

Unit 4: Biomolecules

Multiple Choice Questions

MULTIPLE CHOICE QUESTIONS (EXERCISE)

1. Which characteristics of water molecules is responsible for most of the unique properties of water?

- (a) Small in size
- (b) Held together by covalent bonds
- (c) Can easily separate from one another
- (d) Stick together

2. To which group of lipids, the human sex hormones belong?

- (a) Steroid
- (b) Waxes
- (c) Prostaglandins
- (d) Phospholipids

3. Which of the following is NOT a protein?

- (a) Haemoglobin
- (b) Cholesterol
- (c) Pepsin
- (d) Antibody

4. Which one is the largest carbohydrate?

- (a) Cellulose
- (b) Ribose
- (c) Glyceraldehyde
- (d) Glucose

5. What compound would be manufactured difficult when soil has a shortage of phosphorous?

- (a) DNA
- (b) Fatty acids
- (c) Proteins
- (d) Cellulose

6. A compound whose chemical composition is most closely related to maltose is:
(a) Starch (b) Protein
(c) ATP (d) RNA
7. Which group is found in all fatty acids?
(a) PO_4 (b) SO_4
(c) C-N (d) COOH
8. Haemoglobin has:
(a) Primary structure
(b) Secondary structure
(c) Tertiary structure
(d) Quaternary structure
9. Which process produces peptide bonds?
(a) Digestion
(b) Dehydration synthesis
(c) Hydrolysis
(d) Enzyme deactivation

SLO BASED MULTIPLE CHOICE QUESTIONS

Biological Molecules

10. Basic knowledge of biochemistry helps to understand anatomy and
(a) Morphology (b) Parasitology
(c) Physiology (d) Pathology
11. The type of metabolic reactions in which simpler substances are combined to form complex substance are called:
(a) Anabolic reactions
(b) Catabolic reactions
(c) Redox reactions
(d) Hydrolytic reactions
12. The percentage of water which makes the living mass of living organism is at least:
(a) 60% (b) 70%
(c) 80% (d) 90%
13. Proteins, nucleic acids and lipids make of the dry mass of living organisms:
(a) 93% (b) 7%
(c) 78% (d) 50%
14. Molecule consisting of many identical molecular units is called:
(a) Monomer (b) Isomer
(c) Enantiomer (d) Polymer

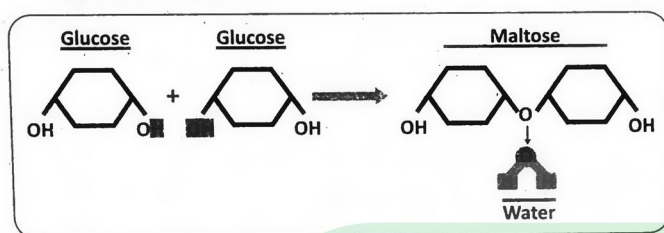
Types of bonds in biology

15. Which bond have stored energy and known as potential source of energy?
(a) C-N bond (b) C-O bond
(c) C-H bond (d) C-C bond
16. Atom A shares its electron with Atom B which type of chemical bond is most likely to be formed between them?
(a) Covalent
(b) Ionic
(c) Hydrogen
(d) Hydrophobic interaction
17. Sodium atom loses its electron and becomes cation, while chlorine accepts that electron and becomes anion, an electrostatic attraction is created between them, which is also called as:
(a) Covalent bond
(b) Ionic bond
(c) Dipole-dipole interaction
(d) Hydrogen bond
18. The bond which helps in maintaining the structure of large molecules like proteins, nucleic acids, as well as DNA replication is:
(a) Hydrophobic interaction
(b) Hydrophilic interaction
(c) Ionic bond
(d) Hydrogen bond

19. Non-polar molecules tend to cluster together in aqueous environments to minimize contact with water molecules. This phenomenon is termed as:

- (a) Hydrophobic interaction
- (b) Hydrogen bonding
- (c) Hydrophilic interaction
- (d) Condensation

20. Which type of reaction is being shown below:



- (a) Dehydration synthesis
- (b) Condensation
- (c) Hydrolysis
- (d) Both (a) and (b)

