

Biomolecules

SOLUTIONS

Exercise-I (Conceptual Questions)

1. **Ans. (4)**
Generally Mono saccharides → Sugars
Poly saccharides → Non-sugars
Reducing sugar → Mono saccharides
2. **Ans. (3)**
Glucose, Fructose, Mannose $\xrightarrow{\text{gives}}$ Same osazone when react with Ph-NH-NH₂ (Phenyl Hydrazine)
3. **Ans. (4)**
 $\alpha\text{-D-Glucose} \rightleftharpoons \text{Glucose} \rightleftharpoons \beta\text{-D-Glucose}$
Mutarotation
4. **Ans. (2)**
Glycogen structure is similar to amylopectin which is highly branched.
5. **Ans. (1)**
Anomer of glucose means
C-1 H and -OH group change position
6. **Ans. (4)**
Sucrose $\xrightarrow{\text{Invertase}}$ Glucose + Fructose
7. **Ans. (3)**
Cellulose → Polysaccharide
Non-reducing in Nature
So No Reaction with Fehling solutions and Tollen reagent.
8. **Ans. (3)**
Hemiacetal Hemiketal

$\begin{array}{c} \text{—O} \quad \text{H} \\ \diagdown \quad \diagup \\ \text{C} \\ \diagup \quad \diagdown \\ \text{—} \quad \text{OH} \end{array}$

$\begin{array}{c} \text{—O} \quad \text{R} \\ \diagdown \quad \diagup \\ \text{C} \\ \diagup \quad \diagdown \\ \text{—} \quad \text{OH} \end{array}$

If Hemiacetal and Hemiketal structure is present then reducing in nature
Sucrose → Non reducing in nature
9. **Ans. (4)**
Branched polymer of glucose
Glycogen → Highly branched amylopectin
10. **Ans. (1)**
Reducing sugars → Reduced fehling's solution
→ Reduced tollen's reagent

11. **Ans. (4)**
Polysaccharides → Starch Cellulose Dextrin Glycogen
12. **Ans. (1)**
Helical structure of protein is stabilized by Hydrogen bonds
 $\begin{array}{l} \rightarrow \alpha\text{-Helix} \\ \rightarrow \beta\text{-Helix} \end{array}$
13. **Ans. (2)**

$$\begin{array}{c} \text{H} \qquad \qquad \text{H} \\ | \qquad \qquad | \\ \text{H}_2\text{N}-\text{C}-\text{CO} \boxed{\text{OH} + \text{H}} -\text{N}-\text{C}-\text{COOH} + \\ | \qquad \qquad | \\ \text{R}_1 \qquad \qquad \text{R}_2 \end{array}$$

$$\xrightarrow{-\text{H}_2\text{O}}$$

$$\begin{array}{c} \text{H} \qquad \qquad \text{H} \\ | \qquad \qquad | \\ \text{H}_2\text{N}-\text{C}-\text{C}-\text{NH}-\text{C}-\text{COOH} \\ | \qquad \quad || \qquad | \\ \text{R}_1 \qquad \text{O} \qquad \text{R}_2 \end{array}$$

Peptide Bond
14. **Ans. (2)**
disulphide Bond formation in protein.
-S-S- Linkage [SH-functional group]
15. **Ans. (3)**

$$\begin{array}{c} \text{H} \\ | \\ \text{NH}_2-\text{C}-\text{COOH} \\ | \\ \text{R}=\text{H} \end{array}$$

Simple amino acid

↓

Glycine
16. **Ans. (1)**
Fibrous protein → Generally insoluble in water
Eg. Keratin (present in Hair, Wool, Silk)
17. **Ans. (1)**
Lysine → α -Amino acid
Relative position of Amino group with respect to carboxylic acid.
18. **Ans. (4)**
Fibrous protein → Hydrogen Bond → Present
Disulphide Bond → Present
Electrostatic force attraction → Absent

19. **Ans. (2)**

NH_2 group > Carboxylic acid group $\Rightarrow$ Basic in nature

Eg. Histidine

Lysine

Arginine

20. **Ans. (1)**

Non-essential Amino acid $\begin{cases} \rightarrow \text{Synthesized in Body} \\ \rightarrow \text{No need to take in diet} \end{cases}$

21. **Ans. (1)**

Non essential Amino acid $\rightarrow$ Serine

22. **Ans. (1)**

Amino acid $\begin{cases} \xrightarrow[\text{Medium}]{\text{Acidic}} \oplus \text{Ve} \\ \xrightarrow[\text{Medium}]{\text{Basic}} \ominus \text{Ve} \end{cases}$

Amino acid Have 2 group (1) NH_2
(2) $-\text{COOH}$

$\xrightarrow[\text{act as Base}]{\text{in Acidic Medium}} \begin{array}{c} \text{COOH} \\ | \\ \text{NH}_3^+ - \text{C} - \text{H} \\ | \\ \text{R} \end{array}$

$\xrightarrow[\text{act as acid so donate } \text{H}^+]{\text{in Basic Medium}} \begin{array}{c} \text{COO}^- \\ | \\ \text{NH}_2 - \text{C} - \text{H} \\ | \\ \text{R} \end{array}$

23. **Ans. (3)**

tertiary structure of proteins $\rightarrow$ Folding of secondary structure

Two major molecular shapes viz $\rightarrow$ Fibrous and globular

24. **Ans. (3)**

Globular protein $\rightarrow$ Haemoglobin Insulin Albumins

Fibrous protein $\rightarrow$ Keratin (present in Hair, Wool, Silk myosin (present in muscles)

25. **Ans. (2)**

Due to change in physical and chemical reaction $\xrightarrow{\text{Denaturation of protein}}$ disrupt it's various form (Except primary structure)

26. **Ans. (2)**

Egg $\xrightarrow{\text{boiling}}$ Coagulation of egg protein (Irreversible denaturation)

27. **Ans. (2)**

Haemoglobin $\rightarrow$ Oxygen carrier in the blood

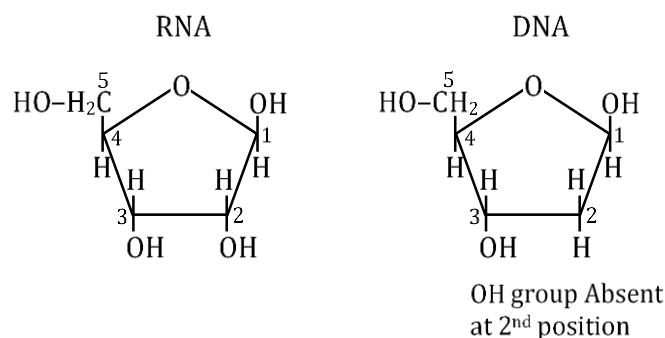
28. **Ans. (2)**

Benzidine is not a Amino acid

29. **Ans. (1)**

$\begin{array}{cc} \text{A} & \text{G} \\ || & ||| \\ \text{T} & \text{C} \end{array}$

30. **Ans. (4)**



31. **Ans. (3)**

DNA $\rightarrow$ Adenine, Guanine $\leftarrow$ Present
Thymine, Cytosine $\leftarrow$ Present
Quinoline $\rightarrow$ Absent

32. **Ans. (1)**

RNA $\begin{cases} \rightarrow \text{A, G} & (\text{Purines}) \\ \rightarrow \text{U, C} & (\text{Pyrimidine}) \end{cases}$

33. **Ans. (1)**

A = T

G $\equiv$ C

34. **Ans. (2)**

Mainly DNA is localized in Nucleus

35. **Ans. (1)**

$\text{DNA} \xrightarrow{\text{Transcription}} \text{RNA} \xrightarrow{\text{Translation}} \text{Protein}$

36. **Ans. (4)**

Only Vitamin B₁₂ $\rightarrow$ Store in Body

Water soluble vitamin B, vitamin C

Readily excreted in Urine and Cannot be stored (Except-Vit. B₁₂)

37. **Ans. (4)**

Vitamin K $\rightarrow$ Fat soluble

$\rightarrow$ Blood clotting

$\rightarrow$ Chemical name is phyloquinone

38. **Ans. (2)**

Enzyme → Protein part + Non protein part
(Holoenzyme) (Apoenzyme) (Cofactor coenzyme)

39. **Ans. (2)**

Vit. C → Anti scury
Vit E → Anti sterility

40. **Ans. (1)**

Carotene → Vit. A

41. **Ans. (1)**

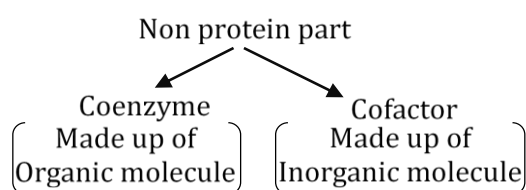
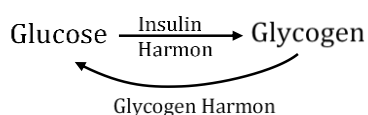
Avitaminosis → Multiple deficiencies (more than one vitamin deficiency)
Xerophthalmia → Deficiency of Vit - A
Convulsions → Deficiency of Vit - B6

