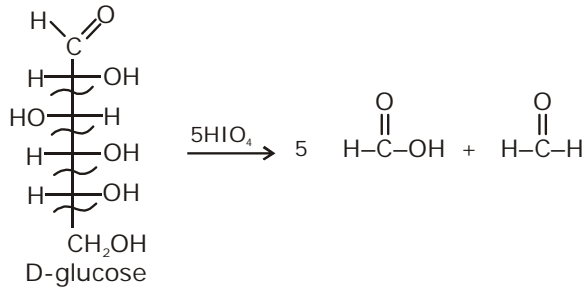
13. (B)



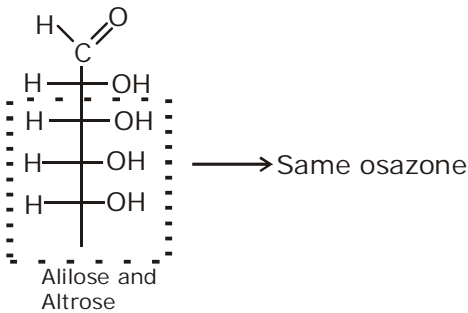
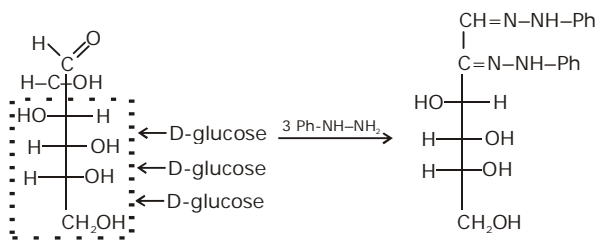
14. (C)



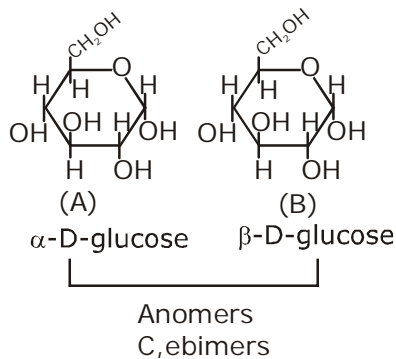
15. (B)



16. (D)

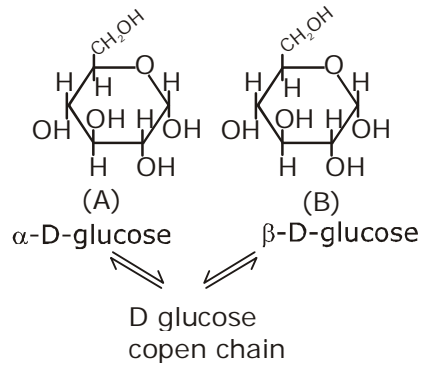


17. (A)



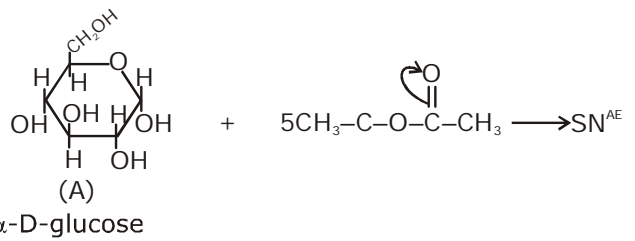
18. (B)  
B

19. (C)



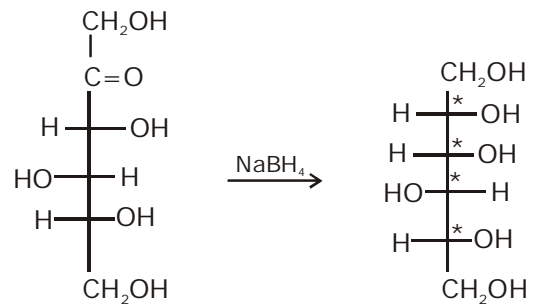
So' c will not undergo mutarotation

20. (C)



No. of -OH gp. present 5 so 5 moles of acetic anhydride will consumed

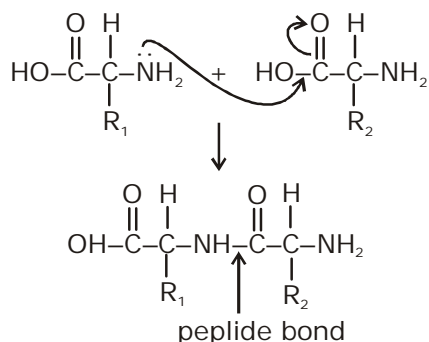
21. (B)



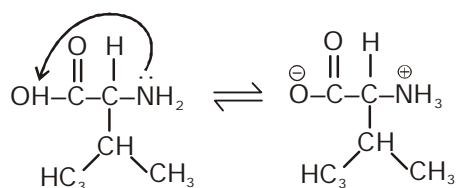
$$\text{T.S.I.} = 2^{n-1} + 2^{P-1} \quad n=\text{even} \quad P = \frac{n+1}{2}$$

T.S.I. = 10 (8+2) mese  
optical active

22. (C)



23. (B)



24. (A)

