BIOMOLECULES
SOLUTIONS

LEVEL – 1

INTRODUCTION

1. The most abundant organic compound in the biosphere is
(1) Protein (2) Nucleic acid (3) Water (4) Cellulose
Most abundant organic compound is cellulose and after that chitin.

2. Framework elements of protoplasm are:
(1) CHN (2) HNO (3) OCN (4) CHO
Organic compounds are compounds of C, H and O chiefly.

3. Which of the following is not a Hexose sugar?
(1) Fructose (4) Mannose (3) Galactose (4) Arabinose
Arabinose is pentose sugar.

4. Which mineral element is most abundant in extra cellular fluid?
(1) Na^+ (2) K^+ (3) Mg^{+2} (4) Zn^+
Na is most abundant extracellular element and K is most abundant intracellular element.

5. Which of the following component is minimum in the cellular pool?
(1) Water (2) Protein (3) Lipid (4) Carbohydrate
Approx 2% of cellular pool is lipids. XI NCERT pg 147, table 9.4

6. About 93% of cellular material is composed of three elements which are
(1) Carbon, Nitrogen & Hydrogen (2) Carbon, Oxygen & Hydrogen
(3) Carbon, Nitrogen & oxygen (4) Oxygen, Hydrogen & Calcium
XI NCERT pg 143, table 9.1

7. Most abundant mineral element in human body is
(1) K^+ (2) Mg^{+2} (3) Na^+ (4) Ca^+
Calcium is stored in bones matrix.

8. Which of the following is an example of lectin?
(1) Morphine (2) Monoterpene
(3) Abrin (4) Concanavalin A
XI NCERT pg 146, table 9.3

CARBOHYDRATES

9. Grape sugar is
(1) Sucrose (2) Glucose (3) Fructose (4) None of these
Most fruits are rich in fructose except grapes.

10. Mark the odd one out
(1) Ribose (2) Mannose (3) Galactose (4) Raffinose
Raffinose is a trisaccharide.All others are monosaccharides.

11. Which of the following is a polysaccharide but is not the polymer of glucose?
(1) Starch (2) Keratin (3) Chitin (4) Cellulose
Chitin is polymer of N-acetyl glucosamine. Keratin is a protein.

12. Which of the following sugar exists in both open chain and ring form?
(1) Pentose only
(2) Pentose and Hexose only
(3) All monomers having 3 to 7 carbon atoms
(4) Hexose only

Pentose and hexose sugars only naturally exist as both linear and ring forms.

13. Fructose is a
(1) Reducing sugar like maltose (2) Non reducing sugar like glucose
(3) Reducing sugar like sucrose (4) Non-reducing sugar like lactose

All monosaccharides and most disaccharides (except sucrose) are reducing sugars due to free aldehyde or ketone group.

14. An example of fructosan is
(1) Inulin (2) Cellulose (3) Starch (4) Glycogen

XI NCERT pg 148, 2nd para. Fructosan means polymer of fructose.

15. The stored form of glucose in animals is
(1) Glycogen (2) Starch (3) Lipid (4) Glucose

XI NCERT pg 148, Animals store glucose as glycogen in liver and muscles whereas plants store glucose as starch.

16. Erythrose sugar is
(1) Tetrose (2) Pentose (3) Hexose (4) Polysaccharide

Erythrose is 4 C containing sugar and hence tetrose sugar.

17. Amongst the naturally occurring sugars which is the sweetest one
(1) Glucose (2) Saccharine (3) Fructose (4) Sucrose

Fructose > Glucose > Sucrose. Saccharine is an artificial sweetener.

18. Which carbohydrate does not change the colour of Benedict solution?
(1) Sucrose (2) Glucose (3) Fructose (4) Galactose

Sucrose being non-reducing sugar does not change the colour of Benedict solution.

19. Which of the following is a constituent of agar agar?
(1) Glucose (2) Fructose (3) Glucosamine (4) Galactose

Agar agar found in seaweed is heteropolysaccharide of galactose.

20. Amongst the natural materials the largest amount of cellulose occurs in
(1) Wood (2) Cotton (3) Jute (4) Cereals

Cotton is 99% cellulose.

21. Choose the odd one out w.r.t their structure
(1) Maltose (2) Lactose (3) Sucrose (4) inulin

Inulin is polysaccharide and the rest all are disaccharide.

22. Which of the following is non-reducing sugar?
(1) Glycogen (2) Trehalose (3) Sucrose (4) All of these

XI NCERT pg 148. Glycogen being polysaccharide is non reducing and so is sucrose and trehalose (disaccharide).

23. What is true about glycogen?
(1) Is composed of a mixture of different hexoses
(2) Is broken down and synthesized using the same enzymes
(3) Is broken down by glucagon
(4) It is the sugar of blood

Glucagon hormones tend to increase blood sugar level by breaking glycogen in liver primarily. Glycogen being a homopolymer is made of just glucose. Its formed and broken by different enzymes. Glucose is blood sugar and not glycogen.

24. What is correct about hetero polysaccharides?
(1) Polymer of more than one type of true monosaccharide
(2) Polymer of one or more types of derived monosaccharides
(3) Carbohydrate and non-carbohydrate groups join to form heteropolysaccharides
(4) All of the above

XI NCERT pg 149.Heteropolysaccharides on hydrolysis not only yield monosaccharides but also some other additional compound.

25. Which of the following is sugar acid having an alcoholic group?
(1) Palmitic acid (2) Aspartic acid (3) Ascorbic acid (4) Glutamic acid

Ascorbic acid or vitamin C is sugar acid having an alcoholic group, Aspartic acid and Glutamic acid are amino acids whereas Palmitic acid is fatty acid.

26. Choose the correct set which consists of non-reducing disaccharide.
(1) Trehalose, maltose (2) Trehalose, sucrose
(3) Maltose, sucrose (4) Maltose, lactose

All disaccharides except sucrose and trehalose are reducing in nature.

27. Choose the correct set of polysaccharides on the basis of common function
(1) Starch, glycogen, and cellulose (2) Pectin, starch, and glycogen
(3) Glycogen, starch, and inulin (4) Chitin, cellulose, and glycogen

Glycogen, starch, and inulin are all storage polysaccharides. Chitin (exoskeleton of arthropods), cellulose (cell wall of plants), Pectin (fruit wall) are structural polysaccharides.

PROTEINS

28. Which of the following is not an aromatic amino acid?
(1) Threonine (2) Tyrosine (3) Tryptophan (4) Phenylalanine

XI NCERT pg 144,2nd para

29. Which of the following is a standard but non-essential amino acid?
(1) Methionine (2) Tyrosine (3) Ornithine (4) Isoleucine

Methionine is S containing essential amino acid, Isoleucine too is an essential amino acid, wheras ornithine is neither essential nor non-essential amino acid.

30. Except glycine all amino acids in protein are
(1) Dextrorotatory (2) Laevorotatory
(3) Non-rotatory (4) Both (1) and (2)

All amino acids due to chiral or asymmetric carbon bend light towards left and hence levorotatory except glycine.

31. Most complex amino acid is:
(1) Glutamine (2) Tryptophan (3) Tyrosine (4) Phenylalanine

XI NCERT pg 144. Tryptophan, an aromatic amino acid is made of 2-rings and hence most complex.

32. Basic amino acids have more amino groups than carboxylic groups. Which of the following set has both basic amino acids?
(1) Glutamic acid and Glycine (2) Histidine and Lysine
(3) Arginine and Valine (4) None of these

XI NCERT pg 144, 2nd para

33. The amino acid which gives rise to thyroxine is
(1) Glycine (2) Alanine (3) Tyrosine (4) Tryptophan

Hormone thyroxine is a derivative of tyrosine.

34. The primary structure of a protein is due to
(1) Glycosidic bonds (2) Hydrogen bonds (3) S-S linkage (4) Peptide bonds

XI NCERT pg 149, last para

35. In which of the following amino acid, R group is replaced by a methyl group?
(1) Glycine (2) Alanine (3) Serine (4) Valine

XI NCERT pg 144.2nd line

36. Which of the following type of bond gives protein a secondary structure?
(1) Peptide bond (2) Disulphide bond

(3) Hydrogen bond (4) Hydrophobic and Vander Val forces

XI NCERT pg 150. Peptide bond are introduced at primary level, H-bonds at secondary level and Disulphide bond, Hydrophobic and Vander Val forces are introduced at tertiary level.

37. Keratin and Collagen are

(1) Globular proteins (2) Conjugated proteins

(3) Fibrous (4) Not Proteins

Keratin and Collagen are Fibrous or scleroprotein or structural proteins.

38. Most of the proteins present in protoplasm show following type of configuration

(1) Primary (2) Secondary (3) Tertiary (4) Quaternary

XI NCERT pg 150, 1st para, last line.

39. In quaternary configuration of protein, disulphide bond may form between following amino acids

(1) Methionine and serine (2) Tyrosine and valine

(3) Methionine and cysteine (4) Proline and cysteine

Methionine and cysteine, both are S-containing amino acids.

40. Choose the odd one

(1) Tyrosine (2) Phenylalanine (3) Tryptophan (4) Lysine

XI NCERT pg 144, 2nd para, except lysine all others are aromatic amino acids.

41. Which of the following is strongest bond in the native tertiary structure of globular protein?

(1) Disulphide linkages

(2) Ionic bonds between positively and negatively charged groups

(3) Hydrogen bonds between R-groups

(4) Hydrophobic interactions between nonpolar R groups

Peptide bond is the backbone and strongest of all bonds but introduced at primary level only, whereas disulphide bonds is strongest bond in the native tertiary structure of globular protein.

42. Which of the following macromolecule is the most diverse-physically & chemically?

(1) Nucleic acid (2) Protein (3) Polysaccharide (4) Lipid

XI NCERT pg 147, last para. Proteins being heteropolymers of 20 different types of amino acids are hence the most diverse macromolecules.

43. Which of the following amino acid is not present in histone protein?

(1) Arginine (2) Lysine (3) Both (1) and (2) (4) Aspartate

Histone proteins are made of basic amino acids like arginine and lysine, whereas aspartate is an acidic amino acid and hence not part of histone proteins.

44. Which of the following is a neutral amino acid?

(1) Valine (2) Lysine (3) Glutamic acid (4) Aspartate

XI NCERT pg 144,2nd para

45. Which of the following is a monomeric protein?

(1) Hemoglobin (2) Insulin (3) RNA polymerase (4) Myoglobin

Insulin on hydrolysis gives only amino acids and hence monomeric protein, all others are conjugated proteins.