21. Breakdown of maltose into two glucose monomers by the addition of water molecules is an example of:

- (a) Hydrolysis
- (b) Condensation
- (c) Dehydration synthesis
- (d) Redox reaction

Importance of Water

22. The concentration of water in different organisms, varies from:

- (a) 40 – 80%
- (b) 65 to 89%
- (c) 80 – 90%
- (d) 50 – 60%

23. Which one of the following is not a hydrophilic molecule?

- (a) Salts
- (b) Sugars
- (c) Amino acids
- (d) Lipids

★24. If there were no hydrogen bonding in water, then the water would boil at and freeze at

- (a) 60°C, 90°C
- (b) -80°C, -100°C
- (c) 80°C, 100°C
- (d) -100°C, 0°C

25. When oil is dropped into water, oil is excluded from water forming strong associations among themselves, this phenomenon is called:

- (a) Hydrophobic exclusion
- (b) Hydrophobic interaction
- (c) Hydrogen bonding
- (d) Hydrophilic interaction

26. Water's high heat capacity benefits living tissues by:

- (a) Providing protection against sudden thermal changes
- (b) Preventing ionization
- (c) Making emollient sensation
- (d) Providing cooling effect

27. The specific heat of vaporization of water is:

- (a) 570 Kcal/kg
- (b) 374 cal/moles
- (c) 574 kcal/kg
- (d) 717.6 kcal/gram

★28. Evaporation of 2ml of water out of 1 litre lowers the temperature of remaining 998ml water by:

- (a) 1°C
- (b) 2°C
- (c) 3°C
- (d) 4°C

29. Surface tension allows water striders to walk on water due to:

- (a) High specific heat capacity
- (b) Polarity of water molecules
- (c) Cohesive forces between water molecules
- (d) All of the above

30. At room temperature (25°C), in a litre of water, out of 550 million water molecules, only gets ionized:

- (a) 100 molecules
- (b) 10,000 molecules
- (c) 550 million molecules
- (d) only 1 molecule

31. Water exhibits its maximum density at:

- (a) 100°C
- (b) 0°C
- (c) 4°C
- (d) -100°C

32. Ice floating protects aquatic ecosystems by:

- (a) Forming an insulating layer that traps heat
- (b) Making compartments in sea
- (c) Reflecting sunlight
- (d) Evaporation prevention

Carbohydrates

33. During photosynthesis, when reduction of CO_2 occurs, the resulting sugar molecule contains carbon, hydrogen and oxygen in molar ratio:

- (a) 1:4:1
- (b) 1:2:1
- (c) 3:6:8
- (d) 2:1:2

34. Which one of the following is NOT a hexose?

- (a) Glucose
- (b) Fructose
- (c) Galactose
- (d) Erythrose

35. The primary energy-storage molecule is glucose, and the number of CH-bonds in it are:

- (a) 5
- (b) 6
- (c) 7
- (d) 3

36. Glucose and galactose have a difference in the orientation of one OH (hydroxyl) group at:

- (a) C3
- (b) C4
- (c) C5
- (d) C6

37. Which of the following hexoses show stereoisomerism?

- (a) Glucose and galactose
- (b) Fructose and galactose
- (c) Glucose and fructose
- (d) All of the above

38. The sugar which acts as a precursor in photosynthesis is:

- (a) Glucose
- (b) Ribose
- (c) Ribulose
- (d) Erythrose

39. In case of glucose, oxygen-bridge develops between:

- (a) C_1 and C_2
- (b) C_2 and C_5
- (c) C_2 and C_4
- (d) C_1 and C_5

40. Glucose molecule having OH group on upper/above side is termed as:

- (a) Alpha D-glucose
- (b) Beta D-glucose
- (c) Charli D-glucose
- (d) Gamma D-glucose

41. The Fischer projection was devised by German chemist Emil Fischer in:

- (a) 1994
- (b) 1831
- (c) 1891
- (d) 1952

42. Which is NOT related to maltose?

- (a) 1,4 – glycosidic linkage
- (b) Formed by 2 glucose monomers
- (c) Formed as an intermediate product during digestion of starch
- (d) Beta-D-glucose

