

For BioResire students



# NEET Biology Material

**Elite Batch**

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# BIOMOLECULES

## Biomolecules

All the carbon compounds that we get from living tissues.

**Biomicromolecules:** Molecules which have molecular weights less than one thousand Dalton. They are also known as monomers.

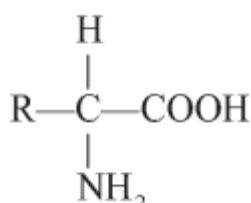
**Biomacromolecules:** Have molecular weight more than 10000 Daltons (generally 10,000 Daltons and above). They are generally polymers. A biomolecule a with molecular weight in the range of ten thousand daltons and above; found in acid insoluble fraction. e.g. polysaccharides, nucleic acids, proteins and lipids.

## Primary and secondary metabolites

- **Primary metabolites:** have identifiable functions and play important roles in normal physiological process eg. Amino acids, nitrogenous bases, proteins and nucleic acid.
- **Secondary metabolites:** are product of certain metabolic pathways from primary metabolites, eg. carotenoids, drugs, alkaloids, essential oils, rubber, gum, cellulose and resins etc.

## Amino acids

Organic compounds containing an amino group and one carboxyl group (acid group) and both these groups are attached to the same carbon atom called a carbon and so they are called amino acids.



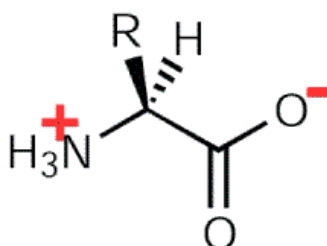
e.g. In Glycine R = H

In alanine R = CH<sub>3</sub>

In serine R = CH<sub>2</sub> – OH

Twenty types of amino acids. Amino acid exists in Zwitterionic form at different pHs.

## Zwitterionic



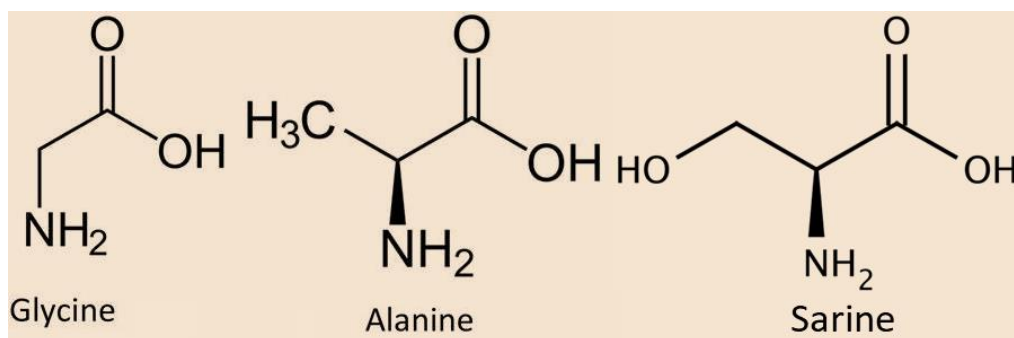
Based on number of amino and carboxyl groups, amino acids can be:

**Aromatic:** Tryptophan, phenylalanine and Tyrosine are aromatic (give smell) amino acids.

**Proteins:** Proteins are polypeptide chains made up of amino acids. There are 20 types of amino acids joined together by peptide bond between amino and carboxylic group. There are two kinds of amino acids.

**Essential amino acids are** obtained by living organism along with food.

**Non-essential amino acids** can be prepared by our body from raw materials.



### Biological macromolecules

There are three main types of biological macromolecules, according to mammalian systems:

- Carbohydrates
- Nucleic acids
- Proteins
- Lipids

**Carbohydrates:** Carbohydrates are polymers of carbon, hydrogen and oxygen. They can be classified as monosaccharides, disaccharides and polysaccharides. Carbohydrates are found in starch, fruits, vegetables, milk and sugars. They are an important source of a healthy diet.

**Nucleic Acids:** The nucleic acids include DNA and RNA that are the polymers of nucleotides. Nucleotides comprise a pentose group, a phosphate group, and a nitrogenous base group. All the hereditary information is stored in the DNA. The DNA synthesized into RNA and proteins.

**Proteins:** Proteins are the polymers of amino acids. These include the carboxylic and the amino group. There would be no lipids or carbohydrates without proteins because the enzymes used for their synthesis are proteins themselves.

**Lipids:** Lipids are a hydrophobic set of macromolecules, i.e., they do not dissolve in water. These involve triglycerides, carotenoids, phospholipids, and steroids. They help in the formation of the cell membrane, formation of hormones and in the and as stored fuel.