46. The enzyme which is not made up of protein is

(1) Trypsin (2) Carboxypeptidase (3) Ribozyme (4) Rennin

XI NCERT pg 154, 1st line.

47. Which of the following is a heteropolymer?

(1) Cellulose (2) Glycogen (3) Starch (4) Protein

XI NCERT pg 147, last para ,4th line.

LIPIDS

48. Which of the following is not a simple lipid?
(1) Tripalmitin (2) Oil (3) Wax (4) Lecithin
XI NCERT pg 144, 3rd para, last line. Lecithin is a phospholipid.

49. Which of the following is not a polyunsaturated fatty acid?
(1) Linolenic acid (2) Oleic acid (1) Arachidonic acid (4) Linoleic acid
Oleic acid has one double bond, Linoleic acid has 2 double bonds, Linolenic acid has 3 double bonds and Arachidonic acid has 4 double bonds.

50. Number of fatty acids present in the molecule of phospholipids
(1) Two (2) One (3) Three (4) Four
XI NCERT pg 145, lecithin is a phospholipid.

51. Palmitic acid and stearic acid are
(1) Saturated fatty acids so essential for the body
(2) Saturated fatty acids so non-essential for the body
(3) Unsaturated fatty acids so essential for the body
(4) Unsaturated fatty acids so non-essential for the body
Palmitic acid ($C_{16}H_{32}O_2$) and stearic acid ($C_{18}H_{36}O_2$) are saturated fatty acids that can be formed in the body and hence are non-essential.

52. Following compound is not a true lipid
(1) Glycolipid (2) Lecithin (3) Cholesterol (4) Cephalin
Cholesterol is a derived lipid. On hydrolysis it does not yield fatty acids and hence not a true lipid.

53. Prostaglandins are
(1) Derivatives of PUFA (2) Simple lipid
(3) Wax (4) Carbohydrate
Prostaglandins are derivative of arachidonic acid (PUFA).

54. Which of the following is an example of homopolymer?
(1) Protein (2) Lipid (3) Heparin (4) Inulin
XI NCERT pg 148, 2nd para

55. Which of the following is not an unsaturated fatty acid?
(1) Oleic acid (2) Linoleic acid
(3) Stearic acid (4) Arachidonic acid
Stearic acid ($C_{18}H_{36}O_2$) is saturated fatty acid.

56. Which of the following nitrogen containing base is present in Lecithin?
(1) Choline (2) Ethanolamine (3) Serine (4) Lectin
XI NCERT pg 145, figure of Lecithin.

57. Prostaglandins function in inflammatory and allergic reactions are derivative of
(1) Palmitic acid (2) Stearic acid
(3) Linoleic acid (4) Arachidonic acid
Prostaglandins are derivative of arachidonic acid (PUFA).

NUCLEIC ACID

58. DNA differs from RNA in
(1) Nature of sugar alone (2) Nature of purines
(3) Nature of pyrimidines (4) both (1) and (3)
Both DNA and RNA has same purines ie G and A, but differs in sugars (DNA-deoxyribose , RNA-ribose) and pyrimidines (DNA-C,T and RNA- C,U)

59. ATP is
(1) Nucleotide with ribose sugar (2) Nitrogenous base
(3) Nucleoside with deoxyribose sugar (4) Nucleoside with ribose sugar
ATP means adenosine triphosphate.

60. The smallest RNA is
(1) mRNA (2) tRNA (3) rRNA (4) A monomer
tRNA is smallest RNA and hence also called sRNA ie soluble RNA.

61. Choose the correct match w.r.t. number of base pairs in one helix of DNA
(1) A – DNA – 8 base pairs (2) C – DNA – 11 base pairs
(3) B – DNA – 10 base pairs (4) Z – DNA – 9 base pairs
XI NCERT pg 152, 1st para

62. The pairing of A = T, and G ≡ C is the universal phenomenon of DNA. From this we can deduce all the following except
(1) A + T = G + C
(2) Ratio of A: T is one
(3) Guanine equal Cytosine
(4) Nitrogenous bases in the two strands are complementary
A + G = T + C as per Chargaff rule and not A + T = G + C

63. Cyanide is a metabolic poison as it:
(1) Inhibits the enzymes of TCA cycle
(2) Inhibits the enzymes cytochrome oxidase and blocks tissue respiration
(3) Inhibits glycolysis
(4) Stops protein synthesis
Cyanide irreversibly inhibits the enzymes cytochrome oxidase and blocks tissue respiration

64. Which of the following is not a nucleoside?
(1) Adenosine (2) Guanosine
(3) Deoxyadenosine (4) Adenosine mono phosphate
Adenosine mono phosphate is a nucleotide. XI NCERT pg 144, last para

65. ATP liberates high energy by breakdown of ____ bonds.
(1) Phosphate (2) Hydrogen (3) Glycosidic (4) Both 1 and 3
ATP is adenosine triphosphate, where energy is stored in phosphate bonds.

66. What is common in all of them i.e., NAD, FAD, NADP, ATP?
(1) Adenine (2) Phosphate (3) Ribose (4) All of these
All are nucleotides containing ribose sugar.

67. Which of the following is a nucleoside?
(1) Adenylic acid (2) Cytosine (3) Uridine (4) Thiamine
XI NCERT pg 144, last para

68. Methylated uracil is
(1) Adenine (2) Guanine (3) Thymine (4) Cytosine
Thymine is methylated uracil required in DNA.

69. The radius of DNA helix is
(1) 10Å (2) 20 Å (3) 10nm (4) 100 nm
B-DNA structure discovered by Watson and Crick has a diameter of 20 Å

70. Which of the following is not present in the structure of DNA?
(1) Thiamine (2) Uracil
(3) Cytosine (4) Both (1) and (2)
Thiamine means Vitamin B1, so absent in DNA. DNA has thymine.

71. Which of the following nucleotide is a derivative of vitamin?
(1) Cytidine monophosphate (2) Adenosine monophosphate
(3) Guanosine monophosphate (4) Flavin mononucleotide
Flavin mononucleotide (FMN) is a derivative of vitamin B2, Riboflavin

72. Hydrogen bond formation is not possible in the formation of
(a) Carbohydrate (b) Lipids (c) Protein (d) Nucleic acid
(1) a only (2) a, b only (3) a, b, c only (4) d only
Proteins have H-bonds at secondary level and in DNA the complementary bases are attached via H-bonds.

73. Mark the odd pair in the followings
(1) Amino acid – protein (2) Nucleotide – DNA
(3) Glycerol – fatty acid (4) Monosaccharide – cellulose
Fatty acid is not polymer of glycerol. Rest all are polymeric forms. Protein is polymer of Amino acid, DNA is polymer of nucleitides, and Cellulose is polymer of monosac glucose. Lipids are esters of fatty acids and glycerol.

74. ATP liberates high energy by breakdown of ____ bonds.
(1) Phosphate (2) Hydrogen (3) Glycosidic (4) Both 1 and 3
ATP is adenosine triphosphate, where energy is stored in phosphate bonds.

ENZYMES

75. Which of the following structures of protein is present in enzyme molecules?
(1) Primary structure (2) Secondary structure
(3) Tertiary structure (4) Quaternary structure
Biological proteins like enzymes are at tertiary level in protein structure.

76. Energy requiring reactions are
(1) Catabolic reactions (2) Anabolic reaction
(3) Endothermic reactions (4) both (2) and (3)
Catabolic reactions (exothermic) yields energy whereas Anabolic reaction (endothermic) require energy.

77. Which of the following enzyme has minimum turn over number?
(1) Carbonic anhydrase (2) Lactase
(3) Hexokinase (4) Lysozyme
Turnover number depends on the number of active sites in enzyme, lysozyme has the least and carbonic anhydrase has the maximum.

78. Specificity of a digestive enzyme depends on its
(1) Primary structure (2) K_m value
(3) Turnover number (4) Number of active sites
Specificity of a digestive enzyme depends on its shape of active site that in turn is due to primary structure ie sequence of amino acids. Km value is a measure of affinity of enzyme for its substrate.

79. Which of the following classes of biomolecules are known to have catalytic properties?
(1) Protein and lipid (2) Protein and RNA
(3) Protein and Carbohydrate (4) Carbohydrate and lipid
Almost all enzymes are proteins except ribozyme (RNA).

80. Choose the incorrect statement
(1) In peroxidase enzyme, haem is the prosthetic group, and it is a part of the active site of the enzyme
(2) Cofactor is bound to the enzyme to make enzyme catalytically active
(3) Coenzymes are the inorganic compounds that are tightly bound to apoenzyme
(4) Enzyme lowers activation energy of reactions and enhance greatly the rate of reactions
Coenzymes are the organic compounds that are loosely bound to apoenzyme.

81. Iron combines with porphyrin to form haem pigment. Such haem molecule is present in haemoglobin and
(1) Cytochrome (2) Catalase (3) Myoglobin (4) All of these
XI NCERT pg 157 4th para. Myoglobin like hemoglobin store oxygen and has haem to show affinity for oxygen. Cytochrome oxidase is a respiratory enzyme with haem component.

82. In a holo-enzyme prosthetic group is
(1) Inorganic part
(2) Non protein essential part
(3) Organic part attached loosely
(4) Inactive part which is removed during activation of zymogen
Prosthetic group is organic part firmly attached to apoenzyme.

83. Allosteric enzymes undergo conformational changes in response to modulatory binding, and the modulators for allosteric enzymes may be
(1) Either inhibitory or stimulatory
(2) Always inhibitory
(3) Always stimulatory
(4) Modulator binding is independent of allosteric enzyme function
Modulators can bind to allosteric site of enzymes that can increase or decrease enzymatic activity.

84. Which of the following statement is not correct about prosthetic group?
(1) These are organic compounds.
(2) It tightly binds with apozyme.
(3) Vitamins are the example of prosthetic group.
(4) Haem is the prosthetic group of enzyme catalase.
XI NCERT pg 159.Vitamins derivatives are the example of coenzymes.