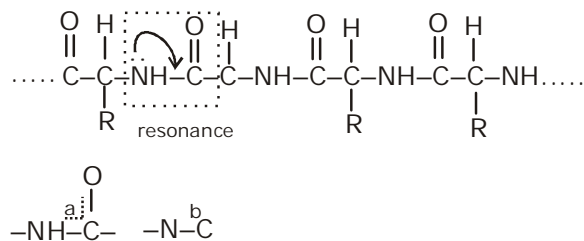
Nit.C  $\rightarrow$  Ascorbic acid

25. (A)

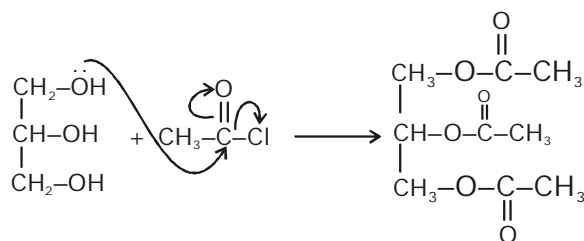
$pK_{a1} = 2.34$   
 $pK_{a2} = 9.60$

$$pI = \frac{pK_{a1} + pK_{a2}}{2} = \frac{2.34 + 9.60}{2} = \frac{11.94}{2} = 5.92$$

26.



27. (A)



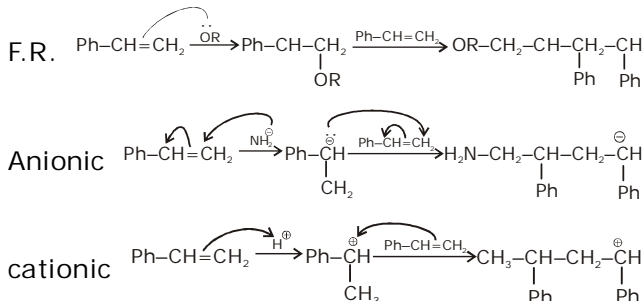
28. (A)

Starch is natural polymer of D-glucose

29. (D)

n  $\alpha$ -D-glucose  $\rightarrow$  starch  
n styrene  $\rightarrow$  Polystyrene  
Acrylonitrile  $\rightarrow$  orlon

30. (B)



31. (C)

$R_3Al + TiCl_4$  is ziegler Natta catalyst

32. (D)

Tetrafluoroethenl is monomer of Teflon.

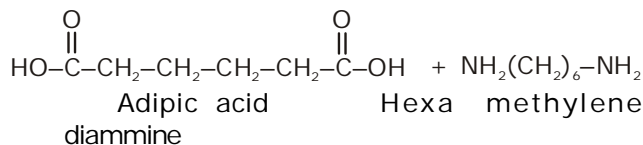
33. (D)

Acrylonitrile

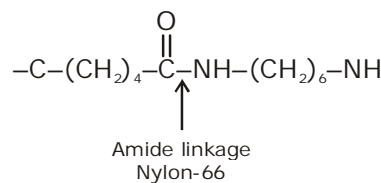
34. (B)

Hydroxn bond is presnt between adipic acid & Hexa methylene diam

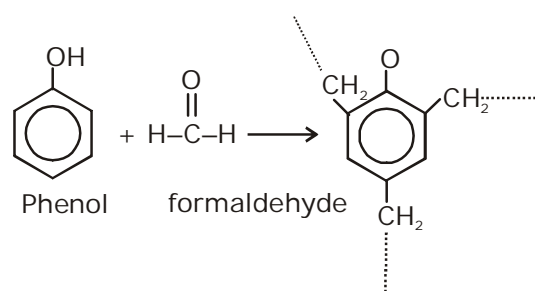
35. (C)



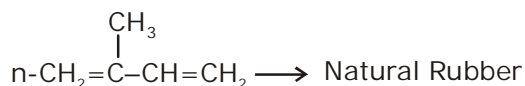
36. (A)



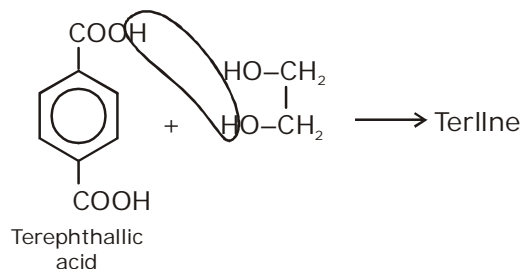
37. (A)



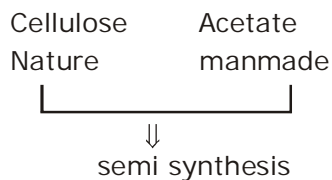
38. (D)



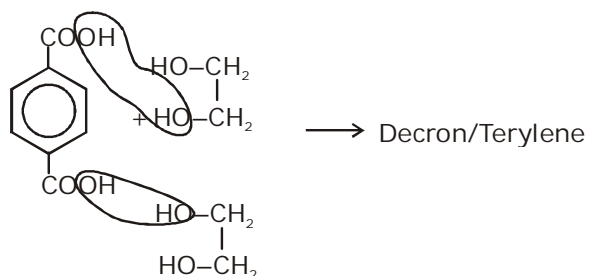
39. (D)



40.