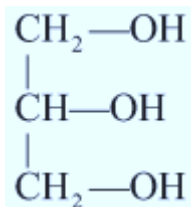
## Fatty Acids & Saturated

With single bonds in carbon chain, e.g., Palmitic acid, butyric acid.

## Unsaturated

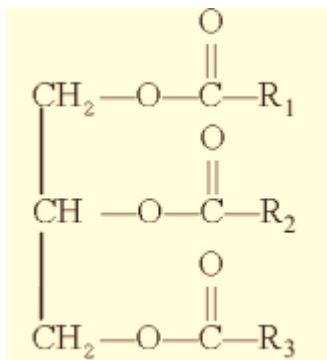
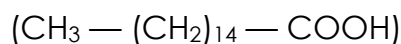
With one or more double bonds, e.g., oleic acid, linoleic acid.

## Glycerol



A simple lipid, is trihydroxy propane.

Some lipid have fatty acids esterified with glycerol. Example of fatty acid (Palmitic acid)



Triglyceride ( $R_1, R_2, R_3$  are alkyl groups in fatty acids.)

Nitrogen bases (Carbon compounds with heterocyclic rings)

**Purine:** Adenine, Guanine,

**Pyrimidine:** Cytosine, Uracil, Thymine.

**Nucleoside:** Nitrogenous base + Sugar e.g., Adenosine, guanosine.

**Nucleotide:** Nitrogenous base + Sugar + Phosphate group. e.g. Adenylic acid, Guanylic acid. Thymidylic acid.

**Nucleic acids:** Deoxyribonucleic acid (DNA) and ribonucleic acid (RNA).

## Examples of Macromolecules:

### Synthetic Fibres

- Nylon, rayon and spandex consist entirely of macromolecules. These are created in certain steps:
- The monomers are reacted to make prepolymers or a liquid, primitive

macromolecule. In the next step, the prepolymers are fed through a cell where it solidifies and attains the desired thickness. This process is called spinning.

**Genetic Transfer:** DNA is a genetic material that contains nucleic acids which code for genetic material. During meiosis, the DNA is no longer a whole, and the nucleotides that remain are responsible for transferring the genetic information to the gametes.

## Monomers and Polymers

Macromolecules are basically polymers, long chains of molecular sub-units called monomers. Carbohydrates, proteins and nucleic acids are found as long polymers. Due to their polymeric nature and large size, they are known as macromolecules.

## Structure of Proteins

- **Primary structure:** Is found in the form of linear sequence of amino acids. First amino acid is called N-terminal amino acid and last amino acid is called C-terminal amino acid.
- **Secondary structure:** Polypeptide chain undergoes folding or coiling which is stabilized-by hydrogen bonding. Right handed helices are observed; e.g., fibrous protein in hair, nails.
- **Tertiary structure:** Long protein chain is folded upon itself like a hollow woollen ball. Gives a 3-dimensional view of protein, e.g., myosin.
- **Quaternary structure:** Two or more polypeptides with their folding's and coiling's are arranged with respect to each other, e.g., Human haemoglobin molecule has 4 peptide chains - 2  $\alpha$  and 2  $\beta$  Subunits.

## Monosaccharides

Monosaccharides are joined by glycosidic bond, right end is reducing and left end is non reducing.

## Polysaccharides

Are long chain of polymers of monosaccharides.

- **Starch:** Store house of energy in plant tissues. Forms helical secondary structures, made of only glucose monomers.
- **Cellulose:** Homopolymer of glucose. It does not contain complex helices. Cotton fibre is cellulose.
- **Glycogen:** Is a branched homopolymer, found as storage polysaccharide in animals.
- **Insulin:** Is a polymer of fructose.
- **Chitin:** Chemically modified sugar (amino-sugars) N-acetyl galactosamine form exoskeleton of arthropods; heteropolymer.

## Metabolic Pathways

There are two types of metabolic pathways:

- **Anabolic pathways:** Lead to formation of more complex structure from a simpler structure with the consumption of energy, e.g., Protein from amino acids., also known as biosynthetic pathways.
- **Catabolic pathway:** Lead to formation of simpler structure from a complex structure, e.g., Glucose → Lactic Acid + energy The most important energy currency in living systems is ATP (adenosine tri – phosphate).