42. **Ans. (1)**

Cell Membranes $\xrightarrow{\text{Mainly composed}}$ Phospholipids

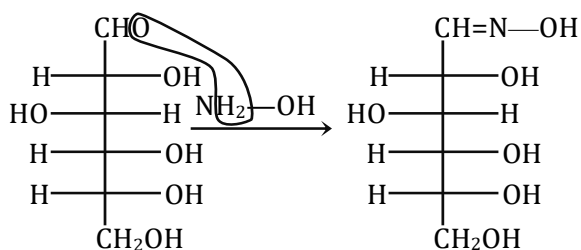
43. **Ans. (4)**

Protein $\xrightarrow{\text{Hydrolysis}}$ Peptides chain $\longrightarrow$
Amino acid

44. **Ans. (1)**45. **Ans. (3)**

⇒ Balance glucose level

Exercise-II (Previous Year Questions)

1. **Ans. (4)**2. **Ans. (3)**

Amino acid $\xrightarrow{\text{Peptide Bond}}$ protein

3. **Ans. (2)**

RNA $\xrightarrow{\text{Sugar}}$ ribose
DNA $\longrightarrow$ 2 - deoxyribose

4. **Ans. (4)**

Sucrose is non reducing sugar

5. **Ans. (1)**

Central dogma
DNA → RNA $\longrightarrow$ Protein

6. **Ans. (1)**

Cellulose $\longrightarrow$ Intramolecular H-Bonding possible

7. **Ans. (1)**

Amylose → 1 - 4 α - linkage
Amylopectin → 1 - 4 α linkage + 1 - 6 α - linkage Both

8. **Ans. (4)**

Generally Amino acid form zwitterion
∴ Glycine can form zwitterion

9. **Ans. (3)**

Non-essential amino acid → Alanine

10. **Ans. (2)**

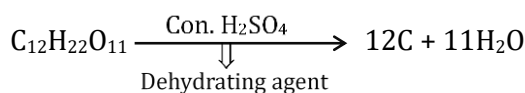
Primary structure remain same during denaturation process

11. **Ans. (4)**

Sucrose = α - D Glucose + β - D Fructose

12. **Ans. (1)**

Basic Amino acid → lysine, arginine, histidine

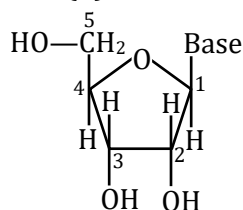
13. **Ans. (1)**14. **Ans. (2)**

Osteomalacia → Vit. D. Deficiency
Vit. A → Xerophthalmia
E → Anti sterility hormone
K → Blood dealy in clotting

15. **Ans. (1)**

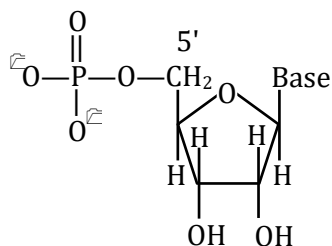
Vit. B₁₂ → Pericious Anaemia (RBC deficient in haemoglobin)

16. Ans. (2)



Nucleoside

Base link with 1' position of sugar in nucleoside so statement I is correct



Nucleotide

→ When nucleoside is linked to **phosphoric acid** at 5' position of sugar moiety we get a Nucleotide



Statement II is Incorrect because not link with **phosphorous acid**.

17. Ans. (4)

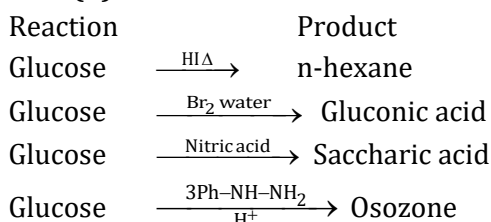
Cheilosis (Fissuring at corners of mouth and lips) occurs due to deficiency of vitamin B₂ (Riboflavin)

18. Ans. (2)

Glycogen is similar to amylopectin in its structure.

Exercise-III (Analytical Questions)

1. Ans. (4)



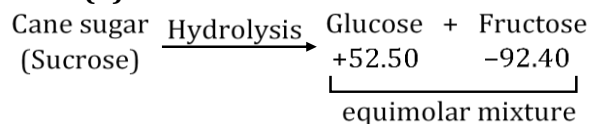
2. Ans. (3)

Option 1, 2, 4 explained by open chain.
Only option 3 is explained by cyclic st.
Penta acetate of glucose + Hydroxylamine
This reaction does not occur O.S. in this -CHO doesn't present in free state.