85. Mark the correct statement regarding co-enzymes?
(1) Co-enzymes can be both organic or inorganic compounds
(2) All cofactors are coenzymes.
(3) 'Haem' act as co-enzyme for the enzyme peroxidase and catalase
(4) Its association with apoenzyme is only transient usually occurring during the course of catalysis.
XI NCERT pg 159. Co-enzymes can be only organic and that too derivatives of Vitamin B complex. All coenzymes are cofactors. 'Haem' act as prosthetic grp for the enzyme peroxidase and catalase

86. Inhibition of enzyme activity by a molecule, which reversibly modifies the structure of the active site of the enzyme is called
(1) Product inhibition (2) Uncompetitive inhibition
(3) Competitive inhibition (4) Non-competitive inhibition
Product or feedback inhibition is reversible and temporarily modifies the active site of enzyme. Competitive inhibition is reversible but cause no change in the active site of enzyme. Uncompetitive inhibition and Non-competitive inhibition are irreversible.

87. Mark the correct statement for enzymes
(1) Enzyme always contains more than one polypeptide chain
(2) Competitive inhibition changes the V_{max} of enzyme kinetics
(3) Lyase enzymes catalyse removal of groups from substrate by the mechanism of hydrolysis
(4) Haem acts as prosthetic group for the enzyme peroxidase and catalase
XI NCERT pg 159. Enzyme contains one or more than one polypeptide chain. Competitive inhibition does not change the V_{max} of enzyme kinetics. Lyase enzymes catalyse removal of groups from substrate by the mechanism of lysis and not hydrolysis.

88. The mechanism of enzyme inhibition used in the control of bacterial pathogens is

(1) Competitive inhibition (2) Non-competitive inhibition
(3) Feedback inhibition (4) Allosteric inhibition

XI NCERT pg 158, 3rd para, last line.

89. In an experiment to study fermentation by yeast, temperature was increased from 20°C to 30°C, rate of enzyme catalysed reaction increases by

(1) 2 times (2) 5 times (3) 10 times (4) No effect

XI NCERT pg 154, last line.

90. What will happen to an enzyme when apoenzyme is separated from its metal component?

(1) Activity will be increased (2) Activity will be lost
(3) Activity will be decreased (4) No change in activity

XI NCERT pg 159, last line.

LEVEL – 2

INTRODUCTION

1. Maximum element (by weight) in the protoplasm, is

(1) Carbon (2) Hydrogen (3) Oxygen (4) Nitrogen

XI NCERT pg 143, table 9.1

2. Which of the following is incorrect statement?

(1) All the elements present in a sample of earth's crust are also present in a sample of living tissue.
(2) All the carbon compounds that we get from living tissues can be called as biomolecules
(3) Inorganic compounds like sulphate and phosphate are seen in acid insoluble fraction
(4) The relative abundance of carbon and hydrogen with respect to other elements is higher in any living organism than in earth's crust

XI NCERT page 143, table 9.1. Inorganic compounds like sulphate and phosphate being micro molecules are seen in acid soluble fraction.

3. Which of the following is a secondary metabolite (toxins) -

(1) Morphine (2) Ricin (3) Vinblastin (4) Carotenoids

XI NCERT page number 108 table 9.3

CARBOHYDRATES

4. Fructose present in honey is

(1) Levorotatory (2) Dextrorotatory
(3) Optically inactive (4) Both (1) and (2)

Most sugars are dextrorotatory except fructose. Hence fructose also called levulose.

5. Which is the least sweet sugar?

(1) Lactose (2) Sucrose (3) Fructose (4) Galactose

Sweetness quotient, Fructose > Galactose >Sucrose > Lactose

6. Which of the following polysaccharides is not a polymer of glucose?

(1) Amylose (2) Inulin (3) Glycogen (4) Cellulose

XI NCERT pg 148. Inulin polymer of fructose. Amylose means starch.

7. Mark the incorrect statement regarding chitin

(1) It is a polymer of N-acetyl glucosamine
(2) It is present in exoskeleton of arthropods

(3) It contains both glycosidic and peptide linkage
(4) It is an example of mucopolysaccharide

XI NCERT pg 149,1st para. Peptide bonds are found only in proteins.

8. Starch, cellulose, and glycogen are all carbohydrates. The property which they all share is.
(1) Branched structure
(2) α - 1, 4 linkage
(3) Polymers of glucose
(4) Originate from plant sources

Cellulose has an unbranched structure with β-1,4 linkage. Glycogen-animal polysaccharide.

9. Glycolysis is
(1) oxidation of glucose to pyruvate.
(2) conversion of glucose to haem.
(3) oxidation of glucose to glutamate
(4) conversion of pyruvate to citrate.

XI NCERT pg 153, 1st para

10. Which of the following statement is true?
(1) Cellulose and Glycogen both have β-glucose
(2) Glycogen has α-glucose and Cellulose has β-glucose
(3) Glycogen and Cellulose both have α-glucose
(4) Cellulose has α-glucose and Glycogen has β-glucose

Cellulose has β glucose and Glycogen have α-glucose.

11. Which of the following statement is incorrect w.r.t. polysaccharides?
(1) Inulin is a polymer of fructose having β(2→ 1) glycosidic bond
(2) Glycogen is a branched polymer of glucose having α(1 → 4) and α(1 → 6) glycosidic bond
(3) Starch is a branched polymer of glucose having α (1 → 4) glycosidic bond only
(4) Cellulose is an unbranched polymer of glucose having β (1 → 4) glycosidic bond

Starch is a branched polymer of glucose having α (1 → 4) and α (1 → 6) glycosidic bonds.

12. All the following statements about the structure of glycogen are true except.
(1) Branched chains occur about every ten residues
(2) It is a copolymer of glucose and galactose
(3) It contains α - 1, 4 glycosidic linkages
(4) It contains α - 1, 6 glycosidic linkages

XI NCERT pg 148. Glycogen is polymer of only glucose.

13. Cellulose the most important constituent of plant cell is made up of:
(1) Unbranched chain of glucose molecules linked by β-(1 →4) glycosidic linkage
(2) Branched chain of glucose molecules linked by α-(1→4)-glycosidic bonds at the site of branching
(3) Branched chain of glucose molecules linked by α-(1→4)-glycosidic bond at the site of branching
(4) Branched chain of glucose molecules linked by α-(1→4)-glycosidic bond in straight chain and β-(1→6) glycosidic bond at the site of branching.

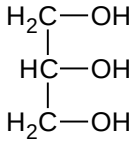
Cellulose is unbranched polymer of β-glucose.

PROTEINS

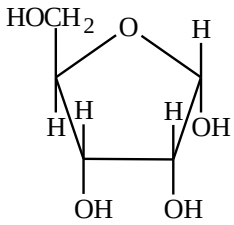
14. Amino acids are organic compounds containing
A. An amino group B. Carboxyl group C. Hydrogen D. Variable R group
(1) A only
(2) A and B only
(3) A, B and C only
(4) A, B, C and D

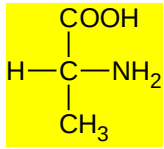
XI NCERT pg 143, last para.

15. Which of the following structure will lead to the formation of zwitterions?

(1) 

(2) $CH_3 — (CH_2)_{14} — COOH$

(3) 

(4) 

XI NCERT pg 144,2nd para. Amino acids exists as Zwitterion ion at pH of 7.4.

16. Which of the following is not a protein?

(1) Keratin (2) Wool (3) Chitin (4) Collagen

Chitin is a polysaccharide.

17. Which of the following is an indispensable amino acid, and contains sulphur?

(1) Cysteine (2) Methionine (3) Phenylalanine (4) Lysine

Methionine **is an esential or** indispensable amino acid containing sulphur. Cysteine **is a non-essential or** dispensable amino acid containing sulphur.

18. The enormous diversity of protein molecules is mainly due to diversity of

(1) Peptide bonds

(2) R groups on the amino acids

(3) Amino groups on the amino acids

(4) Amino acid sequences within the protein molecules

Sequence of amino acids creates a variety of proteins.

19. Which statement about protein is correct?

(I) Quaternary structure of protein depends on primary amino acid sequence also.

(II) In protein only right-handed helices are observed.

(III) In protein, tertiary structure is the result of the interaction of two or more independent polypeptide chain

(IV) H-bonds in a protein are introduced at their primary level.

(1) I and II (2) II and III (3) I and III (4) II and IV

In protein, quaternary structure is the result of the interaction of two or more independent polypeptide chains. H-bonds in a protein are introduced at their secondary level.

LIPIDS

20. Which of the following statement is not correct about triglycerides?

(1) It contains both saturated and unsaturated fatty acids

(2) Higher the proportion of saturated fatty acids in triglycerides more likely they are to be liquid at a given temperature

(3) They do not form hydrogen bonds with water molecules and therefore do not dissolve in water.

(4) It is the most common lipid in nature and is further classified as fats or oils.

XI NCERT pg 144,3rd para. The higher the proportion of saturated fatty acids in triglycerides, the more likely they are to be solid at a given temperature.

21. A lipid having tetra cyclic structure is

(1) Wax (2) Sterol (3) Neutral fat (4) Phospholipid

XI NCERT pg 145.Figure of cholesterol.

NUCLEIC ACID

22. Which of these does not have an oxygen atom in their molecule?

(1) Guanine (2) Adenine (3) Thymine (4) Uracil

XI NCERT pg 145, figure of Adenine.

23. With reference to double standard DNA. The following ratio is always constant for all species

(1) $\frac{A+T}{G+C}$ (2) $\frac{G+C}{A+T}$ (3) Both (1) and (2) (4) $\frac{A+G}{T+C}$

As per Chargaff's rule, in all species number of purines is equal to number of pyrimidines.

24. Which of the following is only a ribose nucleotide?

(1) Cytosine-pentose sugar-phosphate (2) Guanine-pentose sugar-phosphate
(3) Thymine-pentose sugar-phosphate (4) Uracil-pentose sugar-phosphate

RNA has N-bases A, G, C, U whereas DNA has A, G, C, T.

25. Which of the following sequence is correct on the basis of increasing molecular weight?

(1) DNA, ATP, NADP, AMP (2) AMP, ATP, NADP, DNA
(3) ATP, AMP, DNA, NADP (4) ATP, ADP, NADP, DNA

AMP-Adenosine monophosphate, ATP-Adenosine triphosphate (both are nucleotides), NADP-Nicotinamide dinucleotide and DNA being polymer of nucleotides shall be the heaviest.