## Bonds linking monomers in a polymer

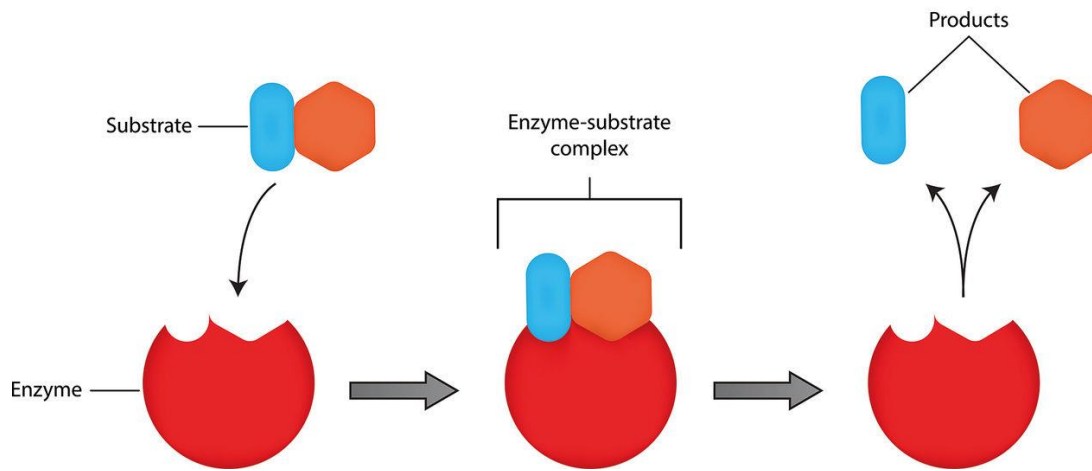
**Peptide bond:** Formed between the carboxyl (–COOH) group of one amino acid, and the amino (–NH<sub>2</sub>) group of the next amino with the elimination of water moiety, (dehydration).

**Glycosidic bond:** Bond formed between two carbon atoms of two adjacent monosaccharides., by dehydration.

**Phosphodiester bond:** Bond formed in nucleic acids where in a phosphate moiety links the 3-carbon of one sugar of one nucleotide to the 5-carbon of the sugar of the succeeding nucleotide. (The bond between phosphate group and hydroxyl group of sugar)

## Enzymes

- Enzymes are commonly proteinaceous substances which are capable of catalysing chemical reactions of biological origin without themselves undergoing any change. They are commonly called as biocatalysts.
- The nucleic acids that behave like enzymes are called ribozymes.
- The tertiary structure of protein/Enzyme has pockets or crevice into which substrate fit to form ES complex.
- The formation of the ES complex is essential for catalysis.  $E + S = ES \rightarrow EP \rightarrow E + P$
- The structure of substrate gets transformed into the structure of product through formation of transient state structure.
- The major difference between inorganic and organic catalyst is inorganic catalyst works effectively at high temperature and pressure but enzyme get damaged at high temperature.
- The external energy required to start a chemical reaction is called activation energy.



### Factors influencing Enzyme Activity:

- **Temperature:** An enzyme is active within a narrow range of temperature. Temperature at which enzyme is most active is called optimum temperature. The enzyme activity decrease above and below this temperature.
- **pH:** Every enzyme has an optimum pH at which it is maximum active. Most of the intracellular enzymes work at neutral pH.
- **Concentration of Substrate:** Increase in substrate concentration increases the rate of reaction due to occupation of more active sites by substrate.
- **Competitive Inhibitor:** When the molecular structure of inhibitor resembles the substrate, it inhibits the function of enzymes.

### Enzymes are classified as:

- Oxidoreductases/ Dehydrogenases:**  $S_{\text{reduced}} + S'_{\text{oxidized}} \rightarrow S_{\text{oxidized}} + S'_{\text{reduced}}$
- Transferases:**  $S - G + S' \rightarrow S + S' - G$
- Hydrolases:** Catalyses the hydrolysis of peptide, ester, glycosidic bonds etc
- Lyases:** Remove the groups from substrate.
- Isomerases:** Inter conversion of optical, geometrical or positional isomers.
- Ligases:** Catalyses the linking together of two compounds.

### Co-factors

Co-factors are the non-protein constituent of an enzyme which make the enzyme more catalytically active. The protein portions of enzyme are called apoenzyme.

- **Prosthetic group:** These are organic compound which tightly bound to the apoenzyme.  
e. g., Haem is prosthetic group in peroxidase and catalase.
- **Coenzyme:** These are organic compounds whose association with the apoenzyme is only transient, usually occurring during the course of catalysis.

e.g., Coenzyme Nicotinamide adenine dinucleotide (NAD) and NADP contain vitamin niacin.

