

## Classical Thinking

## 6.0 Introduction

- Chemically all living organisms have three basic types of macromolecules, which are polymers of simple subunits called \_\_\_\_\_.  
(A) monosaccharide (B) dipeptide  
(C) monomers (D) nucleotides
- Sugar, amino acids and nucleotides unite to their respective subunits to form \_\_\_\_\_.  
(A) bio-elements (B) micromolecules  
(C) macromolecules (D) all of these

## 6.1 Biomolecules in the Cell

## Carbohydrates

- Carbohydrates are composed of  
(A) carbon (B) hydrogen  
(C) oxygen (D) all of these
- In which of the following, the ratio of hydrogen and oxygen atoms is 2 : 1?  
(A) Proteins (B) Fats  
(C) Oil (D) Carbohydrates
- Which of the following do not give smaller sugar units on hydrolysis?  
(A) Monosaccharides (B) Disaccharides  
(C) Polysaccharides (D) Glycogen
- Carbohydrates are biomolecules made from just three elements: carbon, hydrogen and oxygen with the general formula \_\_\_\_\_.  
(A)  $C_x(HO)_y$  (B)  $C_x(H_2O)_y$   
(C)  $C_x(H_2)_y$  (D)  $C_x(O_2)_y$
- Match the following and select the correct option.

Column I (Sugars)		Column II (No. of Carbons)	
i.	Erythrose	a.	Five
ii.	Glucose	b.	Four
iii.	Ribose	c.	Seven
iv.	Sedoheptulose	d.	Six

- i - a, ii - c, iii - d, iv - b  
i - a, ii - b, iii - c, iv - d  
i - b, ii - c, iii - d, iv - a  
i - b, ii - d, iii - a, iv - c
- Disaccharide is formed when two monosaccharides react by condensation reaction releasing a \_\_\_\_\_ molecule.  
(A)  $CO_2$  (B) water  
(C) hydrogen (D) CO

- Which of the following bond holds the two monosaccharide units together?  
(A) Sulphide bond  
(B) Glycosidic bond  
(C) Peptide bond  
(D) Disulphide bond
- Identify the INCORRECT pair from the following.  
(A) Sucrose (cane sugar): On hydrolysis, it produces Glucose and Fructose  
(B) Lactose (milk sugar): On hydrolysis, it produces Glucose and Galactose  
(C) Maltose (malt sugar): On hydrolysis, it produces two units of Glucose  
(D) Fructose (Fruit sugar): On hydrolysis, it produces Glucose and Lactose
- Which of the following is a stored food in the plants?  
(A) Glucose (B) Starch  
(C) Cellulose (D) Glycogen
- Starch and cellulose are the compounds made up of many units of  
(A) Simple sugar (B) Fatty acid  
(C) Glycerol (D) Amino acid
- Identify the two types of glucose polymers present in starch.  
(A) Amylose and glycogen  
(B) Amylose and amylopectin  
(C) Amylopectin and glycogen  
(D) Cellulose and amylopectin
- Which of the following correctly describes the two types of polysaccharides?  
(A) **Homopolysaccharides:** It contains same type of amino acids.  
**Heteropolysaccharides:** It contains two or more different monosaccharides.  
(B) **Homopolysaccharides:** It contains same type of monosaccharides.  
**Heteropolysaccharides:** It contains two or more different monosaccharides.  
(C) **Homopolysaccharides:** It contains same type of monosaccharides.  
**Heteropolysaccharides:** It contains two or more different nucleotides.  
(D) **Homopolysaccharides:** It contains same type of nucleotides.  
**Heteropolysaccharides:** It contains two or more different amino acids.
- \_\_\_\_\_ serves to form the cell walls in plant cells.  
(A) Cellulose (B) Starch  
(C) Glycogen (D) Amylopectin



16. Match the columns and select the correct option.

	Column I		Column II
i.	Starch	a.	Animal storage molecule
ii.	Cellulose	b.	Plant storage molecule
iii.	Glycogen	c.	Heparin
iv.	Heteropoly-saccharide	d.	Plant cell wall component

- (A) i - a, ii - c, iii - d, iv - b  
 (B) i - a, ii - b, iii - c, iv - d  
 (C) i - b, ii - c, iii - d, iv - a  
 (D) i - b, ii - d, iii - a, iv - c

17. The exoskeleton of insects is made up of chitin which is a \_\_\_\_\_.

- (A) mucoprotein (B) lipid  
 (C) lipoprotein (D) polysaccharide

### Lipids

18. In lipids, \_\_\_\_\_ ratio is greater than 2:1

- (A) carbon to oxygen  
 (B) hydrogen to oxygen  
 (C) oxygen to nitrogen  
 (D) sulphur to oxygen

19. \_\_\_\_\_ are water insoluble and small molecular weight compounds as compared to macromolecules.

- (A) Lipids (B) Proteins  
 (C) Carbohydrates (D) Nucleic acids

20. Fats are esters of fatty acids with \_\_\_\_\_

- (A) glycerol ( $\text{CH}_2\text{OH}-\text{CHOH}-\text{CH}_2\text{OH}$ )  
 (B) glycerol ( $\text{CH}_3\text{OH}-\text{CHOH}-\text{CH}_2\text{OH}$ )  
 (C) glycerol ( $\text{CH}_2\text{OH}-\text{CHOH}-\text{COOH}$ )  
 (D) glycerol ( $\text{CH}_2\text{OH}-\text{COH}-\text{CH}_2\text{OH}$ )

21. Unsaturated fats are liquid at room temperature and are called \_\_\_\_\_

- (A) oils (B) glycolipids  
 (C) phospholipids (D) waxes

22. Phospholipids have \_\_\_\_\_.

- (A) only hydrophilic polar groups  
 (B) only hydrophobic non-polar groups  
 (C) both hydrophilic polar groups and hydrophobic non-polar groups  
 (D) phytosterols

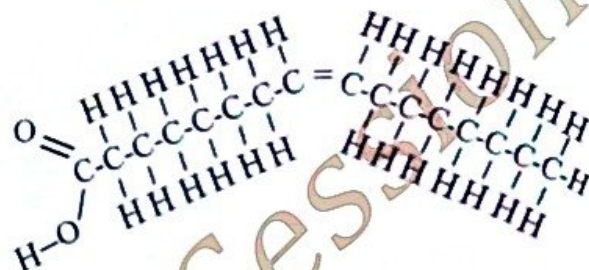
23. Match the columns and select the correct option.

	Column I		Column II
i.	Simple lipids	a.	Cholesterol
ii.	Compound lipids	b.	Vanaspati ghee
iii.	Sterols	c.	Glycerol
		d.	Lecithin

- (A) i - a, ii - c, iii - d  
 (B) i - a, ii - b, iii - c  
 (C) i - b, ii - c, iii - d  
 (D) i - b, ii - d, iii - a

24. Fatty acids which do not contain double bond between carbon atoms are  
 (A) saturated fatty acids  
 (B) unsaturated fatty acids  
 (C) esters of glycerol  
 (D) polymers of triglycerides

25. Which type of fatty acid is represented in the following structure?



- (A) Saturated fatty acid  
 (B) Amphipathic fatty acid  
 (C) Unsaturated fatty acid  
 (D) Glycerol

26. Large amounts of \_\_\_\_\_ have been found in the brain white matter and myelin sheath.

- (A) adrenocorticoids (B) cerebrosides  
 (C) oleic acids (D) mucoproteins

27. Which of the following are the examples of unsaturated fatty acids?

- (A) Oleic acid (B) Linoleic acid  
 (C) Glycerol (D) Both (A) and (B)

28. Yam Plant (*Dioscorea*) produces a steroid compound called \_\_\_\_\_.

- (A) diosgenin (B) adrenocorticoid  
 (C) progesterone (D) estrogen

### Proteins

29. The term 'Protein' was coined by

- (A) Schleiden (B) M. Wilkins  
 (C) Berzelius (D) Luca Ghini

30. Proteins

- (A) are micromolecules  
 (B) are macromolecules  
 (C) have low molecular weight  
 (D) are found in small quantity in the cell

31. Proteins consist of

- (A) carbon, hydrogen, chlorine, sulphur  
 (B) carbon, hydrogen, oxygen, nitrogen  
 (C) carbon, manganese, phosphorus, nitrogen  
 (D) carbon, iodine, oxygen and inorganic phosphate

32. In proteins, amino acids are linked together by \_\_\_\_\_ bonds which join the carboxyl group of one amino acid residue to the amino group of another residue.

- (A) glycosidic (B) peptide  
 (C) ester (D) phosphodiester



33. Which of the following are the two types of secondary structure of proteins?  
 (A)  $\delta$ -helix and  $\beta$ -pleated sheets  
 (B)  $\alpha$ -helix and  $\beta$ -pleated sheets  
 (C)  $\beta$ -helix and  $\alpha$ -pleated sheets  
 (D)  $\beta$ -helix and  $\delta$ -pleated sheets
34. Complete the analogy and select the correct option.  
 $\alpha$ -helix structure : Keratin ::  $\beta$ -pleated sheet :  
 (A) Phospholipids (B) Silk fibres  
 (C) Palmitic acid (D) Lecithin
35. Proteins are \_\_\_\_\_ in nature.  
 (A) hydrophilic (B) hydrophobic  
 (C) amphoteric (D) polar
36. A protein consisting of more basic amino acids such as \_\_\_\_\_, exists as a cation at the physiological pH of 7.4. Such proteins are called basic proteins.  
 (A) lysine and aspartic acid  
 (B) methionine and arginine  
 (C) lysine and arginine  
 (D) proline and cysteine
37. Histones of \_\_\_\_\_ are basic proteins.  
 (A) chromoproteins (B) nucleoproteins  
 (C) phytoproteins (D) mucoproteins
38. Histones are involved in packaging of DNA into structural units called \_\_\_\_\_.  
 (A) nucleotides (B) nucleosides  
 (C) nucleosomes (D) chromatin
39. Conjugated proteins consist of a simple protein united with some non-protein substance. The non-protein group is called \_\_\_\_\_.  
 (A) mucoprotein (B) lipoprotein  
 (C) prosthetic group (D) globin
40. Identify the examples of derived proteins.  
 (A) Metaproteins, haemoglobin  
 (B) Haemoglobin, peptones  
 (C) Metaproteins, peptones  
 (D) Mucoproteins, peptones

### Nucleic Acids

41. In 1924, Feulgen showed that \_\_\_\_\_ contain DNA.  
 (A) nucleosomes (B) chromosomes  
 (C) chromophores (D) histones
42. A nucleotide contains  
 (A) sugar + phosphate  
 (B) N-base + phosphate  
 (C) sugar + nitrogenous base  
 (D) sugar + N-base + phosphate
43. Which one of the following pairs of nitrogenous bases of nucleic acids, is wrongly matched with the category mentioned against it?  
 (A) Guanine, Adenine – Purines  
 (B) Adenine, Thymine – Purines  
 (C) Thymine, Uracil – Pyrimidines  
 (D) Uracil, Cytosine – Pyrimidines
44. The base pairs of DNA are correctly shown as  
 (A) A  $\equiv$  T and C = G  
 (B) A = T and C = G  
 (C) A = T and C  $\equiv$  G  
 (D) A  $\equiv$  T and C  $\equiv$  G
45. Complementary strands of DNA molecule are (i) and bound by (ii).  
 (A) i – parallel, ii – peptide bond  
 (B) i – antiparallel, ii – hydrogen bond  
 (C) i – linear, ii – glycosidic bond  
 (D) i – cyclic, ii – peptide bond
46. The amount of purines is equal to the amount of pyrimidines was suggested by  
 (A) Robert Brown (B) Miescher  
 (C) Chargaff (D) Khorana
47. In an experiment, DNA was found to have 31% adenine and 19% guanine. The percentage of cytosine shall be  
 (A) 38% (B) 31%  
 (C) 19% (D) 62%
48. Nitrogen bases are attached by  
 (A) peptide bonds  
 (B) phosphodiester bonds  
 (C) hydrogen bonds  
 (D) glycosidic bonds
49. In a DNA strand, the nucleotides are linked together by  
 (A) glycosidic bonds  
 (B) phosphodiester bonds  
 (C) peptide bonds  
 (D) hydrogen bonds
50. The two strands of DNA complete a turn at a vertical distance of  
 (A) 20 Å (B) 10 Å  
 (C) 34 Å (D) 3.4 Å
51. Distance between two successive base pairs of a DNA molecule is  
 (A) 6.8 Å or 0.034 nm  
 (B) 4.3 Å or 3.4 nm  
 (C) 3.4 Å or 0.34 nm  
 (D) 4.4 Å or 44 nm



15. Which of the following is a derived lipid with four interlocking rings?  
 (A) Cholesterol (B) Estrogen  
 (C) Testosterone (D) All of these

16. Match the items in Column I with items in Column II and choose the correct answer.

Column I		Column II	
i.	Triglyceride	a.	Animal hormones
ii.	Membrane lipid	b.	Feathers and leaves
iii.	Steroid	c.	Phospholipids
iv.	Wax	d.	3 FA + 1 Glycerol

- (A) i - d, ii - c, iii - a, iv - b  
 (B) i - b, ii - c, iii - d, iv - a  
 (C) i - c, ii - d, iii - a, iv - b  
 (D) i - d, ii - a, iii - b, iv - c

### Proteins

17. Study the following statements and select the correct option.  
 i. In quaternary structure, the peptide chains are much looped, twisted and folded back on themselves due to formation of hydrogen bonds.  
 ii. When a protein has more than two polypeptide subunits their arrangement in space is called secondary structure.  
 (A) Statement (i) is correct.  
 (B) Statement (ii) is correct.  
 (C) Both the statements (i) and (ii) are correct.  
 (D) Both the statements (i) and (ii) are incorrect.
18. Which of the following correctly describes the amphoteric nature of proteins?  
 (A) Proteins can act as only acids.  
 (B) Proteins can act as only bases.  
 (C) Proteins can act as both acids and bases.  
 (D) Proteins only show presence of non-polar amino acids.

19. Read the following statements with respect to albumin and histones and select the correct option.

- i. Histones are insoluble in water but they get coagulated on heating.  
 ii. Albumins are insoluble in water.  
 (A) Statement (i) is correct.  
 (B) Statement (ii) is correct.  
 (C) Both the statements (i) and (ii) are correct.  
 (D) Both the statements (i) and (ii) are incorrect.

20. Identify 'X' and 'Y' in the following table.

Proteins	Role
	X
Immunoglobulin	Blood clotting
Y	

- (A) X: Transport of Oxygen  
 Y: Haemoglobin  
 (B) X: Resistance against diseases  
 Y: Fibrinogen  
 (C) X: Muscle contraction  
 Y: Fibrinogen  
 (D) X: Structural stability of cell  
 Y: Fibrinogen

### Nucleic Acids

21. DNA consists of two complementary nucleotide chains. If the sequence of nucleotide in one of the chains is 5'AGCTTCGA3', then the nucleotide sequence in the other chain shall be  
 (A) 5'TAGCATAT3' (B) 5'GATCCTAG3'  
 (C) 3'TCGAAGCT5' (D) 3'GCTAAGCT5'
22. Chargaff's rules are applied to  
 (A) ssRNA (B) ssDNA  
 (C) dsDNA (D) mRNA
23. A DNA molecule measuring 680 Å contains \_\_\_\_\_ nucleotides.  
 (A) 1360 (B) 510  
 (C) 340 (D) 400
24. DNA differs from RNA in \_\_\_\_\_.  
 (A) absence of - OH group at the 2'- position  
 (B) presence of - OH group at the 2'- position  
 (C) absence of phosphate group at the 2'- position  
 (D) presence of phosphate group at 2'- position.
25. Read the following statements and select the correct option.  
 i. m-RNA carries genetic information from DNA to ribosomes, which are the sites of protein synthesis.  
 ii. r-RNA provides proper binding site for m-RNA during protein synthesis.  
 iii. t-RNA helps in elongation of polypeptide chain during the process called translation.  
 (A) Statements i and ii are correct.  
 (B) Statements ii and iii are correct.  
 (C) Statements i and iii are correct.  
 (D) Statements i, ii and iii are correct.