26. Number of nitrogen bases in a single strand of B-DNA with 100 turns is

(1) 500 (2) 1000 (3) 2000 (4) 250

Each turn of B-DNA has 10 base pairs i.e., 20 N-bases. Hence both strands shall have 100 x20=2000 N-bases, and single strand shall have 1000 bases.

27. The high energy bonds of ATP are present between

(1) C – N (2) C – C (3) O – P (4) C – O

ATP is adenosine triphosphate, where energy is stored in phosphate bonds.

28. Which of these molecules is acidic?

(1) Guanine (2) Cytidine
(3) Adenosine (4) Uridine mono phosphate

XI NCERT pg 144, last para. Nucleotide contains phosphoric acid.

29. Purines are 9 membered double ring nitrogenous bases which possess nitrogen at

(1) 1, 3, 6, 9 position (2) 2, 3, 7, 8 position
(3) 1, 3, 7, 9 position (4) 5, 6, 7, 8 position

XI NCERT pg 144, Adenine is a purine.

30. Which of the following is incorrect w.r.t. Chargaff rule?

(1) Purines and pyrimidines occur in equal amount
(2) Base ratio $\frac{A+G}{C+T}$ is specific for a species
(3) Molar amount of adenine is equal to that of thymine and cytosine equal to guanine
(4) Phosphate and deoxyribose sugar occur in equal amount

As per Chargaff's rule, in all species number of purines is equal to number of pyrimidines. Base ratio $\frac{A+G}{C+T}$ is specific for all species.

ENZYMES

31. Presence of competitive inhibitor

(1) Increases Km
(2) Decrease Km
(3) First increase then decrease Km value
(4) First decreases then increases Km value

Competitive inhibitor increases Km value i.e., decreases the affinity of enzyme for its substrate.

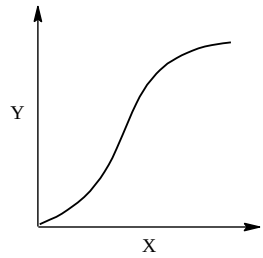
32. According to induced fit theory of Koshland
(1) Fine geometrical alternations of enzyme protein occur during formation of E-S complex
(2) Substrate undergoes fine geometrical alternations while active site of enzyme remains unchanged
(3) Active sites are static like a key
(4) None of these

XI NCERT pg 157,1st para. Enzyme undergoes fine geometrical alternations. Active sites are changed.

33. Which of the following statement is not true for allosteric inhibition?
(1) Inhibitor has no structural similarity with the substrate
(2) It is irreversible
(3) Inhibitor attaches to an area other than active site
(4) Conformation of enzymes is changed

Allosteric or product inhibition is reversible, inhibitor joins at allosteric site and not active site.

34. The graph indicates that binding of haemoglobin with oxygen is
(1) Competitive
(2) Non-competitive
(3) Allosteric
(4) Uncompetitive



The binding of Hb to oxygen is initially slow and later the rate increases making the curve S-shaped.

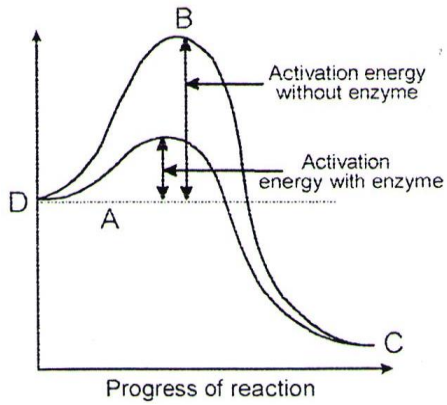
35. Enzymes are divided into 6 classes each with 4 – 13 subclasses and named accordingly by a four-digit number. Enzyme which catalyses hydrolysis of ester, ether, and P-N, bonds, its first digit will be assigned as
(1) 1 . a . b. c (2) 2 . a . b . c (3) 3 . a . b . c (4) 4 . a . b . c

XI NCERT pg 157

36. Given below are the four statements (A –D). Which of the following statements is/are correctly explain the characteristic of inorganic catalyst which resembles the enzymes?
A. Have low molecular weight
B. Remain unchanged after the completion of reaction
C. Required in very small quantity as compared to their substrate.
D. Generally, work at high temperature and pressure
Choose the correct option.
(1) A and B (2) B and C (3) C and D (4) A and D

Enzymes being mostly proteins have high molecular weight than inorganic catalyst. Enzymes generally tend to work at optimum temperature and get denatured at high temperature.

37. Given below is a graphical representation of concept of activation energy. Choose the correct set for the labeled portion A, B, C and D in the graph.



(1) A – Potential energy, B – Substrate
C – Transition state, D – Product

(2) A – Substrate, B – Potential energy
C – Transition state, D – Product

(3) A – Substrate, B – Transition state,
C – Product, D – Potential energy

(4) A – Potential energy, B – Transition state
C – Substrate, D – Product

XI NCERT pg 156

38. The enzymes that catalyze removal of groups from substrates by mechanisms other than hydrolysis leaving double bonds belong to

(1) Oxidoreductase
(2) Isomerases
(3) Ligases
(4) Lyases

XI NCERT pg 158, last line

ASSERTION & REASON QUESTIONS

In the following questions a statement of assertion (A) is followed by a statement of reason (R).

(1) ***If both Assertion & Reason are true and the reason is the correct explanation of the assertion, then mark (1)***
(2) ***If both Assertion & Reason are true but the reason is not the correct explanation of the assertion, then mark (2)***
(3) ***If Assertion is true statement but Reason is false, then mark (3)***
(4) ***If both Assertion and Reason are false statements, then mark (4)***

1. **Assertion:** The living state is an equilibrium steady state to be able to perform work.
Reason: Living process is a constant effort to prevent falling into non-equilibrium.
Ans-4 The living systems are in metabolic flux and thus, maintain the concentration of biomolecules, always remaining in nonequilibrium steady state where equilibrium is seldom achieved. No work can be carried out in equilibrium state. Living systems are therefore, regularly receiving an input of energy to prevent reaching an equilibrium and always remain in non-equilibrium steady state. Energy is obtained from metabolism. Metabolism and living state are thus, complementary and synonymous.

2. **Assertion:** Living organisms have more nitrogen and oxygen per unit mass than inanimate objects (e.g., earth crust).
Reason: Living organisms have more Ca, Mg, Na in them than inanimate object.
Ans-3 After performing elemental analysis of a plant tissue, animal tissue, microbial paste (living matter) and of a piece of earth's crust (animate object), it was found that all living and non-living systems are made up of same chemical i.e., elements (e.g. carbon, hydrogen, oxygen and several others). Most living organisms have relatively high abundance of carbon and hydrogen than in earth's crust.

3. **Assertion:** Human diet should compulsorily contain glycine, serine and tyrosine.
Reason: This is due to the fact that it can not be synthesised in the body.
Ans-4 Essential amino acids are those which are taken from food and not synthesized in the body whereas non-essential amino acids need not be supplied in the diet and are synthesized in the body. Glycine, serine and tyrosine are non-essential amino acids.

4. **Assertion:** Amino acids are known as a-amino acids.
Reason: Amino acids are organic compounds containing an amino group and carboxylic group as substituent on the a-carbon.
Ans-1 Amino acids are organic acids (with carboxylic group – COOH) having amino group ($–NH_2$) generally attached to α-carbon that also bears a variable hydrocarbon or alkyl group R and hydrogen. Amino acids are, therefore, substituted methanes where the four substituent groups occupy the four valency positions. These are hydrogen, carboxyl group and a variable group designated as R group.

5. **Assertion:** Proteins are heteropolymer.
Reason: Dietary proteins are the source of non-essential amino acids.
Ans-3 Each individual protein is a polymer of amino acids. As there are 20 types of amino acids, a protein is a heteropolymer and not a homopolymer. Amino acids can be essential or non-essential. Certain amino acids are essential for our health and they have to be supplied through our diet. Dietary proteins are thus, a source of essential amino acids. Non-essential amino acids are those amino acids which are synthesised in our body.

6. **Assertion:** The long protein chain folds upon itself like a hollow ball giving rise to the tertiary structure.
Reason: Tertiary structure gives a 3-dimensional view of a protein.
Ans-2 The primary structure of protein depicts the sequence of amino acids in a chain or gives the positional information in a protein. Protein thread is folded in the form of a helix or in the sheet form in the secondary structure. The long protein chain is also folded upon itself like a hollow wollen ball, giving rise to the tertiary structure. This gives us a 3-dimensional view of a protein. Tertiary structure is absolutely necessary for many biological activities of proteins.

7. **Assertion:** Vegetable oils are fats which are present in plant cells in soluble form.
Reason: Vegetable oils occur only in cells of embryo.
Answer: (4) Vegetable oils and fats are present in plants in insoluble form. They are extracted mostly from seeds. In several cereals, they are obtained from embryo. Olive and palm oils are obtained from flesly pericarp of the fruit. Sometimes oils are also extracted from roots, stem and leaves.

8. **Assertion:** Unsaturated fats are more reactive compared with the saturated fats.
Reason: Unsaturated fats have only single bonds in their structure.
Answer: (3) Compounds having double bond in their structure are more unstable compounds in comparison to single bond holders. Unsaturated fats those have double bonds in their structures are more reactive than saturated fats.

9. **Assertion:** Palmitic acid has 20 carbon atoms including carboxyl carbon.
Reason: Arachidonic acid has 16 carbon atom including carboxyl carbon.
Answer: (4) Palmitic acids and arachidonic acids are simple fatty acids. A fatty acid has a carboxyl group attached to an R group. The R group could be a methyl ($–CH_3$), or ethyl ($–C_2H_5$) or higher number of $–CH_2$ groups (1 carbon to 19 carbons). For example, palmitic acid has 16 carbons including carboxyl carbon. Arachidonic acid has 20 carbon atoms including the carboxyl carbon

10. **Assertion:** Amino acids are amphoteric in their function.
Reason: All amino acids are necessary for our body.
Answer: (2) Proteins and amino acids are amphoteric in nature, i.e., in aqueous they possess both cationic and anionic groups. All the amino acids are necessary for the normal function of the body as they are building blocks of proteins and enzymes.