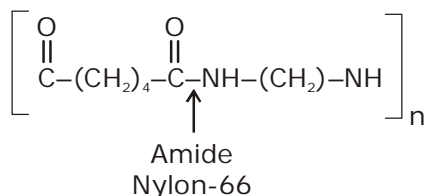
41. (D)



42. (B)

elastomer  $\Rightarrow$  it is weak force.

43. (B)

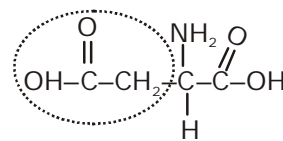


44. (D)

Glycosidic linkage is present in sucrose, maltose & lactose.

45. (B)

Aspartic acid  $\leftarrow$  Acidic amino acid

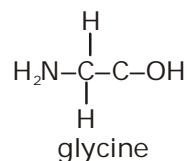


$P^I=32$

46. (A)

Protein on hydrolysis  $\alpha$ -amino acid.

47. (A)



Because in glycine there are no any chiral carbon

48. (D)

Peptide linkage is present in protein and Nylon, b

49. (D)

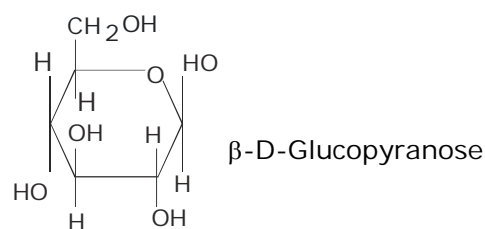
Lactose  $\longrightarrow$  galactose and Glucose

50. (D)

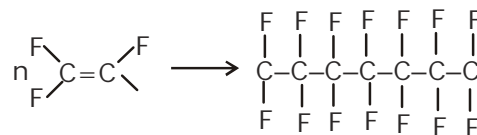
Amino	Acid
↓	↓
$\text{NH}_2\text{gp}$	$\text{COOHgp}$

So compound in which  $-\text{NH}_2\text{gp}$  &  $-\text{COOHgp}$  both are present are known as amineacid.

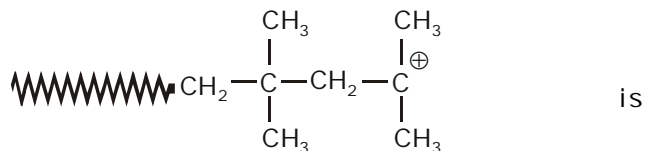
51. (B)

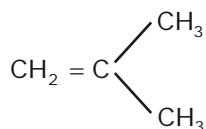


52. (B)

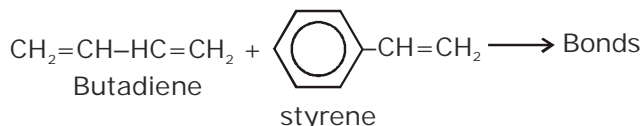


53. (A)





54. (B)



55. (C)

Oligosaccharides  $\Rightarrow$  2–10 monosaccharide units are present.

56. (C)

non reducing sugar  
Sucrose (1,2-glycosidic linkage of  $\alpha$ -glucose,  $\beta$ -D-fructose)

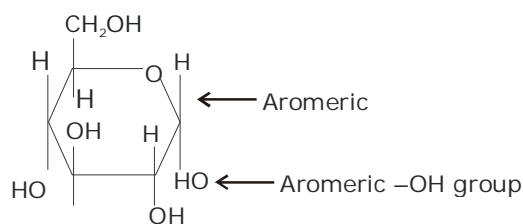
57. (D)

Reducing sugar = fructose

58. (C)

D-fructose  $\rightleftharpoons$  D glucose  $\rightleftharpoons$   $\alpha$ -D-glucose exist in 3 forms (Isomeric)

59. (D)

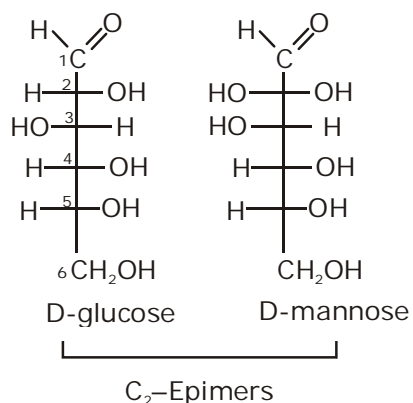


60. (D)

Sucrose – X (Anomeric -OH is absent)

Maltose  
Lactose } ← Anomeric OH is present

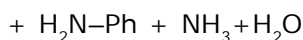
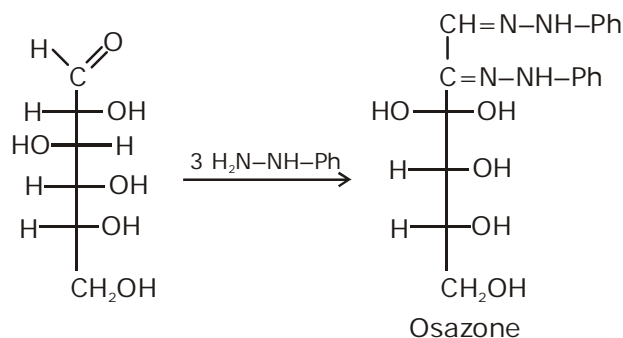
61. (D)