43. The disaccharide found only in mammalian milk, which is main source of energy for infant of mammals is:

- (a) Maltose
- (b) Cane sugar
- (c) Agar
- (d) Lactose

44. Which of the following is the most familiar disaccharide?

- (a) Maltose
- (b) Sucrose
- (c) Lactose
- (d) Both (a) and (c)

45. Lactose intolerance arises from deficiency of an enzyme that breaks:

- (a) α (1-2) bonds in sucrose
- (b) α (1-4) bonds in starch
- (c) β (1-4) bonds in lactose
- (d) α (1-6) bonds in amylopectin

46. Compared to amylose, amylopectin is digested at faster rate because:

- (a) it lacks hydrogen bonds
- (b) it contains nitrogen containing group
- (c) branch structure provides more attack points
- (d) both (a) and (b)

47. High-fructose corn syrup has replaced as a sweetener:

- (a) Glucose
- (b) Sucrose
- (c) Maltose
- (d) Lactose

48. Glucose is as sweet as sucrose:

- (a) Half (b) 2 times
(c) 4 times (d) 10 times

49. Chitin differs from cellulose in having:

- (a) α (1-4) linkages
(b) Nitrogen – containing groups
(c) Branched glucose chain
(d) Ether linkage

50. Cellulose is not digested by humans because:

- (a) It lacks glycosidic bonds
(b) It contains nitrogen containing group
(c) It is very hard to eat
(d) Human amylase cannot hydrolyze β (1-4) linkages

51. Starch coils into helices, while cellulose forms straight chains, due to differences in:

- (a) Glycosidic bond orientation (α vs β)
(b) Hydrogen bond number
(c) Isomerization
(d) Presence of n-containing groups

52. Modified form of cellulose is called:

- (a) Agar (b) Pectin
(c) Dextrin (d) Chitin

53. Which one of the following polysaccharide is found in the cell walls of red algae?

- (a) Murein (b) Chitin
(c) Agar (d) Cellulose

54. The straight chains of cellulose are linked together by to form cellulose microfibrils:

- (a) Covalent bond
(b) Hydrogen bond
(c) Ionic bond
(d) Peptide bond

Proteins

55. The term "Protein" was coined by:

- (a) J. Berzelius (b) F. Sanger
(c) Meselson (d) Watson and crick

56. The most abundant organic biomolecules in cells are:

- (a) Nucleic acids (b) Carbohydrates
(c) Lipids (d) Proteins

57. The total number of different types of amino acids that have been reported to occur in living organisms is:

- (a) 25 (b) 20
(c) 170 (d) 300

58. Which group of amino acid is responsible for its identity and unique chemical properties:

- (a) NH_2 group (b) COOH group
(c) R-group (d) All of above

59. Which one of the following amino acid is not synthesized by our bodies?

- (a) Alanine (b) Proline
(c) Glutamine (d) Histidine

★60. Disaccharides and dipeptides are formed as a result of:

- (a) Dehydration synthesis (b) Hydrolysis
(c) Oxidation reduction (d) Catabolism

61. Number of peptide bonds in tetrapeptide are/is:

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

62. If hemoglobin's quaternary structure was disrupted what would be the immediate consequence?

- (a) Oxygen transportation efficiency would decrease
(b) Hemoglobin would more efficiently transport gases
(c) Size of RBCs would increase
(d) Both (b) and (c)

63. In the primary structure of insulin alpha chain has 21 amino acids while beta chain has 30 amino acids, both these chains are joined by:

- (a) Hydrogen bond
(b) Disulphide bond
(c) Ionic bond
(d) Covalent bond

64. Sickle cell hemoglobin valine takes the place of:
 (a) Glutamic acid (b) Glutamine
 (c) Aspartic acid (d) Phenylalanine
65. The proteins get coiled or folded within polypeptide chain at:
 (a) Primary level (b) Secondary level
 (c) Tertiary level (d) Quaternary level
66. The bond which maintains secondary structure of a protein is:
 (a) Hydrophobic interaction
 (b) Ionic bond
 (c) Hydrophilic interaction
 (d) Hydrogen bond
67. The globular structure of a protein is maintained by bonds:
 (a) Ionic, hydrogen, disulphide
 (b) Hydrogen, covalent, peptide
 (c) Hydrophobic interactions, hydrogen bond, hydrophilic interactions
 (d) Only hydrogen bond
68. Aggregation of tertiary structures makes structure of protein:
 (a) Primary (b) Secondary
 (c) Tertiary (d) Quaternary
69. Which one of the following proteins can be crystallized?
 (a) Fibrin (b) Keratin
 (c) Collagen (d) Antibody
70. A researcher discovers a protein that changes shape when pH drops below 6.5. This protein is most likely:
 (a) Fibrous protein
 (b) Globular protein
 (c) Collagen
 (d) Actin and myosin
71. A patient with a clotting disorder likely has a deficiency in:
 (a) Fibrinogen (b) Hemoglobin
 (c) Insulin (d) Albumin
72. The class of proteins that catalyse the metabolism of cells is:
 (a) Channel proteins (b) Enzymes
 (c) Cytochromes (d) Repressors
73. A geneticist working in his lab wants to selectively allow some genes to work, he uses proteins to regulate particular gene action:
 (a) Ferritin (b) Na-K pump
 (c) Repressors (d) Activators
74. Blood ferritin levels are measured in patients as a diagnostic tool of most likely:
 (a) Anemia (b) Thalassemia
 (c) Arthritis (d) Polycythemia
75. Casein is an example of protein that:
 (a) Transports electrons
 (b) Stores Ca^{++} and K^{+}
 (c) Provides energy
 (d) Helps in transport of O_2
76. Actin and myosin are critical for:
 (a) Muscle contraction
 (b) Oxygen transport
 (c) Immune response
 (d) DNA replication
77. Fibrous proteins are characterized by:
 (a) Spherical shape and solubility in water
 (b) Tertiary structure and enzymatic actions
 (c) Globular form and hormone production
 (d) Fibrillar shape and structural roles
78. What is the primary role of antibodies?
 (a) Transport of CO_2
 (b) Catalyze metabolic reactions
 (c) Store iron
 (d) Neutralize antigen
- Lipids**
79. Lipids are insoluble in water due to their:
 (a) Non-polar nature
 (b) High-energy
 (c) Ionic bonds
 (d) Presence of polysaccharides
80. A student of science working in lab mixes ethanol in an acetic acid, most-like the compound formed will be:
 (a) Polypeptide (b) Diethyl ether
 (c) Ester (d) Terpene

81. Triacylglycerol's are composed of:

- (a) Glycerol + 3 fatty acids
- (b) Glucose + 2 fatty acids
- (c) Wax + alcohol
- (d) 3 glycerols + 1 fatty acids

82. When organisms have to store glucose for longer periods, they usually convert it into:

- (a) Dipeptides
- (b) Fats and oils
- (c) Disaccharides
- (d) Polysaccharides

83. The honey bees use to make hexagonal chambers of their combs, by producing:

- (a) Acylglycerol
- (b) Waxes
- (c) Phospholipids
- (d) Terpenoids

84. Which one of the following is not a part of waxes?

- (a) Long chain alkanes
- (b) Glycerol
- (c) Ketones
- (d) Long chain fatty acids

85. The "fluid mosaic model" of cell membranes is primarily composed of:

- (a) Phospholipids
- (b) Sphingolipids
- (c) Glycolipids
- (d) Both (a) and (c)

86. The tail of phospholipids faces inwards in a cell membrane because it is:

- (a) Hydrophobic
- (b) Hydrophilic
- (c) Contains glycerol
- (d) Have positive charge

87. Formula of isoprene unit is:

- (a) $CH_2 - C(CH_2) - CH = CH_2$
- (b) $CH \equiv C(NH_2) - CH_2 - CH_2$
- (c) $CH_2 = C(CH_3) - CH = CH_2$
- (d) $CH_3 - CH_2 - CH_2 - COOH$

88. The type of lipid found in our retinal pigments in eyes is:

- (a) Phospholipid
- (b) Terpenoid
- (c) Waxes
- (d) All of above

89. Testosterone is made up of:

- (a) 3 – six cornered rings + 1-five cornered ring
- (b) 1 – six cornered ring + 3 – five cornered ring
- (c) Only 3 – six cornered rings
- (d) 3 – six cornered rings + 1 four cornered square

90. Anabolic steroids were originally developed for the treatment of:

- (a) Diabetes mellitus
- (b) Infectious diseases
- (c) General anemia
- (d) Migraine

91. The common steroid, that is a part of animal cell membranes is:

- (a) Testosterone
- (b) Cholesterol
- (c) Prostaglandin
- (d) Androgens

92. Identify a compound which is lipid but have modified fats, with non-polar tails attached to a 5 – carbon ring:

- (a) Cholesterol
- (b) Phospholipid
- (c) Acylglycerol
- (d) Prostaglandin

93. Which statement about prostaglandins is FALSE?

- (a) They control blood vessels diameter
- (b) Involved in inflammatory response
- (c) Derivate of fatty acids
- (d) Stored in large quantities

94. The reason behind Aspirin's ability to reduce inflammation, pain and fever is that it is a:

- (a) Prostaglandin inhibitor
- (b) Prostaglandin activator
- (c) Prostaglandin co-factor
- (d) Both (b) and (c)

95. Which one of the following is NOT the function of cholesterol?

- (a) Lipid transport
- (b) Precursor of corticosteroids
- (c) Precursor of vit-A
- (d) Precursor of bile acids

96. Lipids transport which of the following vitamins?

- (a) Vitamin B₁₂ (b) Vitamin C
(c) Vitamin A (d) Vitamin B₆

Nucleic Acids

97. Which pentose sugar is present in RNA but not in DNA?

- (a) Ribose (b) Deoxyribose
(c) Ribulose (d) Glucose

98. Thymine is exclusively found in:

- (a) RNA
(b) DNA
(c) DNA and RNA both
(d) AMP

99. A nucleoside consists of:

- (a) Nitrogenous base + phosphate
(b) Nitrogenous base + pentose sugar
(c) Pentose sugar + phosphate
(d) Nitrogenous base + pentose sugar + phosphate

100. The back bone of nucleic acids is formed by:

- (a) Nitrogenous base
(b) Sugar + phosphates
(c) Fatty acids
(d) Proteins

101. Phosphodiester bonds in DNA are formed between:

- (a) C5 of one nucleotide and C3 of another
(b) Nitrogenous bases
(c) C1- of sugar and phosphate
(d) Purines and pyrimidines

102. Which of the following is a purine base?

- (a) Uracil (b) Cytosine
(c) Thymine (d) Adenine

103. ATP is structurally a:

- (a) Disaccharide (b) Nucleotide
(c) Dipeptide (d) Steroid

104. In a polynucleotide chain, the free ends are:

- (a) $5' PO_4^- + 5' OH$
(b) $5' PO_4^- + 3' OH$
(c) $3' PO_4^- + 5' OH$
(d) Both (a) and (b)

105. According to Watson and Crick model, "the poles" of DNA double helix are composed of:

- (a) Nitrogenous bases
(b) Hydrogen bonds
(c) Sugar + PO₄ groups
(d) Ribonucleotides

106. Number of hydrogen bonds between G and C in a DNA helix are:

- (a) 2 (b) 3 (c) 4 (d) 5

107. According to Chargaff's rule, DNA has:

- (a) $A + T = G + C$
(b) $A = G$ and $T = C$
(c) $A = T$ and $C = G$
(d) $A < T$ and $C < G$

108. The amount of DNA in mitochondria and chloroplast is:

- (a) 1% (b) 2%
(c) 23% (d) 6.1%

109. In the chromosomes of *E. coli*, each strand of DNA contains bases arranged in order.

- (a) 5 million, circular
(b) 3 million, linear
(c) 8 million, circular
(d) 5 million, linear

110. Which type of RNA carries the genetic message from DNA to ribosomes?

- (a) tRNA (b) rRNA
(c) mRNA (d) dRNA

111. Clover leaf structure is the characteristics of:

- (a) mRNA (b) tRNA
(c) rRNA (d) DNA

112. Ribosomal RNA comprises approximately what percentage of total cellular RNA?

- (a) 3-4% (b) 10-15%
(c) 80% (d) 50%

113. During translation; tRNA molecules are responsible for:

- (a) Transcribing DNA into RNA
(b) Transporting amino acids to the ribosomes
(c) Forming the structure of ribosomes
(d) Degradation of mRNA

114. Which RNA is synthesized in nucleolus?

- (a) mRNA (b) tRNA
(c) rRNA (d) All of above

Central Dogma

115. The central dogma of molecular biology describes the flow of genetic information are:

- (a) DNA → Protein → RNA
(b) DNA → RNA → Protein
(c) RNA → DNA → Protein
(d) Protein → RNA → DNA

116. Translation converts the information in:

- (a) DNA to RNA
(b) RNA to protein
(c) Protein to DNA
(d) RNA to DNA

117. If a gene on a DNA strand has the sequence 5' - ATGC - 3', the transcribed mRNA sequence will be:

- (a) 5' - TACG - 3'
(b) 5' - UACG - 3'
(c) 5' - ATGC - 3'
(d) 5' - AUCG - 3'

118. The program in DNA that directs cellular activities is stored in:

- (a) Phosphodiester bond
(b) Hydrogen bond
(c) Ribosomal proteins
(d) Genes

119. Who in 1950, concluded that DNA is a fibrous substance in the form of helix?

- (a) Erwin Chargaff
(b) Watson and Crick
(c) Rosalind
(d) Linus Pauling

Conjugated Molecules

120. Glycoproteins are formed by the linkage of:

- (a) Protein and lipid
(b) Protein and carbohydrate
(c) Two nucleic acids
(d) RNA and histone

121. The conjugated molecules that are integral structural components of membranes of the cells are:

- (a) Glycolipids (b) Glycoproteins
(c) Nucleoproteins (d) Both (a) and (b)

122. Which of the following are the basic structural framework of all types of plasma membranes?

- (a) Lipoproteins (b) Glycoproteins
(c) Glycolipids (d) Nucleo histones

123. Which class of biomolecules is formed by hydrophobic interactions:

- (a) Glycoproteins (b) Lipoproteins
(c) Globular proteins (d) Glycolipids

124. The bond present between chromosomal DNA and proteins is:

- (a) Hydrogen bond (b) Ionic bond
(c) Covalent bond (d) Metallic bond

125. The type of conjugated molecules involved in the regulation of gene expression are:

- (a) Nucleoproteins (b) Glycoprotein
(c) Nucleosomes (d) Both (a) and (c)

ANSWER KEY

1.	d	2.	a	3.	b	4.	a	5.	a	6.	a	7.	d	8.	d
9.	b	10.	c	11.	a	12.	c	13.	c	14.	d	15.	c	16.	a
17.	b	18.	d	19.	a	20.	a	21.	a	22.	b	23.	d	24.	b
25.	a	26.	a	27.	c	28.	a	29.	c	30.	d	31.	c	32.	a
33.	b	34.	d	35.	c	36.	b	37.	a	38.	c	39.	d	40.	b
41.	c	42.	d	43.	d	44.	b	45.	c	46.	c	47.	b	48.	a
49.	b	50.	d	51.	a	52.	d	53.	c	54.	b	55.	a	56.	d
57.	c	58.	c	59.	d	60.	a	61.	c	62.	a	63.	b	64.	a
65.	b	66.	d	67.	a	68.	d	69.	d	70.	b	71.	a	72.	b
73.	c	74.	a	75.	b	76.	a	77.	d	78.	d	79.	a	80.	c
81.	a	82.	b	83.	b	84.	b	85.	d	86.	a	87.	c	88.	b
89.	a	90.	c	91.	b	92.	d	93.	d	94.	a	95.	c	96.	c
97.	a	98.	b	99.	b	100.	b	101.	a	102.	d	103.	b	104.	b
105.	c	106.	b	107.	c	108.	b	109.	d	110.	c	111.	b	112.	c
113.	b	114.	c	115.	b	116.	b	117.	c	118.	d	119.	d	120.	a
121.	d	122.	a	123.	b	124.	b	125.	d						



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