11. **Assertion:** Lipids are not strictly macromolecules .
R: Molecular weight of lipids does not exceeds 800 Dalton
(1)

12. **Assertion:** Coenzyme is a non protein group without which enzymes are inactive or incomplete.
Reason: Coenzymes not only provide a point of attachment for the chemical group being transformed but also influence the properties of the group.
(1)

13. **Assertion:** All Enzymes are protein in nature except ribozyme.
Reason: All proteins are enzymes in nature.
(3)

14. **Assertion:** Sucrose is called as cane sugar.
Reason: Sucrose is present in sugar beet.
(2)
Sucrose is also called cane sugar because most of it is obtained from sugarcane (*Saccharum officinarum*). A large quantity is also obtained from sugar beet (*Beta vulgaris*).

15. **Assertion:** Hard fats are solid at room temperature.
Reason: Wax melts at 55-60^{o}C.
(2)
Hard fats contain long chain of unsaturated fatty acids. They are solid at room temperature. Waxes are fatty acid esters of long chain monohydric alcohols like cytyl, ceryl or mericyl. Waxes are harder than fats and possess a higher melting point between 55-60^{o}C.

16. **Assertion:** Polymerisation of nucleoside forms nucleic acid.
Reason: Nucleoside is acidic in nature
(4)
A nucleic acid molecule is a linear polymer in which the monomers (nucleotides) are linked together by means of phosphodiester "bridges" or bonds. Nucleotide is formed through phosphorylation of nucleoside. Nucleoside is slightly basic in nature and a nucleotide is acidic in nature.

17. **Assertion:** Inulin is a storage polysaccharide.
Reason: Inulin is not metabolized in human body and is readily filtered through the kidney.
(2)
Inulin is fructan storage polysaccharide of roots and tubers of Dahila and related plants. Its is biologically inert, neither reasorbed nor secreted by the tubules, Inulin is not metabolized in human body and is readily filtered through the kidney. It is, therefore, used in testing of kidney function, especially glomerular filtration.

18. **Assertion:** At high temperature, proteins are liable to denaturation.
Reason: Globular proteins generally work as enzymes..
(2)
Bonds maintaining structure of proteins are easily broken by high temperature. The phenomenon is called denaturation. Heat coagulability increases with the increase in size of protein.

19. **Assertion:** Enzymes are generally globular proteins
Reason: Ribozyme and ribonuclease-P are proteinanceous enzymes.
(3)
Enzymes are generally globular proteins. The globular proteins are soluble in water and Are easily coagulated by heat. Similarly most of enzyme are generally soluble in water, but those with lipoprotein are insoluble in water. Most of enzymes are destroyed or made inactive by temperature over 65^{o}C. There are two types of RNA enzymes; known as ribozyme (for removing introns) and ribonuclease – P (for separating rRNAs from hnRNA).

20. **Assertion:** Enzymes lower the activation energy.
Reason: A substrate molecule can be acted upon by a particular enzyme.

(2)

Activation energy is an external supply of energy which is needed for the initiation of the chemical reaction. Activation energy required for such a large number of reactions cannot be provided by living systems. Enzymes lower the activation energy required for a reaction. Enzymes are generally specific for their substrates.

21. **Assertion:** Catalysts and enzymes remain unchanged in reactions.
Reason: Catalysts forms short lived complexes with the substrate molecules.
(1)

Catalysts and enzymes do not participate in chemical reactions. They remain unchanged chemically and quantitatively at the end of reaction. They are short lived complexes with the substrate molecules. The enzyme (E) as a catalyst performs this action by combining with the substrate molecule (S) to form a so called enzyme substrate complex (E.S). During the very brief existence of this complex, the enzyme activates the substrate for further reaction (E-Sa) and the end product (P) soon starts to form and finally dissociates from the enzyme, making the latter available fo reacting with more substrate molecules. This process, as shown below, can be repeated several times.

$$E+S \rightleftharpoons E-S \rightleftharpoons E-Sa \rightleftharpoons E-P \rightleftharpoons E+P$$

In the above reaction, E represents the enzymes, S the substrate, E – S enzymes substrate complex, E – P enzyme end product complete and P the end product.

22. **Assertion:** Amylase enzyme stops its activity in stomach.
Reason: In stomach, pH is acidic due to presence of HCl.
(1)

Each enzyme functions at a particular pH. Specificity of pH enzyme activity is useful in regulating enzymes. e.g., salivary amylase stops its activity in stomach where hydrochloric acid is secreted. Salivary amylase acts at pH 6.8.

23. **Assertion:** Polysaccharides are ideal for storage and as structural component.
Reason: Polysaccharides serve as reserve food.
(1)

Polysaccharides are almost insoluble and decreases its effect on water potential or osmotic potential of the cell. They are, therefore, ideal for storage and as structural components. Being large sized they are unable to pass through cell membranes. Passage is allowed through active process where energy in the form of ATP is required.

24. **Assertion:** Polysaccharides are macromolecules.
Reason: Polysaccharides are formed from monosaccharide units.
(1)

Polysaccharides are complex carbohydrates of high molecular weight. Macromolecules are large sized complex chemicals that have high molecular weight, e.g., proteins, nucleic acids. Polysaccharides. Small sized simple chemicals are called micromolecules.

25. **Assertion:** Helix is the secondary structure of protein.
Reason: The haemoglobin molecule is composed of four polypeptide chains.
(2)

The secondary structure of the protein is the spatial arrangement of amino acids that are close to each other in the peptide chain. In a α-helix the peptide chain is coiled around an imaginary cylinder and stabilized by hydrogen bonds between the amino group of an amino acid and the carboxyl group of the amino acid situated four residues ahead in the same polypeptide chain the

quaternary structure is the arrangement of protein subunits within complex proteins made up of two or more such subunits. The haemoglobin molecule is composed of four polypeptide chains, two designated α and two β.

PREVIOUS YEARS QUESTIONS

1. The simple polyhydroxy ketone molecule containing 3–7 carbon is a: **[Kerala PMT 2002]**

(1) Monosaccharide (2) Polypeptide (3) Disaccharide (4) Polysaccharide

Monosaccharides are simple sugars with 3-7 carbons.

2. Which of the following would not give positive Fehling's test? **[AIIMS 2002]**

(1) Glucose (2) Sucrose (3) Fructose (4) Lactose.

Monosaccharides and most disaccharides are reducing sugars due to free aldehyde or ketone group and hence can be tested or detected using Fehling's or Benedict's reagents. Hence sucrose being non-reducing would not give positive Fehling's test.

3. One molecule of an enzyme is needed to convert 2 molecules of a substrate into products in 5 minutes. 10 molecules of the enzyme and 25 molecules of the substrate are mixed in a test tube. After 10 minutes the test tube will be having. **[Karnataka CET 2002]**

(1) Products only
(2) Products and enzyme
(3) Products and 5 molecules of unreacted substrate
(4) Products, enzyme, and a molecule of unreacted substrate

As one molecule of an enzyme converts 2 molecules of a substrate into products in 5 minutes. therefore 10 molecules of the enzyme within 5 minutes shall be able to convert 20 molecules of the substrate into products, the remaining 5 molecules of substrate shall be acted upon by the freed enzymes in the next 5 minutes. Therefore after 10 minutes the test tube shall have only products and enzymes.

4. Which of the following is a tetrose sugar? **[St. Johns MC 2002]**

(1) Ribose (2) Raffinose (3) Mannose (4) Erythrose

Erythrose is $C_4H_8O_4$, Hence tetrose sugar .Ribose is pentose, Mannose is hexose and Raffinose is a trisaccharide.

5. Select out the correct sequence according to increase in complexity:

(1) Triose, Fructose, maltose, oligosaccharide, starch
(2) Maltose, fructose, triose, oligosaccharide, starch
(3) Fructose, maltose, triose, starch, oligosaccharide
(4) Fructose, maltose, triose, oligosaccharide, starch.

Triose ($C_3H_6O_3$) ,Fructose ($C_6H_{12}O_6$) ,Maltose ($C_{12}H_{22}O_{11}$) ,Oligosaccharide, starch (polysaccharide)

6. Arachidonic acid is: **[JIPMER 2004]**

(1) Nonessential fatty acid (2) Essential fatty acid

(3) Polyunsaturated fatty acid (4) Both (2) and (3) correct.

Arachidonic acid is a PUFA and dietary i.e., we need them in our food and hence essential.

7. A fat molecule comprises of: **[VITEEE 2007]**

(1) One glycerol and one fatty acid molecule
(2) One glycerol and three fatty acid molecules
(3) Three glycerol and one fatty acid molecule
(4) 3 glycerol and three fatty acid molecules.

Fat means triglyceride, ie One glycerol esterified with three fatty acid molecules

8. Starving person will first use **[AIPMT 1988]**

(1) Fats (2) Glycogen (3) Plasma protein (4) Muscle proteins

Glycogen broken to release glucose which is most easily respired than fats. Proteins are broken down only when glycogen and fat reserves are exhausted.

9. Lipids are insoluble in water because they are: **[CBSE 2002]**

(1) Natural (2) Hydrophilic (3) Hydrophobic (4) Zwitterions.

Lipids are water hating ie hydrophobic or non-polar due to long hydrocarbon chain of fatty acids.

10. Phospholipid is: **[JCECE 2003]**

(1) One fatty acid one glycerol and one phosphoric acid
(2) Phosphoric acid, two fatty acids and one glycerol
(3) Phosphoric acid, one fatty acid and three glycerol
(4) Phosphoric acid, three fatty acids and one glycerol

Phospholipid is, one glycerol esterified with 2-fatty acids and one phosphoric acid.

11. An example of competitive inhibition of an enzyme is the inhibition of: **[AIIMS 2003]**

(1) Cytochrome oxidase by cyanide (2) Hexokinase by glucose-6-phosphate
(3) Carbonic anhydrase by carbon dioxide (4) Succinic dehydrogenase by malonic acid

Malonate resembles succinate and hence acts as competitive inhibitor for enzyme succinate dehydrogenase.

12. Maximum percentage of lipoprotein is present in: **[DPMT 2007]**

(1) HDL (2) VDL (3) VLDL (4) Chylomicron

Fatty acids are absorbed maximally in small intestine and are aggregated as fats and coated with proteins to make them hydrophilic. Such lipoproteins are called as chylomicrons.

13. Which of the following amino acid is not optically active? **[BHU 2005]**

(1) Valine (2) Glycine (3) Leucine (4) Isoleucine

Glycine being simplest amino acid has H as its R group and hence lack Chiral carbon, therefore optically inactive.

14. The enzyme code of enzyme 2.7.1.1 refers to the following main group

(1) Lyase (2) Ligase (3) Hydrolase (4) Transferase

The enzyme code of enzyme 2.7.1.1 refers to class 2 enzymes that as per IUPAC system is transferases.

15. Which one of the following is not a constituent of cell membrane? **[CBSE 2007]**

(1) Proline (2) Phospholipids (3) Cholesterol (4) Glycolipids

Proline is a non-essential amino acid and not a part of cell membrane. Cell membrane is made of largely lipids of various types and proteins.

16. Which of the following amino acid can stabilize protein structure by forming disulphide bonds? **[PMT 2007]**

(1) Lysine (2) Alanine (3) Cysteine (4) Arginine

Cysteine is S- containing amino acid and hence can stabilize protein structure by forming disulphide bonds.

17. The enzyme needed in biological systems for joining two molecules is called: **[BHU 2003]**

(1) Lyases (2) Ligases (3) Isomerases (4) Hydrolases

Ligases belong to class 6 of enzymes.

18. Cellulose is **[Manipal 2005]**

(1) Heteroglycan (2) Mucopolysaccharide

(3) Homoglycan pentosans (4) Homoglycan hexosans

Cellulose is homopolymer of glucose.

19. Among following natural materials, largest amount of cellulose is present in: **[PCS 2005]**

(1) Wood (2) Fruit pulp (3) Wheat straw (4) Cotton fibres

Cotton fibers are 99% cellulose.

20. Chitin is a: **[AMU 2005]**

(1) Nitrogen containing polysaccharide (2) Sulphur containing polysaccharide

(3) Simple polysaccharide (4) None of the above

Chitin is homopolymer of N-acetyl glucosamine.

21. Find out the mis-matched pair **[Kerala PMT 2007]**

(1) Agar – Polymer of glucose and sulphur containing carbohydrates

(2) Chitin – Polymer of glucosamine

(3) Peptidoglycan – Polysaccharide linked to peptides

(4) Lipopolysaccharide – A complex of lipid and polysaccharide

(5) Glycogen – Polymer of glucose

Agar is a heteropolymer of galactose and not glucose.

22. Which one of the following will be different in different animals?

(1) Lipids (2) Proteins (3) Vitamins (4) Carbohydrates

Different animals have different genes coding synthesis of different proteins.

23. Which enzyme shows greatest substrate specificity? **[CPMT 2005]**

(1) Pepsin (2) Trypsin (3) Sucrase (4) Nuclease

Sucrase acts only on sucrose whereas pepsin and trypsin digests variety of proteins. Similarly, Nucleases digests different nucleic acids.

24. Quaternary structure of protein is:

(1) Interrelationship of amino acids in a polypeptide chain

(2) Interrelation between the polypeptide chains of a protein having more than two polypeptide chain

(3) The arrangement of amino acids in the polypeptide chain

(4) None of the above

Few proteins have quaternary structure like Hb, where the multiple polypeptide chains interact with each other.

25. During enzymatic protein denaturation which of the following is disrupted? [**DPMT 2003]**

(1) 3D structure (2) Peptic bond (3) AA sequence (4) Secondary structure

Enzymes being tertiary proteins, lose their 3D shape due to breakdown of peptide bonds on denaturation.

26. Scleroproteins are: **[Kerala PMT 2003]**

(1) Keratin (2) Collagen
(3) Both (1) and (2) correct (4) Glycoproteins
(5) Lipoproteins

Scleroproteins means fibrous proteins, keratin and collagen are both fibrous and structural proteins.

27. Basic units of monomers of nucleic acid molecule like DNA are: **[BCECE 2005]**
(1) Nucleotides (2) pentose sugars (3) Phosphoric acid (4) Coenzymes

Nucleic acids are polymers of nucleotides.

28. The carbon atoms of the pentose sugar involved in phosphodiester bond formation in DNA and RNA are:
(1) C_1 and C_5 (2) C_3 and C_5 (3) C_2 and C_5 (4) C_4 and C_5

Polynucleotide chains grows by making 5'-3' phosphodiester bonds.

29. Allosteric modulation is due to the inhibition action of enzyme by: **[Kerala PMT 2006]**
(1) Products of reaction (2) Enzyme concentration
(3) Competitive inhibition (4) Substrate concentration

One type of allosteric inhibition is product or feedback inhibition.

30. Quaternary structure of protein: **[WB-JEE2008]**
(1) May be either α or β
(2) Consists of four subunits
(3) Is unrelated to functions of the protein.
(4) Is dictated by the primary structures of the individual subunits

Few proteins have quaternary structure like Hb, where the multiple polypeptide chains interact with each other. The primary level i.e., sequence of amino acids determines all higher levels of any protein structure.

31. Find out the wrongly matched pair. **[Kerala PMT 2010]**
(1) Primary metabolite – ribose (2) Protein – insulin
(3) Secondary metabolite – anthocyanins (4) Cellulose – heteropolymer
(5) Chitin – Polysaccharide

Cellulose – homopolymer of glucose

32. Formation of both peptide and glycosidic bonds involves **[DUMET 2010]**
(1) Hydration (2) Dehydration (3) Esterification (4) Acidification

Formation of both peptide and glycosidic bonds involves Dehydration synthesis reactions.

33. Which is true? **[Orissa JEE 2009]**
(1) Coenzyme = Holoenzyme + Apoenzyme
(2) Holoenzyme = Coenzyme + Apoenzyme
(3) Apoenzyme = Holoenzyme + Exoenzyme
(4) Holoenzyme = Apoenzyme + Endoenzyme

Holoenzyme =Co-factor (Prosthetic group / Coenzyme /metal ion) + Apoenzyme

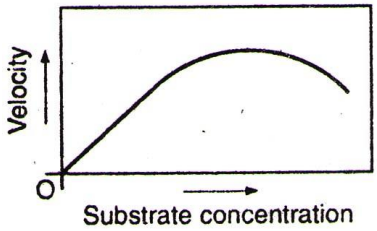
34. Which statement regarding coenzyme is incorrect? **[PMT 2005]**
(1) Coenzymes are the active constituents of enzymes
(2) Every coenzyme is a cofactor, but every cofactor is not a coenzyme
(3) Most of the coenzymes are nucleotides and are composed of vitamins
(4) Every coenzyme is a cofactor and every cofactor is a coenzyme

Every coenzyme is a cofactor but every cofactor can be Prosthetic group / Coenzyme /metal ion.

35. Enzyme having different molecular arrangement but similar functions is: **[DPMT 2003]**
(1) coenzyme (2) apoenzyme (3) isoenzyme (4) holoenzyme

Enzyme having different molecular arrangement but similar functions are isomers of each other , also called isoenzyme.

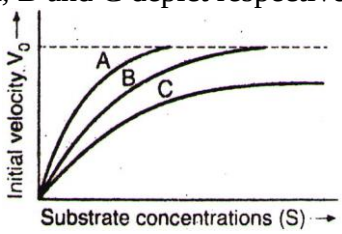
36. The graph given below shows the effect of substrate concentration on the rate of reaction of the enzyme green-gram-phosphatase. What does the graph indicate? **[AIIMS 2005, 08]**



(1) Formation of an enzyme-substrate complex
(2) At higher substrate concentration the pH increases
(3) Presence of an enzyme inhibitor in the reaction mixture
(4) The rate of enzyme reaction is directly proportional to the substrate concentration

As the rate of reaction in the above graph is decreasing with increasing concentration of substrate , hence it indicates presence of an enzyme inhibitor in the reaction mixture

37. The figure given below shows three velocity-substrate concentration curves for an enzyme reaction. What do the curves A, B and C depict respectively. **[AIIMS 2006]**



(1) A = enzyme with an allosteric modulator added,
B = normal enzyme activity, C = competitive inhibition
(2) A = normal enzyme reaction, B = competitive inhibition, C = noncompetitive inhibition
(3) A = enzyme with an allosteric stimulator, B = competitive inhibition added, C = normal enzyme reaction
(4) A = normal enzyme reaction B = noncompetitive inhibitor added, C = allosteric inhibitor added

Competitive inhibition Km value increases whereas Vmax is attained, whereas non-competitive inhibition Km remains same, and Vmax decreased.

38. Feedback inhibition of enzyme is influenced by: **[CBSE 2000]**

(1) Enzyme
(2) Substrate
(3) End-product
(4) External factors

In feedback inhibition, product starts behaving as allosteric inhibitor to decrease enzymatic activity.

39. Decline in the activity of the enzyme hexokinase by glucose-6-phosphate is caused by
(1) Noncompetitive
(2) Competitive inhibitors
(3) Allosteric modulators
(4) Denaturation of enzymes
(5) Increased by substrate concentration

The enzyme hexokinase is under negative feedback i.e., allosteric inhibition of increased product concentration of glucose-6-phosphate.

40. The "lock and key" model of enzyme action illustrates that a particular enzyme molecule
(1) Reacts at identical rates under all conditions
(2) Forms a permanent enzyme-substrate complex
(3) May be destroyed and resynthesized several times
(4) Interacts with a specific type of substrate molecule

The "lock and key" model of enzyme action illustrates that a particular enzyme molecule reacts with a particular substrate only.

41. An example of noncompetitive inhibition is: **[Kerala PMT 2009]**

(1) Reaction of succinic dehydrogenase
(2) Cyanide action on cytochrome oxidase
(3) Sulpha drug on folic acid synthesizing bacteria
(4) The inhibition of hexokinase by glucose 6-phosphate
(5) The inhibition of succinic dehydrogenase by malonate

Cyanide binds at allosteric site of cytochrome oxidase and hence cause noncompetitive inhibition.

42. "All enzymes are protein". This statement is now modified because an apparent exception to this biological truth is: **[DUMET 2010]**

(1) Ribozyme (2) Enterokinase (3) Nitroreductase (4) Dehydrogenase

Most enzymes are proteins except ribozyme (RNA strand).