62. (C)

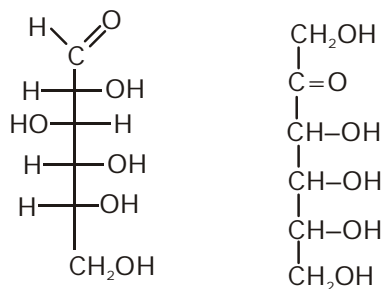
- (A) Enantiomers
- (B) Functional Isomers
- (C) C-3 epimers
- (D) Diastereomer not epimers

63. (A)



64. (D)

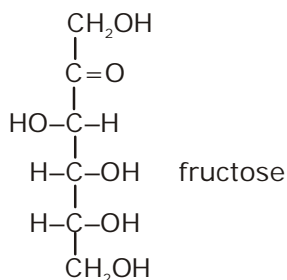
Glucose and fructose



65. (A)

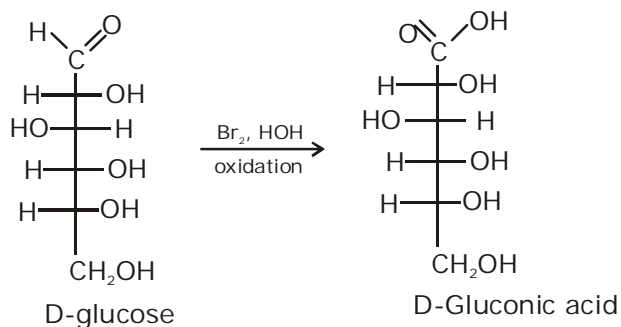
Cellulose ←  $\beta$ -D-glucose

66. (D)



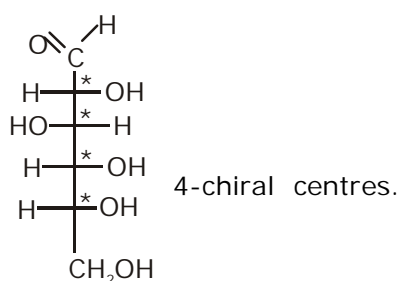
67. (D)



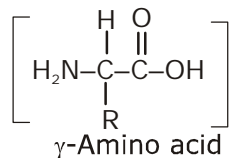


68. (B) All monosaccharide Reduces Tollens reagent.

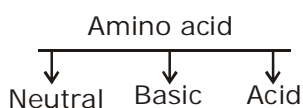
69. (A)



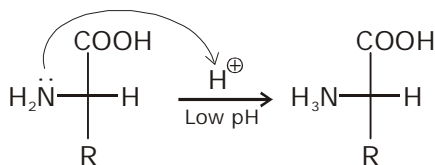
70. (B) Protein is polymer of  $\gamma$ -Amino acid



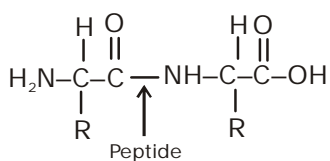
71. (D)



72. (C)

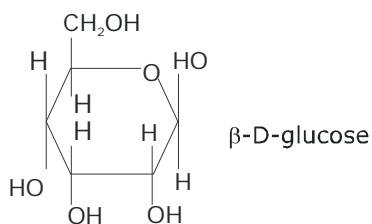


73. (D)



74. (D) Cellulose is the polymer of D-glucose.

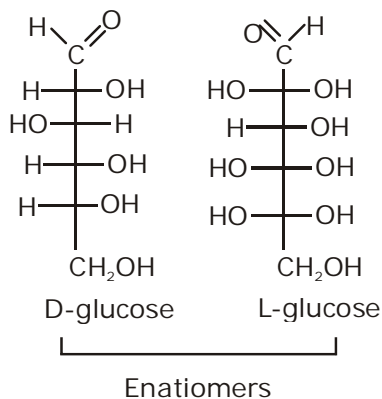
75. (D)



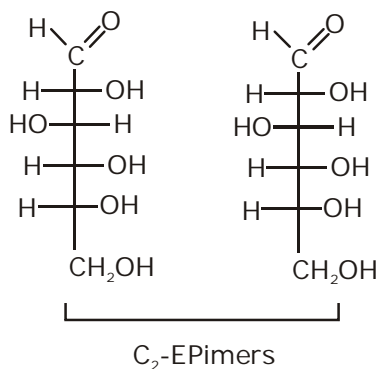
76. (D) glucose and fructose.