- **Metal ions:** Metal ions form coordination bond with side chains at the active site and at the same time form one or more coordination bond with substrate.

e.g., zinc in enzyme carboxy peptidase.

## NCERT LINE BY LINE QUESTIONS

1. Elemental analysis on a plant tissue, Animal tissue or a microbial paste reveals:- [Pg-142,E]  
A) list of elements like C; H; O & several others  
B) Respective content per unit mass of a living tissue  
C) Both  
D) Diversity of living organism in our Biosphere.
2. Elemental list could be \_\_\_\_\_ in \_\_\_\_\_ terms of study on living tissues & earth's crust:- [Pg-142,E]  
A) Same; absolute  
B) Different; absolute  
C) Different; same  
D) Same; relative

### PARAGRAPH – 9.1 HOW TO ANALYSE CHEMICAL COMPOSITION?

3. With respect to other elements which element is relatively abundant in living organism than in earth's crust:- [Pg-143,E]  
A) C & Ca      B) C & H      C) S & N      D) N & Ca
4. For the chemical composition analysis \_\_\_\_\_ is used:- [Pg-142,M]  
A)  $CH_3COOH$       B)  $CH_3COOH - Cl$   
C)  $Cl_3 - CCOOH$       D)  $Cl_3 - COOH$
5. Filtrate obtained after grinding of living tissue is also known as:- [Pg-142,M]  
A) Slurry      B) Acid - soluble  
C) Acid insoluble pool      D) All
6. Acid – insoluble pool is also known as:- [Pg-142,E]  
A) Slurry      B) Retentate      C) filtrate      D) All
7. Analytical techniques applied to the compound gives us an idea of:- [Pg-143,E]  
A) Probable structure of compounds  
B) Molecular formula of compounds.  
C) Both  
D) None
8. All the carbon compounds that we get from the living tissue can be called:- [Pg-143,E]  
A) Biomolecules      B) Slurry      C) Retentate      D) All
9. If the tissue is fully burnt:- [Pg-143,E]  
A) All the carbon compounds are oxidised to gaseous forms ( $CO_2$  & water vapour).  
B) Remaining's are known as ash.  
C) Ash contains inorganic elements & inorganic compounds.  
D) All
10. Inorganic elements like sulphate and phosphates are present in [Pg-143,M]  
A) Ash of burnt tissue      B) Oxidised gaseous form  
C) Both      D) None
11.  $\alpha$  – Amino acids are organic compounds containing [Pg-143,M]  
A) Amino group and acidic group substituted on different carbon.  
B) Keto – group & Hydrogen on different carbon.  
C) Amino group & acidic group substituted on same carbon.  
D) Keto – group & alcohol group substituted on same carbon.
12. How many substituted groups are present in an  $\alpha$  – amino acid [Pg-143,M]

- A) 1                      B) 2                      C) 3                      D) 4
13. The R – group in a proteinaceous amino acid could be [Pg-144,E]  
 A) Hydrogen                      B) Methyl group  
 C) Hydroxy methyl                      D) Any of the above
14. The chemical and physical properties of amino acids are essentially of the [Pg-144,E]  
 A) Amino group                      B) Carboxyl group  
 C) The R - group                      D) All of the above
15. If the R – group of amino acid is methyl [Pg-144,E]  
 A) Glycine                      B) Serine                      C) Alanine                      D) Any of the above
16. A hydrogen substituted carbon containing amino acid is :- [Pg-144,E]  
 A) Glycine                      B) Alanine                      C) Both (A) & (B)                      D) Serine
17. Number of Amino ; Carboxyl & the R – functional group determines:- [Pg-144,M]  
 A) Acidic nature of Amino acid.                      B) Basic nature of Amino acid  
 C) Neutral nature of Amino acid                      D) Any of the above
18. Which of the following group of amino acid is aromatic in nature:- [Pg-144,M]  
 A) tyrosine; phenylalanine  
 B) tyrosine; tryptophan glutamic acid  
 C) Glutamic acid; lysine; valine  
 D) none of the above
19. Which of the following is neutral in nature:- [Pg-144,E]  
 A) Valine                      B) Serine                      C) Alanine                      D) All
20. A particular property of amino acid is the ionizable nature of [Pg-144,m]  
 A) -H                      B) -NH<sub>2</sub>                      C) CH<sub>3</sub>                      D) All
21. Which of the following determines the particular property of amino acid is the Ionizable nature & structure of amino acid:- [Pg-144,M]  
 A) -NH<sub>2</sub> & -COOH                      B) -COOH only  
 C) -NH<sub>2</sub> only                      D) none of the above
22. In different solution; of different \_\_\_\_\_ the \_\_\_\_\_ of amino acid changes. [Pg-144,E]  
 A) pH; pH                      B) pH; structure  
 C) Structure; Structure                      D) structure; pH
23. Which of the following is a zwitterionic form. [Pg-144,E]
- $$\text{H}_3^+\text{N}-\underset{\text{R}}{\text{CH}}-\text{COOH}$$