43. With reference to enzymes, turnover number means …. [**Karnataka CET 2010]**

(1) The number of substrate molecules that a molecule of an enzyme converts into products per hour
(2) The number of substrate molecules that a molecule of an enzyme converts into products per second
(3) The number of substrate molecules that a molecule of an enzyme converts into products per minute
(4) The number of substrate molecules that a molecule of an enzyme converts into products per day

Turn over number depends on the number of active sites in an enzyme that is measured as the number of substrate molecules that a molecule of an enzyme converts into products per unit time ie ie per minute

44. Arrange the steps of catalytic action of an enzyme in order and choose the right option: **[Kerala PMT 2010]**

I. The enzyme releases the products of reaction, and the enzyme is free to bind to another substrate.
II. The active site of enzyme is in close proximity of the substrate and breaks the chemical bonds of the substrate.
III. The binding of substrate induces the enzyme to alter its shape fitting more tightly around the substrate.
IV. The substrate binds to the active site of the enzyme fitting into the active site.

(1) IV, III, II, I (2) III, II, I, IV (3) IV,II, I, III (4) II, I, IV, III
(5) III, IV, I, II

XI NCERT pg 157. This action of enzyme is as per induced fit theory.

45. For its activity, carboxypeptidase requires: **[AIPMT – 2012]**

(1) Niacin (2) Copper (3) Zinc (4) Iron

XI NCERT pg 159, last line

46. Which one of the following biomolecules is correctly characterized? **[AIPMT – 2012]**

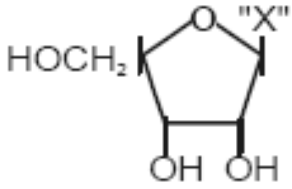
(1) Adenylic acid – adenosine with a glucose phosphate molecule
(2) Alanine amino acid – Contains an amino group and an acidic group anywhere in the molecule
(3) Lecithin – a phosphorylated glyceride found in cell membrane
(4) Palmitic acid – an unsaturated fatty acid with 18 carbon atoms

Lecithin – a phosphorylated glyceride found in cell membrane of alveoli of lungs. Adenylic acid – adenosine with a ribose phosphate molecule. Alanine amino acid – Contains an amino group and an acidic group on the same alpha carbon. Palmitic acid – a saturated fatty acid with 16 carbon atoms

47. Which one of the following pairs of chemical substances, is correctly categorized?
(1) Troponin and myosin – Complex proteins in striated muscles **[AIPMT – 2012]**
(2) Secretin and rhodopsin – Polypeptide hormones
(3) Calcitonin and thymosin – Thyroid hormones
(4) Pepsin and prolactin – Two digestive enzymes secreted in stomach

Secretin– Polypeptide hormones, but rhodopsin is photopigment. Calcitonin– Thyroid hormones but thymosin-thymus hormone. Pepsin– digestive enzymes secreted in stomach but prolactin-hormone.

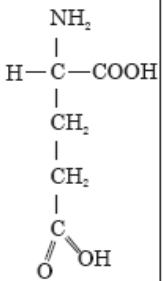
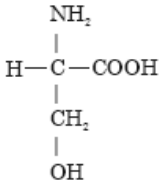
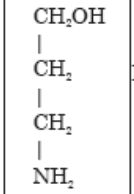
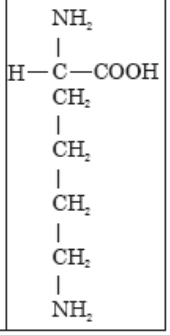
48. Given below is the diagrammatic representation of one of the categories of small molecular weight organic compounds in the living tissues. Identify the **category** shown and the one blank **component** "X' in it **[AIPMT – 2012]**



	Category	**Component**
(1)	Nucleotide	Adenine
(2)	Nucleoside	Uracil
(3)	Cholesterol	Guanine
(4)	Amino acid	NH_2

Above figure is ribose containing nucleoside where X indicates N-base.

49. Which one out of A - D given below correctly represents the structural formula of the basic amino acid?

A	B	C	D
			

(1) A (2) B (3) C (4) D

D represents a basic amino acid as it contains two NH_2 groups.A is acidic amino acid and B is neutral amino acid. C is not an amino acid.

50. Which one is the most abundant protein in the animal world? **[CBSE, AIPMT – 2012]**
(1) Collagen (2) Insulin (3) Trypsin (4) Haemoglobin

XI NCERT pg 148,1st line.

51. A major site for synthesis of lipid is **[NEET 2013]**
(1) RER (2) SER (3) Symplasts (4) Nucleoplasm

lipid syntheis occurs mainly at Endoplasmic reticulum (SER).

52. Transition state strcuture of the substrate formed during an enzymatic reaction is **[NEET – 2013]**

(1) Transient but stable (2) Permanent but unstable
(3) Transient and unstable (4) Permanent and stable

XI NCERT pg 156,2nd para. Transition state strcuture of the substrate formed during an enzymatic reaction is transient and unstable as it gets converted eventually to products.

53. A phosphoglyceride is always made up of **[NEET – 2013]**

(1) only a saturated fatty acid esterified to a glycerol molecule to which a phosphate group is also attached
(2) only an unsaturated fatty acid esterified to a glycerol molecule to which a phosphate group is also attached
(3) a saturated or unsaturated fatty acid esterified to a glycerol molecule to which a phosphate group is also attached
(4) a saturated or unsaturated fatty acid esterified to a phosphate group, which is also attached to a glycerol molecule

Phosphoglyceride means phospholipid that can have either saturated or unsaturated fatty acids.

54. Maximum number of enzymes are found in **[MANIPAL – 2013]**

(1) Herbivores (2) Carnivores (3) Omnivores (4) None of these

Omnivores feed on both plant and animal products and hence need variety of enzymes for digestion.

55. With reference to enzymes, which one of the following statements is true? **[KCET – 2013]**

(1) Apoenzyme = Holoenzyme + Coenzyme (2) Holoenzyme = Apoenzyme + Coenzyme
(3) Coenzyme = Apoenzyme + Holoenzyme (4) Holoenzyme = Coenzyme – Apoenzyme

Holoenzyme =Co-factor (Prosthetic group / Coenzyme /metal ion) + Apoenzyme

56. Which one of the following statements is incorrect about enzyme catalysis?

(1) Enzymes are mostly proteinaceous in nature **[CBSE AIPMT 2012]**
(2) Enzyme action is specific
(3) Enzymes are denaturated by ultraviolet rays and at high temperature
(4) Enzymes are least reactive at optimum temperature

Enzymes are most reactive at optimum temperature

57. Which of the following is a trisaccharide? **[MHT CET 2010]**

(1) Stachyose (2) Sucrose (3) Raffinose (4) Ribose

Ribose-monosaccharide, Sucrose-diasaccharide,Stachyose- tetrasaccharide,

58. If T = 40%, C = 10% then G = ? in a pollen cell **[AIIMS, AFMC – 2013]**

(1) 40% (2) 10% (3) 91% (4) 20%

As per Chargaff's rule, number of G=number of C and number of A=number of T for all species.

59. Lipids, which can be found in oil based salad dressings and ice cream, during digestion is split into **[AIIMS, AFMC – 2013]**

(1) Fatty acids and glycerol (2) Glycerol and amino acids
(3) Glucose and fatty acids (4) Glucose and amino acids

Lipids are esters of glycerol and fatty acids.

60. Holoenzyme is **[OJEE– 2013]**
(1) Non-protein and apoenzyme (2) Protein and apoenzyme
(3) Enzyme protein and coenzyme (4) Enzyme non-protein and coenzyme
Holoenzyme =Co-factor (Prosthetic group / Coenzyme /metal ion) + Apoenzyme

61. Chargaff s rule states that in an organism **[CBSE AIPMT 2003]**
(1) amount of adenine (A) is equal to that of cytosine (C) and the amount of thymine (T) is equal to that of guanine (G).
(2) amounts of all bases are equal.
(3) amount of adenine (A)is equal to that of thymine (T) and the amount of guanine (G) is equal to that of cytosine (C).
(4) amount of adenine (A)is equal to that of guanine (G) and the amount of thymine (T) is equal to that of cytosine (C).
As per Chargaff's rule, number of G=number of C and number of A=number of T for all species.

62. The cell membranes are mainly composed of **[CBSE AIPMT 2005]**
(1) carbohydrates (2) proteins (3) phospholipids (4) fats
The cell membranes are mainly composed of phospholipids and has proteins as receptors.

63. Select the option which is not correct with respect to enzyme action: **[AIPMT 2014]**
(1) A non - competitive inhibitor binds the enzyme at a site distinct from that which binds the substrate.
(2) Malonate is a competitive inhibitor of succinic dehydrogenase.
(3) Substrate binds with enzyme at its active site
(4) Addition of lot of succinate does not reverse the inhibition of succinic dehydrogenase by malonate.
Addition of lot of succinate reverse the inhibition of succinic dehydrogenase by malonate as its an example of competitive inhibition.

64. Which one of the following is a non-reducing carbohydrate? **[AIPMT 2014]**
(1) Lactose (2) Ribose 5-phosphate
(3) Maltose (4) Sucrose
All monosaccharides and most disaccharide are reducing sugars except sucrose.

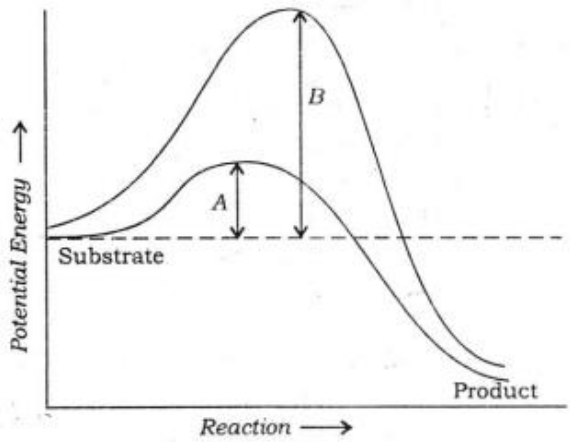
65. Which one of the following statements is incorrect? **[AIPMT 2015]**
(1) In competitive inhibition, the inhibitor molecule is not chemically changed by the enzyme.
(2) The competitive inhibitor does not affect the rate of breakdown of the enzyme-substrate complex.
(3) The presence of the competitive inhibitor decreases the Km of the enzyme for the substrate.
(4) A competitive inhibitor reacts reversibly with the enzyme to form an enzyme-inhibitor complex.
The presence of the competitive inhibitor decreases the affinity of an enzyme towards its substrate and hence the Km value of the enzyme increases.