77. (B) Weakest intermolecular force = Natural Rubber

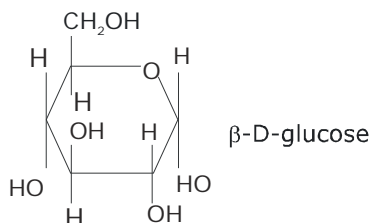
78. (A)



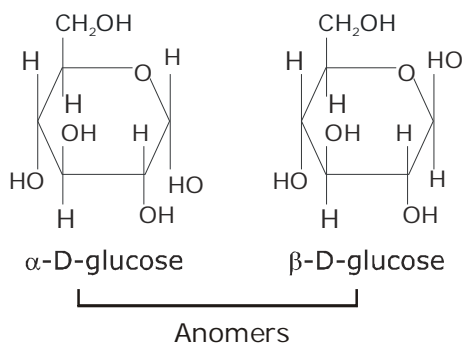
79. (C)



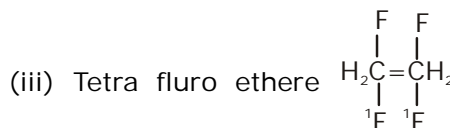
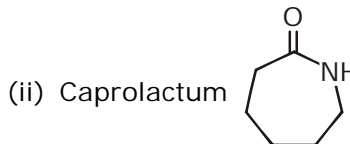
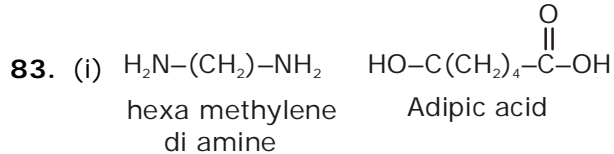
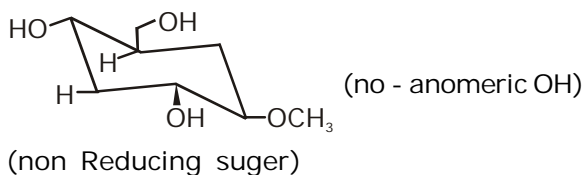
80. (B)



81. (B)



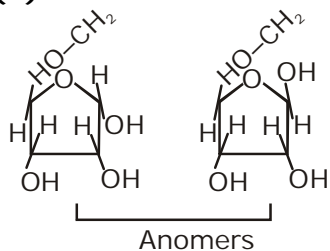
82. (D)



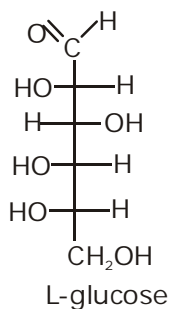
84. Addition polymer PVC (Polyvinylchloride)  
 poethlen  
 Condensation polymer Terylene Bakelite

Exercise-III

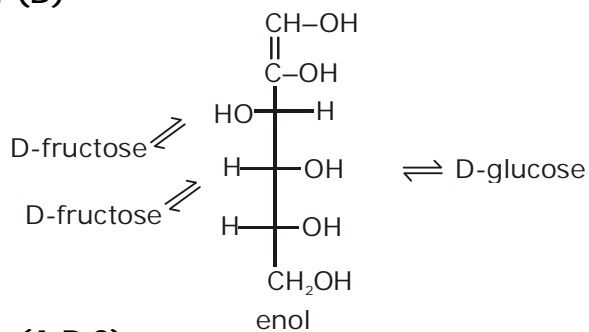
1. (B)



2. (A)



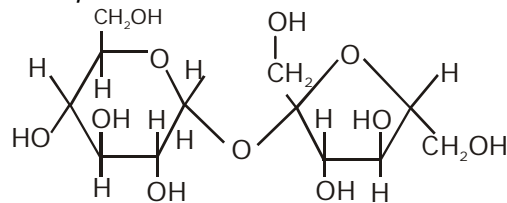
3. (D)



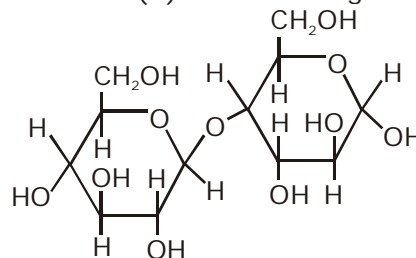
4. (A,B,C)  
 Same Osazone

D-glucose  
 D-Mannose  
 D-fructose } same osazone

Sol. 5 B,C



(X) Non Reducing



(Y) Reducing

Sol.6 A,B,D

positive Tollens – Anomeric –OH

Sol.7 Column-I

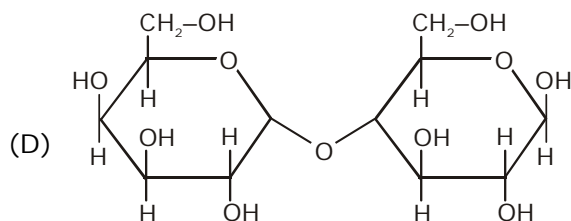
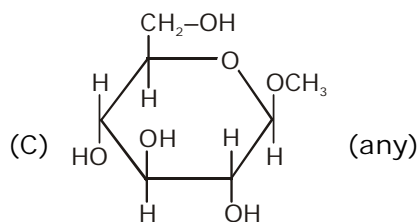
(A) Nylone 66(P,S)      (B) styrene (Q,R)  
 (C) Bakelite (P,S)      (D) Teflon (Q,R)

Column-II

(P) Condlnsation polymerisation  
 (Q) Addition polymerisation  
 (R) Home polymer  
 (S) Co-polymer

## 8. Column-I

- (A)  $\alpha$ -D-Glucose (P,Q,R,S)  
 (B)  $\beta$ -D-Glucose (P,Q,R,S)



## Column-II

- (P) Undergoes osazone formation  
 (Q) On acetylation reaction with acetic anhydride weight increase by 210  
 (R) It is reducing sugar  
 (S) It is known as  $\alpha$ -D-Glucopyranose