3. Ans. (1)

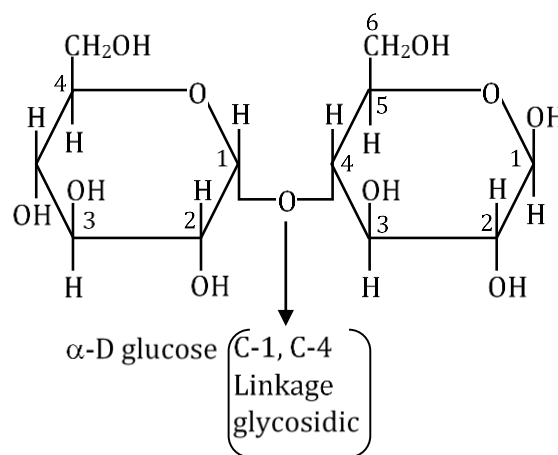
α -D Glucose	β -D-Glucose
Specific rotation	Specific rotation
$[\alpha]_D^{20} + 111^\circ$	$[\alpha]_D^{20} + 19.2^\circ$
30°C	98°C

4. Ans. (4)



5. Ans. (3)

Maltose structure



6. Ans. (4)

Amylose	Amylopectin
(1) 10-20%	(1) 80-90%
(2) water soluble	(2) water insoluble
(3) Blue colour with Iodine	(3) No colour with Iodine

7. Ans. (1)

Starch is polymer of α -glucose

8. Ans. (2)

Carbohydrate	Source
Sucrose	Cane sugar
Lactose	Milk sugar
Glycogen	Animal starch
Starch	Cereal root, tuber

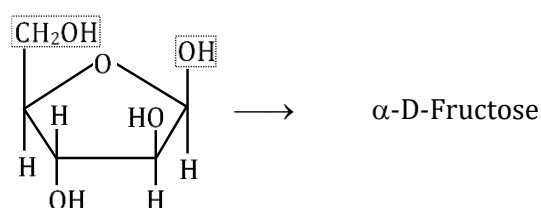
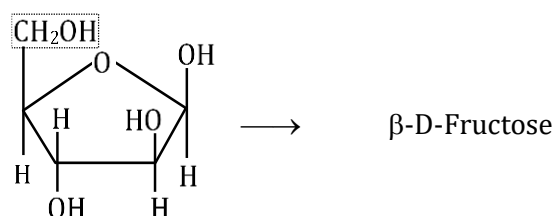
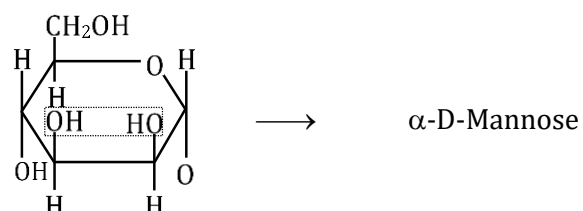
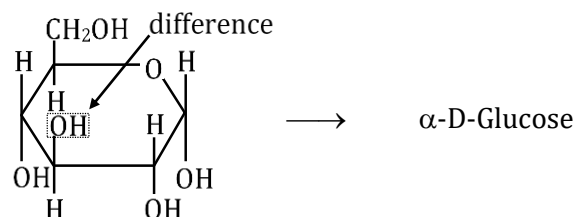
9. Ans. (2)

Carbohydrate	Monosaccharide unit
Maltose $\longrightarrow$	Two α -D-Glucose
Lactose $\longrightarrow$	β -D-Galactose & β -D-Glucose
Cellulose $\longrightarrow$	β -D-Glucose
Sucrose $\longrightarrow$	α -D-Glucose & β -D-Fructose

10. Ans. (2)

Structure

Name

**11. Ans. (3)**

Lactose have free aldehyde group

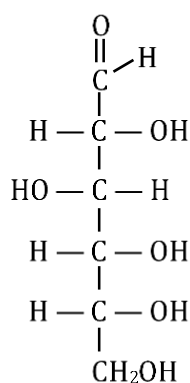
So, reducing in nature

Cellulose, sucrose & starch doesn't have free aldehyde & ketone

So, Non reducing in Nature.

12. Ans. (4)

Baeyer proposed the open chain structure of glucose



D-glucose

The open chain structure of glucose doesn't give reaction with sodium hydrogen sulphite & ammonia which absence of free $-\text{CHO}$ group.

13. Ans. (4)

All are true for protein

14. Ans. (3)

Essential amino acid are those amino acid which are not produced by body & have to consumed externally.

Ex. Leucine & valine

15. Ans. (1)

Isoelectric point of amino acids at which amino acid has no net charge & it exist as neutral ion at certain pH.

16. Ans. (2)

Native protein

17. Ans. (2)

When protein is denatured, the different structure such as secondary & tertiary are denatured because they doesn't contain strong bonds. But primary structure of protein is not denatured because it consist of peptide bond which are strong in nature.

Casein protein present in the milk reacts with the lactic acid present in the curd which breaks the chemical bond of the milk & form new bond & breaking of chemical bond is denaturation.

18. Ans. (3)

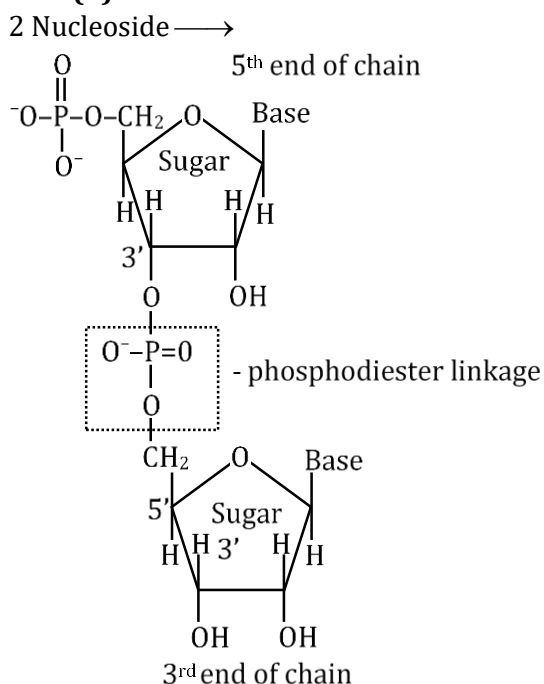
DNA contains the major source of genetic information that is copied to another DNA molecule.

**19. Ans. (4)**

Nucleotides $\Rightarrow$ N_2 Base + Phosphate group + pentose sugar

RNA $\rightarrow$ A, G, U, CDNA $\rightarrow$ A, G, T, C

20. **Ans. (1)**



21. **Ans. (3)**

Nucleoside $\rightarrow$ Sugar + Base
 Sugar is attach with Base with N-glycosidic linkage.

22. **Ans. (1)**



23. **Ans. (2)**



24. **Ans. (2)**

Option (1) Ribozyme non protein enzyme.
 Ans is (2) option as the prosthetic that it attach to enzyme at the time of reaction is known as coenzyme.
 Cofactor is combination of Coenzyme & Prosthetic group.

25. **Ans. (1)**

(Vitamins)	(Sources)
(a) Vitamin-A	$\longrightarrow$ (s) Fish liver oil
(b) Vitamin-B ₁₂	$\longrightarrow$ (r) Meat
(c) Vitamin-B ₆	$\longrightarrow$ (q) Yeast, milk
(d) Vitamin-D	$\longrightarrow$ (p) Exposure to sunlight

26. **Ans. (3)**

(Vitamins)	(Disease)
(a) Vitamin-B ₁	$\longrightarrow$ (r) Beri-Beri
(b) Vitamin-B ₆	$\longrightarrow$ (s) Convulsions
(c) Vitamin-C	$\longrightarrow$ (p) Scurvy
(d) Vitamin-K	$\longrightarrow$ (q) Blood clotting delay

27. **Ans. (2)**

(a) Fat soluble vitamin	$\longrightarrow$ (q) Vitamin A and vitamin D
(b) Water soluble Vitamin	$\longrightarrow$ (s) Vitamin B and vitamin C
(c) DNA	$\longrightarrow$ (p) Fingerprinting
(d) RNA	$\longrightarrow$ (r) Uracil

28. **Ans. (1)**

(a) Heredity	$\rightarrow$ (q) Transmission of inherent characters
(b) Chromosomes	$\rightarrow$ (p) Proteins made up by
(c) Nucleic Acid	$\rightarrow$ (s) Long chain polymers of Nucleotides
(d) Vitamin-E	$\rightarrow$ (r) Increased fragility of RBC