66. A typical simple lipid molecule is made up of **[NEET-I 2016]**
(1) One glycerol and three fatty acid molecules

(2) One glycerol and one fatty acid molecule
(3) Three glycerol and three fatty acid molecules
(4) Three glycerol molecules and one fatty acid molecule
A typical simple lipid molecule ie triglyceride or fats is made up of One glycerol and three fatty acid molecules

67. Which of the following is the least likely to be involved in stabilizing the three-dimensional folding of most proteins? **[NEET-II 2016]**
(1) Hydrogen bonds (2) Electrostatic interaction
(3) Hydrophobic interaction (4) Ester bonds
Hydrophobic interaction, Hydrogen bonds and Electrostatic interaction stabilize protein 3D structure whereas ester bonds are strong covalent bonds and are least likely to be found in protein. Ester bonds are most common in lipids and nucleic acids.

68. Which of the following describes the given graph correctly? **[NEET-II 2016]**
(1) Endothermic reaction with energy A in presence of enzyme and B in absence of enzyme
(2) Exothermic reaction with energy A in presence of enzyme and B in absence of enzyme
(3) Endothermic reaction with energy A in absence of enzyme and B in presence of enzyme
(4) Exothermic reaction with energy A in absence of enzyme and B in presence of enzyme.



XI NCERT pg 156. It's an exothermic reaction as the energy level of product less than that of substrate.

69. A non-proteinaceous enzyme is **[NEET-II 2016]**
(1) lysozyme (2) ribozyme
(3) ligase (4) deoxyribonuclease
Ribozyme is RNA with catalytic property.

70. Which of the following are not polymeric? **[NEET 2017]**
(1) Nucleic acids (2) Proteins (3) Polysaccharides (4) Lipids
Lipids are non polymers ,they are esters of glycerol and fatty acids.

71. Which one of the following statements is CORRECT with reference to enzymes? **[NEET 2017]**
(1) Apoenzyme = Holoenzyme + Coenzyme
(2) Holoenzyme = Apoenzyme + Coenzyme
(3) Coenzyme = Apoenzyme + Holoenzyme
(4) Holoenzyme = Coenzyme + Co-factor
Holoenzyme =Co-factor (Prosthetic group / Coenzyme /metal ion) + Apoenzyme

72. Which two functional groups are characteristic of sugars? **[NEET 2018]**
(1) Carbonyl and phosphate (2) Carbonyl and methyl

(3) Hydroxyl and methyl (4) Carbonyl and hydroxyl
(4)
Sugars are chemically carbohydrates. They are polyhydroxy aldoses, ketoses and their condensation products. Aldoses bear a terminal aldehyde or -CHO group while ketoses have an internal ketone or-CO group. Thus, they possess two functional groups, i.e., carbonyl and hydroxyl.

73. "Ramachandran plot" is used to confirm the structure of **[NEET(Odisha) 2019]**
(1) RNA (2) proteins (3) triacylglycerides (4) DNA
(2)
'Ramachandran plot' is used to confirm the structure of proteins. Ramachandran plot is a plot of the angles-phi (φ) and psi (ψ) of amino acids found in a peptide chain. This plot was developed by GN Ramachandran, an Indian Scientist in 1963.

74. Prosthetic groups differ from coenzymes in that **[NEET (Odisha) 2019]**
(1) they require metal ions for their activity
(2) they are tightly bound to apoenzymes
(3) their association with apoenzymes is transient
(4) they can serve as cofactors in a number of enzyme catalysed reactions
(2)
Prosthetic groups are organic compounds and are distinguished from other cofactors in that they are tightly bound to the apoenzyme. For example. in peroxidase and catalase, which catalyse the breakdown of hydrogen peroxide to water and oxygen, haem is the prosthetic group and it is a part of the active site of the enzyme.

75. Consider the following statement **[NEET (National) 2019]**
(A) Coenzyme or metal ion that is tightly bound to enzyme protein is called prosthetic group.
(B) A complete catalytic active enzyme with its bound prosthetic group is called apoenzyme.
Select the Correct option.
(1) (A) is true but (B) is false (2) Both (A) and (B) are false
(3) (A) is false but (B) is true (4) Both (A) and (B) are true
(2)
Both (A) and (B) are false. Organic compound that is tightly bound to enzyme protein is called prosthetic group.
. A complete catalytic, active enzyme with its bound prosthetic group is called holoenzyme. An apoenzyme is an inactive enzyme which gets activated by the binding of an organic or inorganic cofactor.

76. Floridean starch has structure similar to **[NEET (Sep.) 2020]**
(1) amylopectin and glycogen (2) mannitol and algin
(3) laminarin and cellulose (4) starch and cellulose
(1)
Floridean starch has structure similar to amylopectin and glycogen as both are made from α-D glucose monomers. The key difference between amylopectin and glycogen is, amylopectin is a soluble form of starch, while glycogen is an insoluble form of starch.

77. Which one of the following is the most abundant protein in the animals? **[NEET (Sep.) 2020]**

(1) Collagen (2) Lectin (3) Insulin (4) Haemoglobin

(1)

Collagen is the most abundant protein in animal world and RuBisCO is the most abundant protein in the whole of the biosphere because it is present in every plant that undergoes photosynthesis and molecular synthesis through the Calvin cycle.

78. Identify the substances having glycosidic bond and peptide bond, respectively in their structure **[NEET (Sep.) 2020]**

(1) Glycerol, trypsin (2) Cellulose, lecithin

(3) Inulin, insulin (4) Chitin, cholesterol

(3)

Inulin is a fructan (polysaccharide of fructose). Adjacent fructose units are linked through glycosidic bond. Insulin is a protein composed of 51 amino acids. Adjacent amino acids are attached through peptide bond.

79. Identify the basic amino acid from the following. **[NEET (Sep.) 2020]**

(1) Glutamic acid (2) Lysine (3) Valine (4) Tyrosine

(2)

Option (2) is correct as lysine is a basic amino acid because its side chain contain nitrogen and resemble ammonia, which is a base. Valine is a neutral amino acid; glutamic acid is an acidic amino acid, while tyrosine is an aromatic amino acid.

80. Match the following columns. **[NEET (Sep.) 2020]**

	Column I		**Column II**
A.	Inhibitor of catalytic activity	1.	Ricin
B.	Possess peptide bonds	2.	Malonate
C.	Cell wall material in fungi	3.	Chitin
D.	Secondary metabolite	4.	Collagen

Choose the CORRECT option.

	A	B	C	D
(1)	3	1	4	2
(2)	3	4	1	2
(3)	2	3	1	4
(4)	2	4	3	1

(4)

Option (d) is the correct. It can be explained as follows.

Malonate is the competitive inhibitor of catalytic activity of succinic dehydrogenase. Collagen is proteinaceous in nature and possesses peptide bonds. Chitin is a homopolymer present in the cell wall of fungi and exoskeleton of arthropods. Abrin and ricin are toxins, secondary metabolites.

81. Which of the following are not secondary metabolites in plants? **[NEET 2021]**

(1) Morphine, codeine (2) Amino acids, glucose

(3) Vinblastine, curcumin (4) Rubber, gums

(2)

Primary metabolites are compounds that are directly involved in the growth and development of a plant like amino acids and sugars(glucose). Primary metabolites prominently function growth, development and reproduction of cell. Secondary metabolites are Compounds produced in other metabolic pathways that, although important, are not essential for the functioning of the plant.

82. Following are the statements with reference to lipids. **[NEET 2021]**

I. Lipids having only single bonds are called unsaturated fatty acids.
II. Lecithin is a phospholipid.
III. Trihydroxy propane is glycerol.
IV. Palmitic acid has 20 carbon atoms including carboxyl carbon.
V. Arachidonic acid has 16 carbon atoms.

Choose the CORRECT answer from the options given below.

(1) I and III (2) II and IV (3) II and III (4) II and V

(3)

Statements I, IV and V are incorrect, while II and III are correct.
The incorrect statements can be corrected as
Lipid having only single bonds are called saturated fatty acids. Palmitic acid has 16 carbon atoms including carboxyl carbon. Arachidonic acid has 20 carbon atoms.

83. Match the List-I with List-II. **[NEET 2021]**

	List – I		List – II
A.	Protein	1.	C = C double bonds
B.	Unsaturated fatty acid	2.	Phosphodiester bonds
C.	Nucleic acid	3.	Glycosidic bonds
D.	Polysaccharide	4.	Peptide bonds

Choose the CORRECT answer from the options given below.

	A	B	C	D
(1)	4	1	2	3
(2)	1	4	3	2
(3)	2	1	4	3
(4)	4	3	1	2

(1)

Proteins are polypeptides, they are linear chain of amino acids linked by peptide bond.
Unsaturated fatty acids are carbon chains containing one or more double bonds with terminal carboxylic acid. The two sugar molecules of nucleic acids are linked together via phosphodiester bond. Polysaccharides are long chain of sugar molecules joined with a covalent bond, i.e. glycosidic linkage.

84. Cellulose does not blue colour with Iodine because **[NEET 2023]**

(1) It is a helical molecule.
(2) It does not contain complex helices and hence cannot hold iodine molecules.
(3) It breaks down when iodine reacts with it.
(4) It is a disaccharide.

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85. Malonate inhibits the growth of pathogenic bacteria by inhibiting the activity of **[NEET 2023]**

(1) Amylase (2) Lipase

(3) Dinitrogenase (4) Succinic dehydrogenase

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86. Given below are two statements: **[NEET 2023]**

Statement I: A protein is imagined as a line the left end represented by first amino acid C – terminal) and the right end represented by last amino acid (N-terminal)

Statement II: Adult human haemoglobin, consists of 4 subunits (two subunits of α type and two subunits of β type)

In the light of the above statements, choose the correct answer from the options given below:

(1) Both statement I and Statement II are false

(2) Statement I is true but Statement II is false

(3) Statement I is false but Statement II is true

(4) Both Statement I and Statement II are true

XI NCERT pg 150, 1st line.

87. **Statement I:** Low temperature preserves the enzyme in a temporarily inactive state whereas high temperature destroys enzymatic activity because proteins are denatured by heat.

Statement II: When the inhibitor closely resembles the substrate in its molecular structure and inhibits and activity of the enzyme, it is known as competitive inhibitor. In the light of the above statements, choose the correct answer from the options given below: **[NEET 2023]**

(1) Both Statement I and Statement II are false

(2) Statement I is true, but Statement II is false

(3) Statement I is false, but Statement II is true

(4) Both Statement I and Statement II are true

Enzyme remains inactive at low temperature and get denatured at high temperature.

XI NCERT pg- 154- 15th line.