## 9.

## Column-I

- (A) Sucrose  $\xrightarrow{H_3O^+}$  P,S  
 (B) Maltose  $\xrightarrow{H_3O^+}$  Q,S  
 (C) Lactose  $\xrightarrow{H_3O^+}$  R,S

## Column-II

- (P) Product is glucose+ fructose  
 (Q) Product is 2-glucose  
 (R) Product is glucose  
 (S) Oligo saccharide galactose

## 10.

## Column-I

- (A) Terylene (P,S) (B) Styrene (Q,R)  
 (C) Bakelite (P,S) (D) Teflon (Q,R)

## Column-II

- (P) Condensation polymerisation  
 (Q) Addition Polymerisation  
 (R) Homo Polymer  
 (S) CO-Polymer

## Exercise-IV

## Level-I

- (D) 
$$\begin{array}{c} \text{H} \\ | \\ \text{NH}_2 - \text{C} - \text{COOH} \\ | \\ \text{R} \end{array}$$
- (A) Sugar - Ribose  
nitrogen base - adenine, guanine, cytosine, uracil
- (A) Methylated cellulose on complete hydrolysis give 2,3, 6 - tri-O methyl D- Glucose
- (A) A & T two hydrogen bond. C & G three hydrogen bond A = T, C  $\equiv$  G
- (A) Chlorophylls are green pigments in plants and contain calcium.
- (A) DNA  $\div$  Adenine, guanine, cytosine, thymine  
RNA  $\div$  Adenine, Guanine, cytosine, uracil
- (B) Insulin is a hormone to decrease level of sugar.
- (D) Enzymes are specific biological catalysts that possess well-defined active sites
- (D) Nucleotides are joined by 3'-5' phosphodiester
- (B) cytosine and thymine
- (C) Isomers of glucose that differ in configuration at carbon one (C-1)
- (A) Proteins are made up of  $\alpha$ -amino acids linked to one another by peptide linkage.
- (B) Isomers of glucose that differ in configuration at carbon one (C-1)
- (C)  $> \text{C} = \text{O}$  and  $-\text{OH}$
- (ABCD) All are chiral because all have chiral carbons.

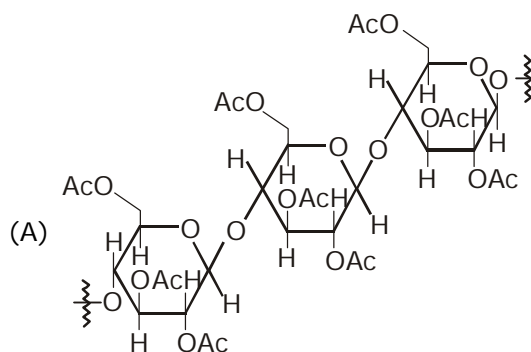
16. (B)  
Biuret test given only peptide linkage.
17. (B)  
2<sup>nd</sup>
18. (B)  
All amino acids except glycine are optically active
- $$\begin{array}{c}
 \text{H} \\
 | \\
 \text{NH}_2 - \text{C} - \text{COOH} \\
 | \\
 \text{H}
 \end{array}$$
- Group Inactive
19. (A)  
Sugar give +ve test with molish reagent
20. (B)  
Formation of polymer by joining of monomer unit
21. (A)  
Polyamide polymer
22. (A)
- $$\begin{array}{c}
 \text{O} \qquad \qquad \text{O} \\
 || \qquad \qquad \quad || \\
 \text{nHO} - \text{C} - (\text{CH}_2)_4 - \text{C} - \boxed{\text{OH}} + \text{nH}_2\text{N} - (\text{CH}_2)_6 - \text{NH}_2 \\
 \qquad \qquad \qquad \downarrow \text{H}_2\text{O} \\
 \text{Nylon - 66}
 \end{array}$$
23. (A)  
Teflon

24. (C)
- $$\text{C}_6\text{H}_5\text{OH} + \text{H}_2\text{C}=\text{O} \xrightarrow{\text{OH}^-} \text{C}_6\text{H}_4(\text{OH})\text{CH}_2\text{OH} + \text{C}_6\text{H}_4(\text{OH})\text{CH}_3$$
- O-hydroxy methyl phenol      P-hydroxy methyl phenol
- $$\text{n C}_6\text{H}_4(\text{OH})\text{CH}_2\text{OH} + \text{n C}_6\text{H}_4(\text{OH})\text{CH}_3 \xrightarrow[\text{n H}_2\text{O}]{\text{copolymerisation}} \text{Bakelite}$$
25. (C)
- $$\text{n CH}_2 = \text{CH} - \text{CH} = \text{CH}_2 + \text{n CH}_2 = \underset{\text{CN}}{\text{CH}}$$
- butan -1,3 - diene                                  acrylonitrile
- $\Delta$  peroxide      polymerisation
- $$\left[ \text{CH}_2 - \text{CH} = \text{CH} - \text{CH}_2 - \text{CH}_2 - \underset{\text{CN}}{\text{CH}} \right]_n$$
- Buna-N synthetic rubber
26. (B)  
Because it is an electrophile which initiate the reaction.
27. (B)  
1 molecules CO<sub>2</sub> require = 3 ATP  
6 molecules of CO<sub>2</sub> require = 3 × 6 = 18 ATP

Exercise-IV

Level-II

1. (B)  
Sucrose is not reducing sugar does not give +ve tollen or benedict test.
2. (B)  
Isomer of glucose that differ in configuration at carbon one (C-1)
3. A→P,S; B→Q,R; C→P,R; D→S
4. (A)



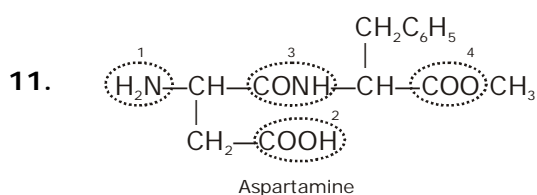
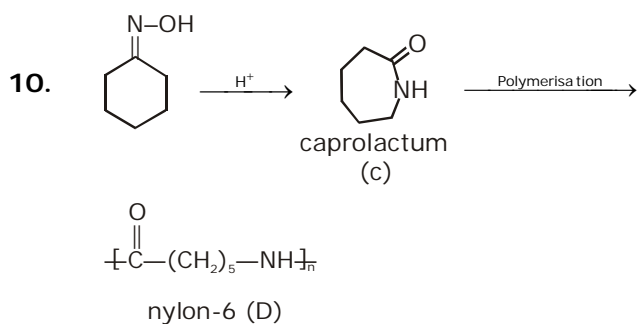
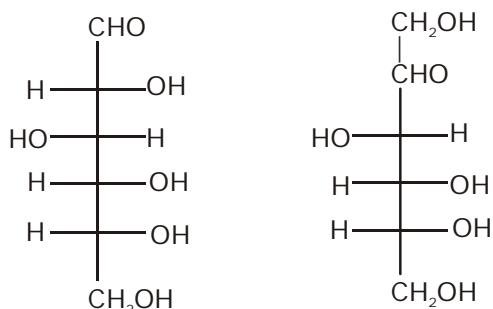
5. (D)  
natural rubber weak intermolecular force of attraction

6. (BC)  
 (B) X is a non-reducing sugar and Y is a reducing sugar  
 (C) The glucosidic linkages in X and Y are  $\alpha$  and  $\beta$ , respectively

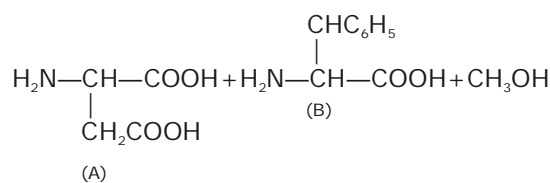
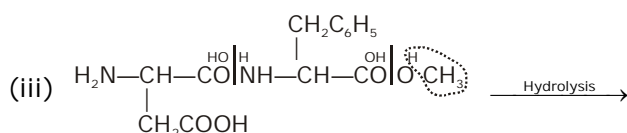
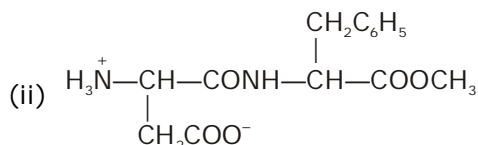
7. (A)  
 (A) Ring (a) is pyranose with  $\alpha$ -glycosidic link

8. (B)  
 C-6 & aldehyde group.

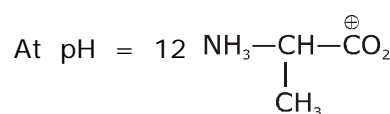
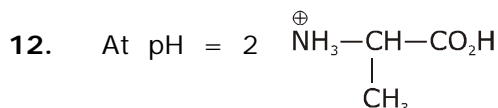
9. Sucrose  $\xrightarrow[H_2O]{H^+}$  D-glucose + D-fructose



- (i)  $\text{NH}_2$ -gp. (1) -amino gp.  
 $-\text{COOH}$  gp. (2) -carboxyl gp.  
 $-\text{CONH}$  gp. (3) -2°-amide gp.  
 $-\text{COOCH}_3$  gp. (4) -ester gp.

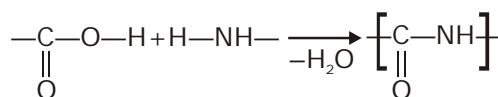


- (iv) B is more hydrophobic due to presence of larger organic gp., benzyl gp. ( $\text{C}_6\text{H}_5\text{CH}_2-$ ).



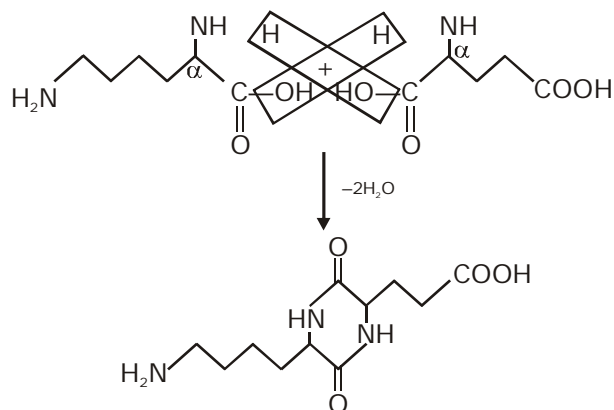
13.  $n\text{CH}_2 = \text{CH}_2 \xrightarrow[\text{Ziegler Natta Catalyst}]{\text{R}_3\text{Al} + \text{TiCl}_4} \text{-(CH}_2-\text{CH}_2\text{)}_n$   
 Ziegler Natta catalyst ( $\text{R}_3\text{Al} + \text{TiCl}_4$ ) acts as heterogenous catalyst. While Willikinson's Catalyst ( $(\text{Ph}_3\text{P})_3\text{RhCl}$ ) acts as homogenous catalyst.

14. Peptide linkage is  $-\text{NH}-\text{C}(=\text{O})-$  and it is formed by the condensatoin between  $-\text{NH}_2$  group and  $-\text{COOH}$  group as follows

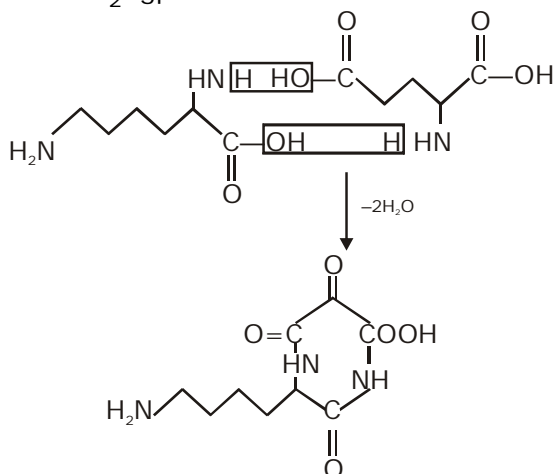


In given amino acids liosine and glutamine the two possible dipeptides are formed as follows:

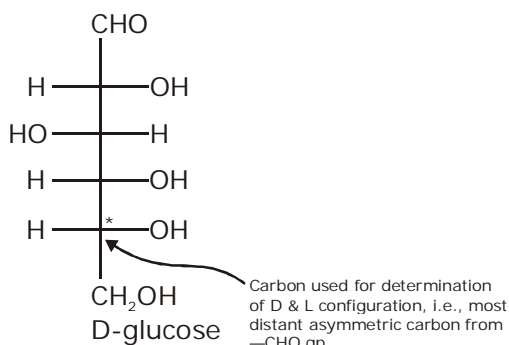
- (i) When both  $\text{NH}_2$  gp.  $\alpha$  to  $-\text{COOH}$  are condensed



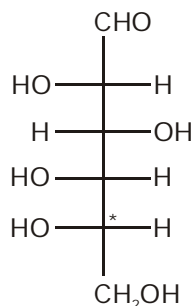
- (ii) When  $\alpha$ -NH<sub>2</sub> of both amino acids is used but in one terminal -COOH gp. lacking  $\alpha$ -NH<sub>2</sub> gp. is used.



15. (a) The structure of L-glucose can be drawn by reversing the position of H and OH at the second last C-atom of D-glucose given i.e.,



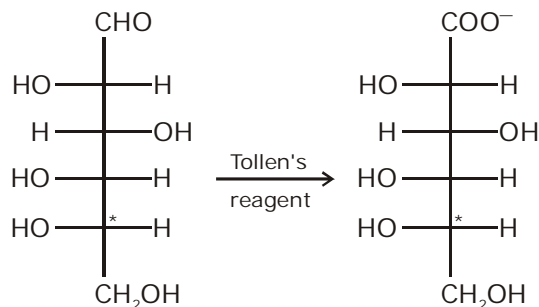
Hence structure of L-glucose will be :



Position of H and OH at C\* is opposite to that in D.

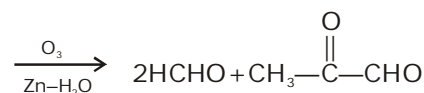
- (b) With Tollen's reagent the terminal

-CHO group oxidised to -COOH group as :

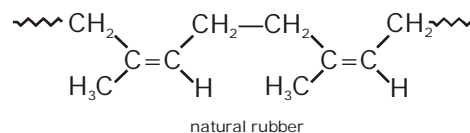


16. In structure (a), one ring has a free hemiacetal group, will hydrolyse into open chain in aqueous solution and therefore will reduce Tollen's reagent. Structure 'b' has only acetal groups, will not hydrolyse in aqueous solution into open chain, will not reduce Tollen's reagent.

17. (a) isoprene



- (b) Isopene →

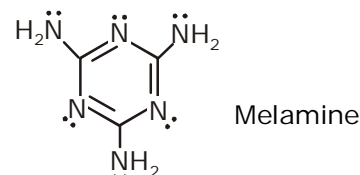


18. (2)

19. (8)

20. (4)

21. (0006)



Lone pairs of electrons in malamine is 6.

22. (0004)

Phe - Gly - Val - Ala  
 Phe - Val - Gly - Ala  
 Val - Gly - Phe - Ala  
 Val - Phe - Gly - Ala  
 (Glycine has no chiral centre)