(A)

$$\text{H}_2\text{N}-\underset{\text{R}}{\text{CH}}-\text{COO}^-$$

(C)

$$\text{H}_3^+\text{N}-\underset{\text{R}}{\text{CH}}-\text{COO}^-$$

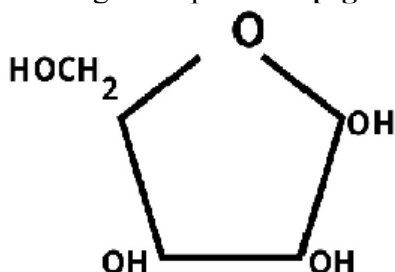
(B)

(D) All of the above
24. Lipids are generally \_\_\_\_\_ insoluble:- [Pg-144,E]  
 A) fat                      B) water                      C) Lipid                      D) All
25. Lipids could be a \_\_\_\_\_ fatty acids or has a \_\_\_\_\_ group attached to an R – group. [Pg-144,M]  
 A) Carboxyl; fatty acid  
 B) Fatty acid; simple  
 C) Carboxyl; simple  
 D) Simple; carboxyl
26. The R – group attached to the carboxyl group in a lipid could be a [Pg-144,E]  
 A) -CH<sub>3</sub>                      B) -C<sub>2</sub>H<sub>5</sub>                      C) Higher number of -CH<sub>2</sub>                      D) All of the above
27. Palmitic acid has \_\_\_\_\_ number of carbons including carboxyl carbon. [Pg-144,E]  
 A) 16                      B) 15                      C) 14                      D) 12
28. Arachidonic acid has \_\_\_\_\_ number of carbon atoms including the carboxyl [Pg-144,E]  
 A) 16                      B) 20                      C) 21                      D) 19
29. Fatty acids could be \_\_\_\_\_ ( with double bonds) or \_\_\_\_\_ ( without double bonds). [Pg-144,M]  
 A) Saturated; Unsaturated  
 B) Unsaturated; Saturated  
 C) Saturated; Saturated

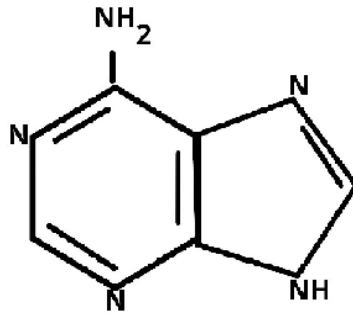
- D) Unsaturated; Unsaturated
30. How many of the following is an esterified glycerol:- [Pg-144,H]  
 Monoglyceride;  
 Diglyceride;  
 Triglyceride;  
 Muramic acid  
 Lignin;  
 Suberin  
 A) 4                                      B) 5                                      C) 6                                      D) 3
31. The oil have lower melting point [Pg-144,H]  
 A) All fats                                      B) triglycerides  
 C) Gingelly oil                                      D) All
32. A phospholipid have [Pg-144,M]  
 A) a phosphorous  
 B) a phosphorylated group  
 C) Both  
 D) None
33. The neural tissues have lipids with \_\_\_\_\_ structure [Pg-144,M]  
 A) More complex                                      B) Less complex  
 C) More simple                                      D) simple
34. Carbon compounds in living organism having heterocyclic rings could be [Pg-144,M]  
 A) Monoglyceride                                      B) Adenine  
 C) Cytosine                                      D) Both (B) & (C)
35. Adenine esterified with sugar is known as [Pg-144,M]  
 A) Adenylic acid                                      B) Adenosine  
 C) Adenotone                                      D) None of the above
36. Nucleic acids like DNA & RNA consist of [Pg-144,E]  
 A) Nucleotide & nucleoside  
 B) Nucleoside only  
 C) Nucleotide only  
 D) Nucleotide & phosphate groups.

### PARAGRAPH – 9.2 PRIMARY AND SECONDARY METABOLITES

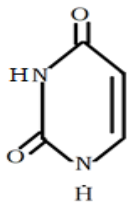
37. **Alkaloids; Flavonoids; Rubber; Essential oils; antibiotics; coloured pigments;scents; Gums spices**  
 How many of the above are primary metabolites [Pg-146,M]  
 A) 7                                      B) 9                                      C) 5                                      D) None
38. Few \_\_\_\_\_ metabolites have ecological importance's:- [Pg-146,E]  
 A) Primary & secondary                                      B) Secondary & Primary  
 C) Only Primary                                      D) Only Secondary
39. The diagram represent:- [Pg-145,E]



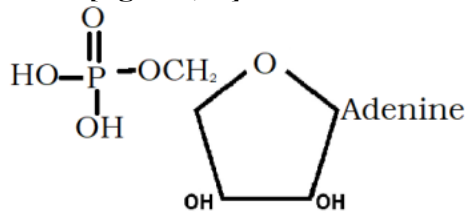
- A) Ribose                                      B) Glucose                                      C) Both                                      D) None
40. CH<sub>3</sub> – (CH<sub>2</sub>)<sub>14</sub> – COOH [Pg-145,E]  
 A) A glycerol molecule                                      B) A fatty acid  
 C) An amino acid                                      D) A carbohydrate
41. Which of the following is the compound represents the shown figure :-[Pg-145,M]



- A) A purine (Adenine)                      B) A pyrimidine (Uracil)  
 C) A purine (Uracil)                      D) A pyrimidine (Adenine)
42. Which of the following is a Nucleoside:- [Pg-145,E]  
 A) Adenylic acid                      B) Uridine  
 C) Thymidylic acid                      D) All
43. How many of the following are nitrogen bases:- [Pg-145,M]



i)



ii)

iii) Guanine

iv) Uracil

- A) All four                      B) Only three                      C) Only two                      D) Only one

### PARAGRAPH – 9.3 BIOMACROMOLECULES

45. They have molecular weight ranging from 18 to around 800 Da.  
 The above written statement represents:- [Pg-146,M]  
 A) About Biomacromolecules  
 B) One feature common to all those compounds found in the acid insoluble fraction.  
 C) Both  
 D) None
46. How many of the following statements are incorrect:- [Pg-146,H]  
 i) Acid insoluble fraction has only four types of organic compounds.  
 ii) All the compound in acid insoluble fraction have molecular weight in range of 10,000 Da and above.  
 iii) Molecular weight less than one thousand Dalton are usually referred to as Micromolecules.  
 iv) Biomacromolecules are simply known as Biomolecules.  
 A) 1                      B) 2                      C) 3                      D) 4
47. How many of the following statement is true regarding lipids in Biomacromolecules:- [Pg-146,H]  
 i) Lipids are polymeric substances.  
 ii) Have molecular weight less than 10,000 Da.  
 iii) Molecular weight do not exceed 800 Da.  
 A) only i) & ii)                      B) only iii)  
 C) All i); ii) & iii)                      D) only ii) & iii)
48. Which of the following statement is not correct:- [Pg-146,M]  
 A) After grinding cell membrane forms the vesicles.  
 B) Vesicles are water soluble.  
 C) Lipids are not strictly Biomacromolecules  
 D) None of the above
49. The acid soluble pool roughly represents \_\_\_\_\_ composition. [Pg-146,M]  
 A) Cytoplasmic                      B) Nuclear                      C) Mitochondrial                      D) None
50. The macromolecules from the cytoplasm and organelles become the [Pg-146,M]  
 A) Retentate                      B) Slurry                      C) Filtrate                      D) All
51. [Pg-147,E]  
**Component                      % of the total cellular mass**

Water	70 – 90
i)	10 – 15
ii)	3
Lipids	iii)
iv)	5 – 7
Ions	1

- A) i)  protein  
 ii)  carbohydrate  
 iii)  2  
 iv)  Nucleic acid
- B) i)  carbohydrate  
 ii)  Nucleic acid  
 iii)  2  
 (iv)  Protein
- C) i)  Nucleic acid  
 ii)  Protein  
 iii)  2  
 iv)  Carbohydrate
- D) i)  Nucleic acid  
 ii)  carbohydrate  
 iii)  2  
 iv)  Protein

### PARAGRAPH – 9.4 PROTEINS

52. Proteins are:- [Pg-147,E]  
 A) Polypeptides  
 B) Linear chains of amino acid linked by peptide bonds  
 C) Polymer of amino acids  
 D) All of them.
53. A protein is a heteropolymer:- [Pg-147,M]  
 A) It contains only one type of amino acids.  
 B) it contains different types of amino acids.  
 C) both  
 D) None
54. Which statement is incorrect:- [Pg-147,H]  
 A) homopolymers have only one type of monomer repeating 'n' number of times  
 B) Dietary proteins are source of essential amino acids.  
 C) Amino acids could be essential or non – essential  
 D) essential amino acids are synthesized in our body.
55. What are functions of proteins:- [Pg-147,M]  
 i) Carry out many functions in living organism  
 ii) Transporter of nutrients  
 iii) Fight infections  
 iv) Regulates in the form of hormones & enzymes  
 A) only two                      B) only three                      C) Only four                      D) None
56. The most abundant enzyme in animal world is \_\_\_i)\_\_\_ while in whole of the biosphere is \_\_\_ii)\_\_\_ [Pg-147,148,M]  
 A) (i) Collagen                      (ii) PEPcase  
 B) (i) RuBisCo                      (ii) PEPcase  
 C) (i) Collagen                      (ii) RuBisCO  
 D) None of them

### PARAGRAPH – 9.5 POLYSACCHARIDE

57. Polysaccharide is the part of \_\_\_ [Pg-149,M]  
 A) In – soluble fraction  
 B) Insoluble pellet

- C) Retentate  
D) All
58. A polysaccharide contains [Pg-148,E]  
A) Different Monosaccharides  
B) Same type of monosaccharide  
C) like cellulose  
D) All of these
59. Cellulose and starch is a homopolymer of [Pg- 149,M]  
A) Glucose      B) Fructose      C) Galactose      D) None
60. Which of the following statement is incorrect :- [Pg- 148,H]  
A) starch is a polysaccharide homopolymer.  
B) Inulin is a polymer of fructose  
C) In a polysaccharide chain, Right end is reducing while left end is non-reducing.  
D) Starch forms helical secondary structures.
61. (I) Starch produces blue colour after binding with I<sub>2</sub> [Pg- 149,H]  
(II) Cellulose cannot hold I<sub>2</sub>  
A) Both are wrong  
B) Both are correct  
C) (I) is correct (II) is incorrect  
D) (II) is correct (I) is incorrect
62. Paper made from plant pulp and cotton fibre is [Pg- 149,M]  
A) Starch only  
B) Cellulose  
C) Complex polysaccharide  
D) Both (B) & (C)
63. What are examples of homopolymers:- [Pg- 149,M]  
A) N – acetyl galactosamine; Glucosamine  
B) Amino acids; sugars  
C) Chitin  
D) None

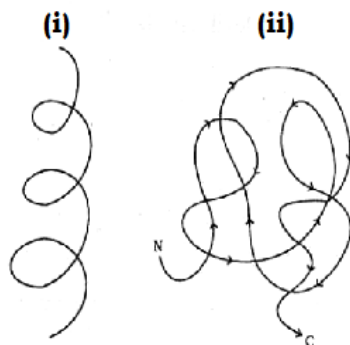
### PARAGRAPH – 9.6 NUCLEIC ACIDS

64. Nucleic acids are:- [Pg- 149,E]  
A) Polynucleosides      B) Polynucleotides      C) Both      D) None
65. A nucleotide has \_\_\_\_\_ chemical distinct compounds:- [Pg- 149,E]  
A) Only one      B) Two      C) Three      D) Four
66. A heterocyclic compound in Nucleic acid is :- [Pg- 149,E]  
A) N<sub>2</sub> – Base      B) Sugar      C) Fatty acid      D) All
67. Adenine and \_\_\_\_\_ are \_\_\_\_\_ purines [Pg- 149,M]  
A) Cytosine; Substituted  
B) Guanine; Substituted  
C) Uracil; Substituted  
D) Guanine; Unsubstituted
68. The sugar found in polynucleotides is either ribose (\_\_\_\_\_) or \_\_\_\_\_ [Pg- 149,M]  
A) 2' deoxyribose; monosaccharide      B) Monosaccharide; 2' deoxyribose  
C) Disaccharide; 2' deoxyribose      D) Disaccharide; Monosaccharide

### PARAGRAPH – 9.7 STRUCTURE OF PROTEINS

69. In a protein the left end represents:- [Pg- 149,150,E]  
A) First amino acid & C – terminal  
B) Last amino acid & N – terminal  
C) First amino acid & N – terminal  
D) Last amino acid & C – terminal
70. In a protein the right end represents [Pg- 149,150,E]  
A) First amino acid & C – terminal  
B) Last amino acid & N – terminal

- C) First amino acid & N – terminal  
 D) Last amino acid & C – terminal
71. Which of the following statement is Untrue:- [Pg- 150,H]  
 A) A protein thread is folded in the form of a helix.  
 B) Only some portion of the protein thread are arranged in the form of a helix  
 C) In proteins only left handed helices are observed.  
 D) Both (B) & (C)
72. The long protein chain is also folded upon itself like a hollow woolen ball known as:- [Pg- 150,M]  
 A) Primary structure  
 B) Secondary Structure  
 C) Tertiary structure  
 D) None of the above
73. Identify the diagram given below [Pg- 150,M]



- A) (i) Primary (ii) Secondary  
 B) (i) Secondary (ii) Tertiary  
 C) (i) Tertiary (iii) Primary  
 D) None of the above
74. Protein polypeptides or subunits arranged with respect to each other of a protein otherwise called the [Pg- 150,E]  
 A) Primary structure  
 B) Tertiary structure  
 C) Quaternary structure  
 D) Secondary structure
75. A adult human Hb (Haemoglobin) consists of \_\_\_\_\_ subunits.  
 A) 1  
 B) 2  
 C) 3  
 D) 4
76. \_\_\_\_\_ subunits of  $\alpha$  – type and \_\_\_\_\_ of  $\beta$  – type together constitute the human haemoglobin(Hb):- [Pg- 150,M]  
 A) 2; 4  
 B) 2; 2  
 C) 4; 2  
 D) 4; 4

### PARAGRAPH – 9.8 NATURE OF BOND LINKING MONOMERS IN A POLYMER.

77. In polypeptide amino acids are linked by [Pg- 151,M]  
 A) H – bond  
 B) Glycosidic Bond  
 C) Peptide bond  
 D) Peptide and H – bond both
78. Choose the correct statement about peptide bond [Pg- 151,H]  
 A) It is formed when carboxyl(-COOH) group of one amino acids react with carboxyl (-NH<sub>2</sub>) group of other amino acid.  
 B) It is formed when amino (-NH<sub>2</sub>) group of one amino acid react with carboxyl (-COOH) group of other amino acid.  
 C) It is formed when carboxyl group (-COOH) of one amino acid react with amino (-NH<sub>2</sub>) group of other amino acid.  
 D) It is formed when amino (-NH<sub>2</sub>) group of one amino acid react with amino (-NH<sub>2</sub>) group of other amino acid.
79. Peptide bond is formed by- [Pg- 151,H]  
 A) Elimination of water moiety i.e. rehydration  
 B) Addition of water moiety i.e. rehydration  
 C) Addition of water moiety i.e. dehydration  
 D) Elimination of water moiety i.e. dehydration
80. Polysaccharide is formed by linking of monosaccharide by- [Pg- 151,M]



## PARAGRAPH – 9.9 DYNAMIC STATE OF BODY CONSTITUENT'S CONCEPT OF METABOLISM

94. What is 'turn over'? [Pg- 152,E]  
A) Biomolecules are never being changed into some other biomolecules and also made from some other biomolecules.  
B) Biomolecules are constantly being changed into some other biomolecules but never made from some other biomolecules.  
C) Biomolecules are never being changed into some other biomolecules nor being made from some other biomolecules.  
D) Biomolecules are constantly being changed into some other biomolecules and also made from some other biomolecules.
95. The breaking & making through chemical reaction which occur constantly in living organism are called [Pg- 152,M]  
A) Metabolism                      B) Anabolism  
C) Catabolism                      D) none of these
96. Amine are formed by- [Pg- 152,M]  
A) removal of (-COOH) from amino acid  
B) removal of (CO<sub>2</sub>) from amino acid  
C) addition of (CO<sub>2</sub>) to amino acid  
D) addition of (COOH) to amino acid
97. Metabolites are converted into each other in a series of linked reactions called \_\_\_\_\_. [Pg- 152,M]  
A) Catabolic pathway only  
B) Anabolic pathway only  
C) Metabolic pathway  
D) None of these
98. Metabolic pathway are- [Pg- 152,E]  
A) Linear only  
B) Circular only  
C) May be linear or circular  
D) None of them
99. How many uncatalysed metabolic conversion is / are found in living system [Pg- 152,E]  
A) 1  
B) More than 1 but less than 100  
C) Zero  
D) Thousand

## PARAGRAPH – 9.10 METABOLIC BASIS FOR LIVING

100. Metabolic pathway that lead to a more complex structure from a simpler structure is / are [Pg- 153,M]  
A) Anabolic pathway  
B) Catabolic pathway  
C) Both A & B  
D) None of these
101. Choose the correct about catabolic pathway [Pg- 153,H]  
i) