

SAMPLE CONTENT

HOLISTIC



MHT-CET

ROADMAP TO SUCCESS

2024



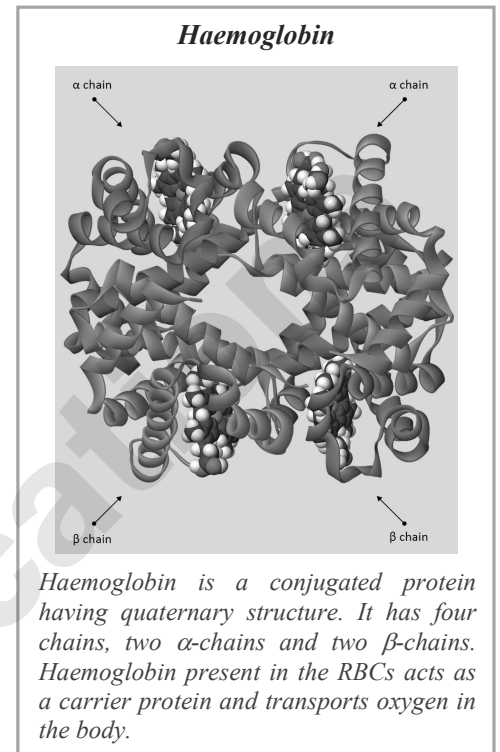
- Based on latest paper pattern
- Quick Review
- Subtopic wise segregation
- Classwork/Homework segregation
- Previous Years' Questions

BIOLOGY (STD. XI)

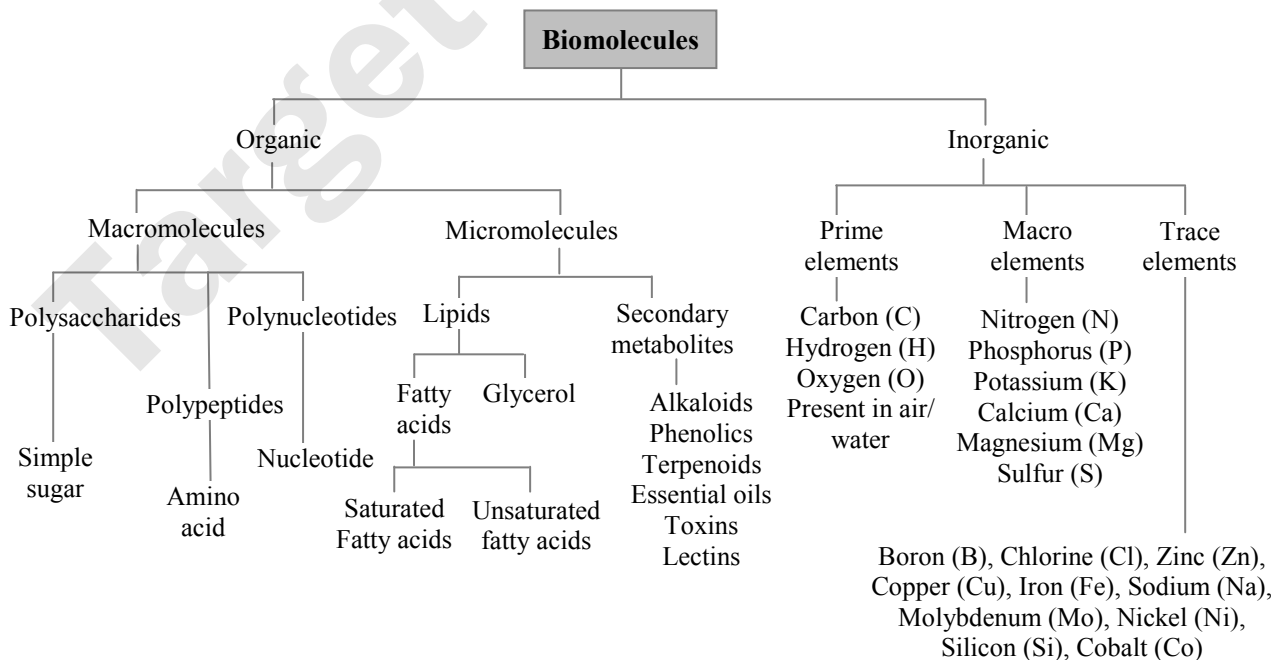
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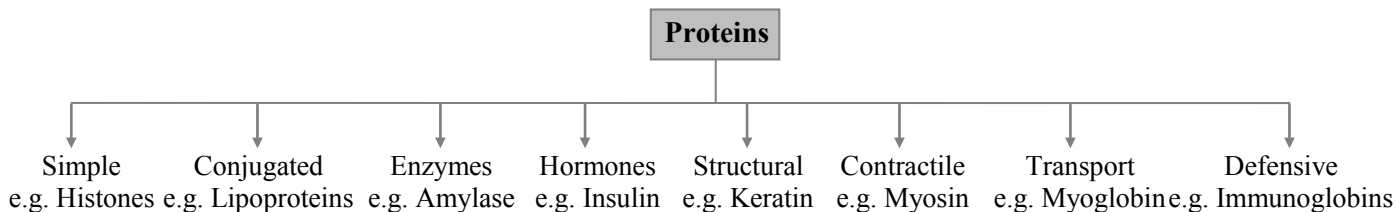
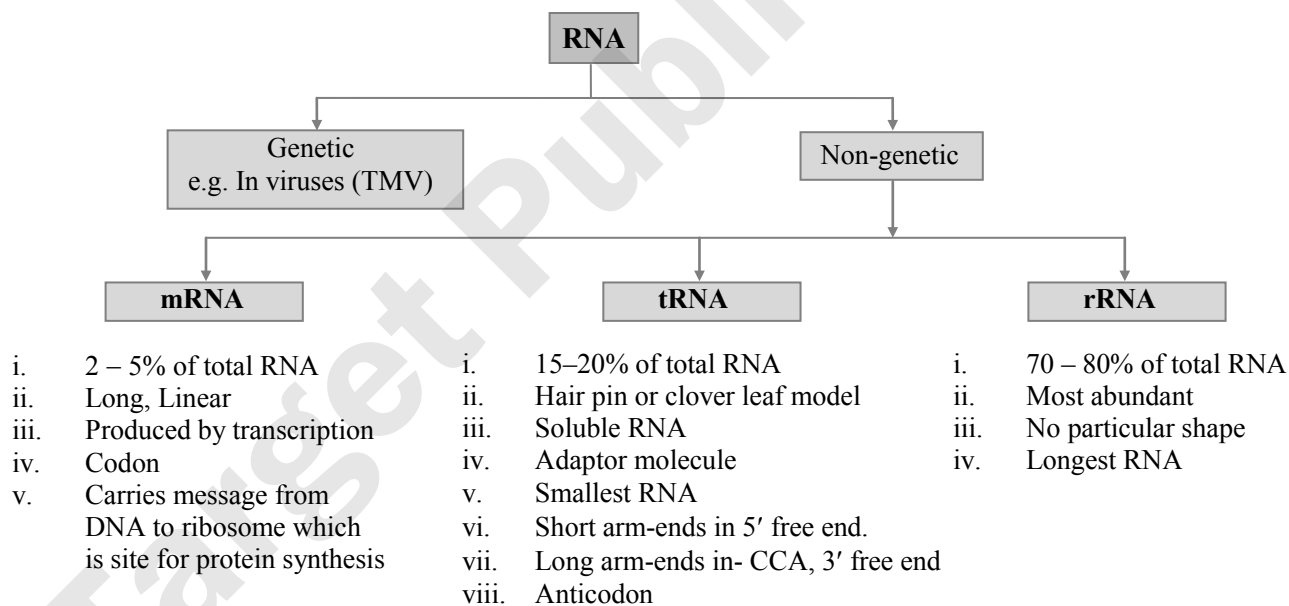
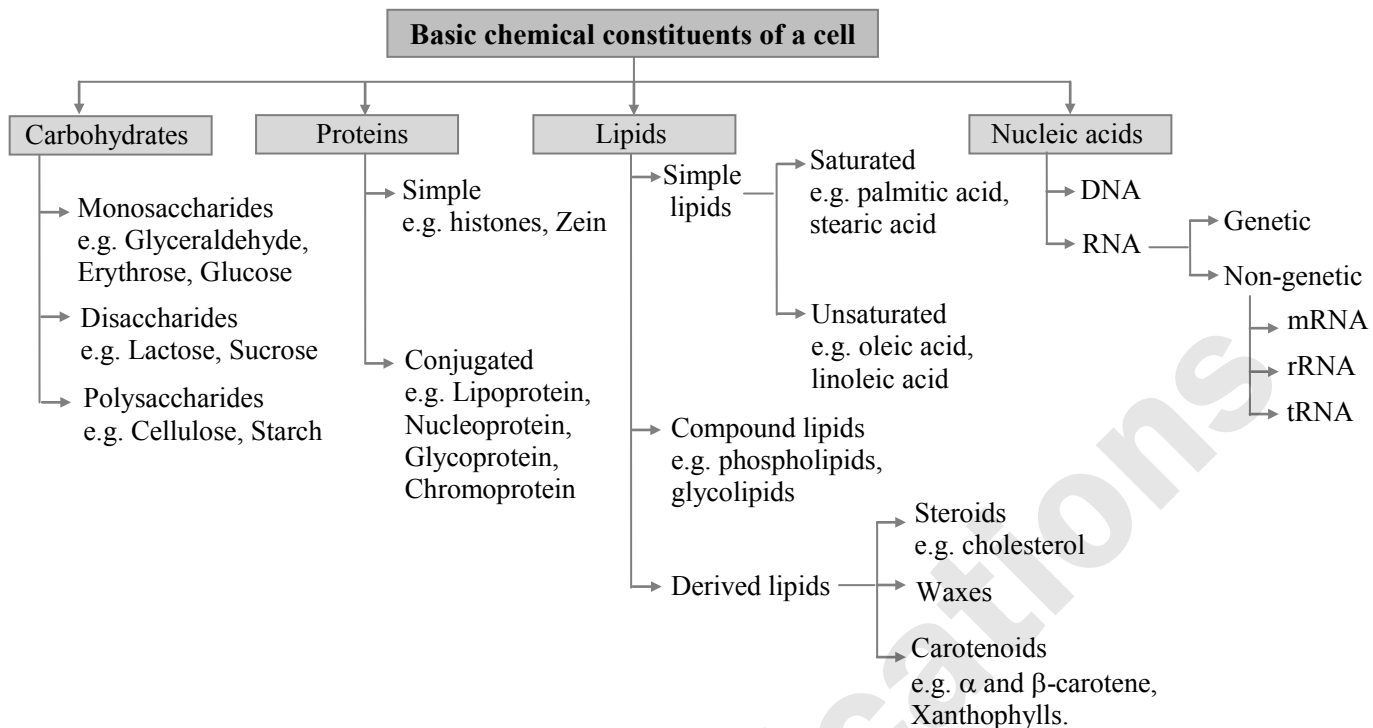
Subtopics

- 6.0 Introduction
- 6.1 Biomolecules in the Cell
- 6.2 Concept of Metabolism



Quick Review





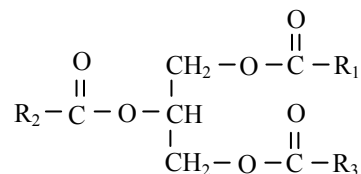
**Classwork****6.1 Biomolecules in the Cell****Carbohydrates**

- In a polysaccharide, number of monosaccharides are linked by
(A) glycosidic bond
(B) peptide bond
(C) hydrogen bond
(D) phosphoester bond
- Which one of the following carbohydrates is a heteropolysaccharide? [MHT CET 2018]
(A) Cellulose (B) Starch
(C) Glycogen (D) Hyaluronic acid
- Which one of the following is a non-reducing carbohydrate?
(A) Maltose
(B) Sucrose
(C) Lactose
(D) Ribose 5-phosphate
- Chitin is a/an
(A) amino acid (B) polysaccharide
(C) protein (D) oligosaccharide
- The two functional groups characteristic of sugars are
(A) Carbonyl and phosphate
(B) Carbonyl and methyl
(C) Hydroxyl and methyl
(D) Carbonyl and hydroxyl

Lipids

- A typical fat molecule is made up of
(A) One glycerol and one fatty acid molecule.
(B) Three glycerol and three fatty acid molecules.
(C) Three glycerol and two fatty acid molecules.
(D) One glycerol and three fatty acid molecules.
- Which of the following have 3 fatty acids as constituents?
(A) Phospholipids (B) Waxes
(C) Fats (D) Steroids
- Steroids are characterised by _____ in their structure. [MHT CET 2018]
(A) carbon atom arranged in four interlocking rings
(B) magnesium atom arranged in the centre of tetrapyrrole
(C) two, six carbon rings
(D) skeletal heterocyclic ring of hydrocarbons

- Identify the following biomolecule:



The above biomolecule is

- (A) Triglyceride (B) Glycerol
(C) Phospholipid (D) Cholesterol
- Which of the following organic compounds is the main constituent of Lecithin?
(A) Phosphoprotein
(B) Arachidonic acid
(C) Phospholipid
(D) Cholesterol

Proteins

- Which of the following is the least likely to be involved in stabilizing the three-dimensional folding of most proteins?
(A) Ester bonds
(B) Hydrogen bonds
(C) Electrostatic interaction
(D) Hydrophobic interaction
- Not all proteins have a
(A) Primary structure
(B) Secondary structure
(C) Tertiary structure
(D) Quaternary structure
- A tripeptide contains
(A) 3 amino acids (B) 4 amino acids
(C) 6 amino acids (D) 2 amino acids
- Which one is neither an acidic nor a basic amino acid?
(A) Lysine (B) Aspartic acid
(C) Arginine (D) Valine
- Identify the basic amino acid from the following.
(A) Glutamic Acid (B) Lysine
(C) Valine (D) Tyrosine
- Which of the following are NOT polymeric?
(A) Nucleic acids (B) Proteins
(C) Polysaccharides (D) Lipids

Nucleic Acids

- DNA present in the nucleus, was named as 'Nuclein' by
(A) James Watson and Crick
(B) Friedrich Miescher
(C) Maurice Wilkins
(D) Rosalind Franklin



18. Which of the following is correct pair of pyrimidine bases? **[MH CET 2015]**
 (A) Adenine and Thymine
 (B) Adenine and Guanine
 (C) Thymine and Cytosine
 (D) Guanine and Cytosine
19. A 340 Å long segment of DNA molecule has 20 thymine nitrogenous bases, what will be the number of guanine nitrogen bases in the same segment? **[MH CET 2015]**
 (A) 10 (B) 40
 (C) 80 (D) 160
20. In a 3.2 Kbp long piece of DNA, 820 adenine bases were found. What would be the number of cytosine bases?
 (A) 780 (B) 1560
 (C) 740 (D) 1480
21. Nucleosome contains
 (A) only histone protein
 (B) both DNA and histone protein
 (C) only DNA
 (D) both DNA and RNA
22. Which of the following biomolecules have a phosphodiester bond?
 (A) Nucleic acids in a nucleotide.
 (B) Fatty acids in a diglyceride.
 (C) Monosaccharides in a polysaccharide.
 (D) Amino acids in a polypeptide.
23. Identify the substances having glycosidic bond and peptide bond, respectively in their structure:
 (A) Glycerol, trypsin
 (B) Cellulose, lecithin
 (C) Inulin, insulin
 (D) Chitin, cholesterol

Enzymes

24. Three of the following statements about enzymes are correct and one is wrong. Which one is wrong?
 (A) Enzymes require optimum pH for maximal activity.
 (B) Enzymes are denatured at high temperature but in certain exceptional organisms, they are effective even at temperatures 80°–90°C.
 (C) Enzymes are highly specific.
 (D) Most enzymes are proteins but some are lipids.
25. Match the following lists.

List - I		List - II	
i.	Lyases	a.	Enzymes catalyzing hydrolysis of ester, ether, peptide, glycosidic, C–C, C-halide or P – N bonds

ii.	Ligases	b.	Enzymes catalyzing a transfer of a group G between a pair of substrate S and S'
iii.	Hydrolases	c.	They catalyse removal of groups from substrates by mechanisms other than hydrolysis leaving double bonds.
iv.	Transferases	d.	They catalyse the linking together of 2 compounds

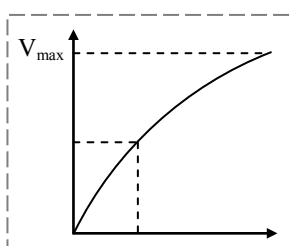
- (A) i – a, ii – c, iii – b, iv – d
 (B) i – d, ii – a, iii – c, iv – b
 (C) i – c, ii – d, iii – a, iv – b
 (D) i – c, ii – b, iii – d, iv – a
26. Consider the following statements:
 i. Coenzyme or metal ion that is tightly bound to enzyme protein is called prosthetic group.
 ii. A complete catalytic active enzyme with its bound prosthetic group is called apoenzyme.
 Select the correct option.
 (A) Both (i) and (ii) are false.
 (B) (i) is false but (ii) is true.
 (C) Both (i) and (ii) are true.
 (D) (i) is true but (ii) is false.
27. Which one of the following statement is correct with reference to enzymes?
 (A) Apoenzyme = Holoenzyme + Coenzyme
 (B) Holoenzyme = Apoenzyme + Coenzyme
 (C) Coenzyme = Apoenzyme + Holoenzyme
 (D) Holoenzyme = Coenzyme + Co-factor
28. Which of the following is NOT a co-enzyme?
 (A) NAD (B) NADP
 (C) FAD (D) ATP
29. Prosthetic groups differ from co-enzymes in that-
 (A) They can serve as co-factors in a number of enzyme - catalyzed reactions.
 (B) They require metal ions for their activity.
 (C) They (prosthetic groups) are tightly bound to apoenzymes.
 (D) Their association with apoenzymes is transient.
30. Arrange the sequences in enzyme action.
 i. Product releases and free enzyme again binds to another substrate molecule.
 ii. Enzyme alter its shape
 iii. Substrate binds to active site of the enzyme
 iv. Fits into the active site
 v. Formation of enzyme product complex.



The correct answer is:

- (A) i, iii, iv, ii, v
 (B) i, ii, iv, iii, v
 (C) iii, ii, iv, v, i
 (D) iii, iv, ii, v, i

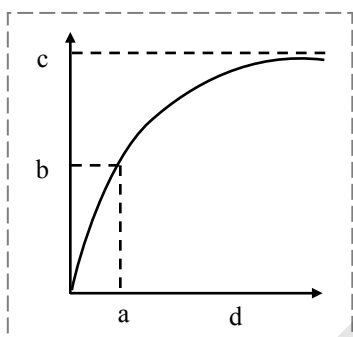
31. The following graph shows the effect of concentration of substrate on enzyme activity:



What does the Y-axis represent?

- (A) Temperature
 (B) Velocity of reaction
 (C) pH
 (D) Pressure

32. The graph below depicts velocity of an enzyme catalysed reaction vs. substrate concentration. Identify the alphabets with correct description.



- i. a = enzyme activity
 ii. b = substrate concentration at maximum velocity
 iii. a = substrate concentration at half of the maximum velocity
 iv. b = half of the maximum velocity

The correct combination is:

- (A) i, ii (B) i, iv
 (C) ii, iii (D) iii, iv

33. What is the role of competitive inhibitor during enzyme action?

- (A) It alters the active site of the enzyme and prevents the binding of substrate.
 (B) It enhances enzyme action.
 (C) It inhibits breaking of chemical bonds of the substrate.
 (D) It declines the enzyme action.

34. Which of the following are not secondary metabolites in plants?

- (A) Rubber, gums
 (B) Morphine, codeine
 (C) Amino acids, glucose
 (D) Vinblastin, curcumin

Homework

6.1 Biomolecules in the Cell

Carbohydrates

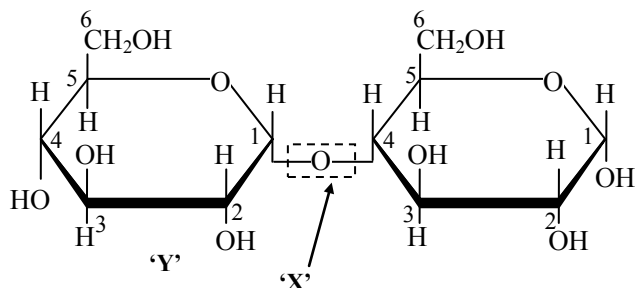
- Monosaccharides have the general molecular formula _____, where n can be 3, 4, 5, 6 and 7.
 (A) $(C_6H_{12}O_6)_n$ (B) $(CH_2O)_n$
 (C) $(CH_2O)_n$ (D) $(C_6H_{12}O_5)_n$
- Monosaccharides containing the _____ group are classified as aldoses and those with _____ group are classified as ketoses.
 (A) aldehyde ($-CHO$), a ketone ($=C=O$)
 (B) ketone ($-CHO$), a aldehyde ($-C=O$)
 (C) aldehyde ($-CHO$), a ketone ($-C=O$)
 (D) aldehyde ($-CH=O$), a ketone ($H-C=OH$)
- The sugar having the molecular formula $C_6H_{12}O_6$ is
 (A) glucose (B) fructose
 (C) galactose (D) all of these
- Concentration of glucose in the human blood is about _____ of blood.
 (A) 90gm per 100ml
 (B) 90mg per 100ml
 (C) 90mg per 10ml
 (D) 90mg per 1000ml
- Identify the INCORRECT statement with respect to galactose.
 (A) Galactose cannot play the same role in respiration as glucose.
 (B) Galactose looks very similar to glucose molecules.
 (C) Galactose can also exist in α and β forms.
 (D) Glucose and galactose can be easily converted into one another.
- Fructose is the fruit sugar and chemically it is ketohexose but it has a _____ rather than a _____.
 (A) five-atom ring, six-atom ring
 (B) five-atom ring, four-atom ring
 (C) six-atom ring, five-atom ring
 (D) four-atom ring, six-atom ring
- Which of the following is TRUE with respect to reducing sugars?
 i. A sugar that serves as a reducing agent due to presence of free aldehyde or ketone group is called a reducing sugar.
 ii. These sugars reduce the Benedict's reagent (Cu^{2+} to Cu^+) since they are capable of transferring hydrogens (electrons) to other compounds.



iii. Reducing sugars include monosaccharides.

- (A) i and iii (B) Only i
(C) ii and iii (D) i, ii and iii

8. Identify the X and Y in the following structure of a disaccharide.



- (A) X: Peptide bond Y: Glucose
(B) X: Glycosidic bond Y: Lactose
(C) X: Glycosidic bond Y: Glucose
(D) X: Glycosidic bond Y: Erythrose

9. Study the following statements and select the correct option.

- (i) Amylose is an unbranched polymer of α -glucose.
(ii) Amylopectin is a branched polymer of α -glucose.
(A) Statement (i) is correct.
(B) Statement (ii) is incorrect.
(C) Both the statements are correct.
(D) Both the statements are incorrect.

10. Which of the following statements is CORRECT with respect to cellulose?

- (A) It is a polymer made from β -glucose molecules.
(B) It is a polymer made from α -glucose molecules.
(C) It is a disaccharide made from β -glucose molecules.
(D) It is a monomer made from β -glucose molecule.

Lipids

11. Triglycerides are three molecules of _____ and _____ molecule of glycerol.

- (A) fatty acids, two
(B) fatty acids, one
(C) palmitic acids, one
(D) phospholipids, one

12. Read the following statements with respect to compound lipids and select the correct option.

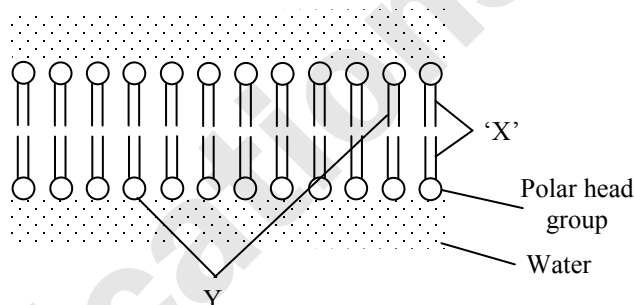
- (i) Compound lipids are esters of fatty acids containing other groups like phosphate (Phospholipids), sugar (glycolipids), etc.
(ii) Glycolipids contain glycerol, fatty acids, simple sugars such as galactose. They are also called cerebrosides.

- (A) Statement (i) is correct.
(B) Statement (ii) is correct.
(C) Statements (i) and (ii) are incorrect.
(D) Statements (i) and (ii) are correct.

13. Which of the following are synthesized from cholesterol?

- i. Adrenocorticoids
ii. Sex hormones (progesterone, testosterone)
iii. Vitamin D
(A) Only i (B) ii and iii
(C) i and iii (D) i, ii and iii

14. Identify 'X' and 'Y' in the following diagram representing the lipid bilayer.



- (A) X: Non-polar tail
Y: Glycerol
(B) X: Polar tail
Y: Phospholipid molecules
(C) X: Non-polar tail
Y: Phospholipid molecules
(D) X: Non-polar tail
Y: Palmitic acid molecules

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.

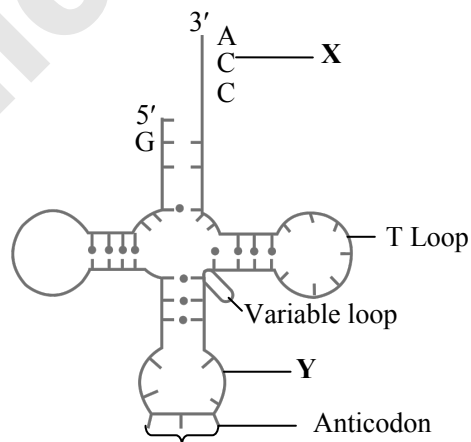
Proteins	Role
Immunoglobulin	X
Y	Blood clotting

- (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.
26. Identify 'X' and 'Y' in the following structure of t-RNA.



- (A) X: Amino acid acceptor end
 Y: Codon loop
 (B) X: Nucleotide acceptor end
 Y: Anti-codon loop
 (C) X: Amino acid acceptor end
 Y: Anti-codon loop
 (D) X: Amino acid acceptor end
 Y: DHU loop

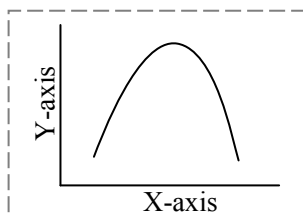
Enzymes

27. Read the following statements with respect to enzymes and select the correct option.
- i. Each enzyme exhibits its highest activity at a specific pH i.e. optimum pH.
 ii. Enzymes are denatured at lower temperature of 10-20°C.



- iii. Most of the enzymes work at an optimum temperature between 20°C and 35°C.
- (A) Statement i and ii are correct.
 (B) Statement ii and iii are correct.
 (C) Statement i and iii are correct.
 (D) Statement i, ii and iii are incorrect.

28. The curve given below shows enzymatic activity with relation to change in conditions. What do the two axes (X and Y) represent?



	X-axis	Y-axis
(A)	Temperature	Enzymatic activity
(B)	Substrate concentration	Enzymatic activity
(C)	Enzymatic activity	Temperature
(D)	Enzymatic activity	pH

29. Which of the following statement is CORRECT about enzyme substrate complex?
- (A) It induces the enzyme to alter its shape.
 (B) It fits the enzyme more tightly around substrate.
 (C) It breaks the chemical bonds of substrate.
 (D) All of these

6.2 Concept of Metabolism

30. Which of the following is TRUE with respect to catabolic and anabolic reactions?
- (A) Catabolic reaction: Conversion of maltose to glucose.
 Anabolic reaction: Synthesis of starch from glucose
- (B) Catabolic reaction: Conversion of starch to glucose.
 Anabolic reaction: Synthesis of glycogen from glucose
- (C) Catabolic reaction: Conversion of glucose to starch.
 Anabolic reaction: Synthesis of glycogen from glucose
- (D) Catabolic reaction: Conversion of starch to glucose.
 Anabolic reaction: Synthesis of glycogen from fructose
31. Study the following type of secondary metabolite and select the correct option.
- i. **Terpenes:** Made from mevalonic acid that is composed mainly of carbon and hydrogen
- ii. **Phenolics:** Made from simple sugars containing benzene rings, hydrogen and oxygen.
- (A) i is correct.
 (B) ii is correct.
 (C) Both i and ii are correct.
 (D) Both i and ii are incorrect.



Answer Key

Classwork

1. (A) 2. (D) 3. (B) 4. (B) 5. (D) 6. (D) 7. (C) 8. (A) 9. (A) 10. (C)
 11. (A) 12. (D) 13. (A) 14. (D) 15. (B) 16. (D) 17. (B) 18. (C) 19. (C) 20. (A)
 21. (B) 22. (A) 23. (C) 24. (D) 25. (C) 26. (D) 27. (B) 28. (D) 29. (C) 30. (C)
 31. (B) 32. (D) 33. (D) 34. (C)

Homework

1. (B) 2. (C) 3. (D) 4. (B) 5. (D) 6. (A) 7. (D) 8. (C) 9. (C) 10. (A)
 11. (B) 12. (D) 13. (D) 14. (C) 15. (D) 16. (A) 17. (D) 18. (C) 19. (D) 20. (B)
 21. (C) 22. (C) 23. (D) 24. (A) 25. (D) 26. (C) 27. (C) 28. (A) 29. (D) 30. (B)
 31. (C)



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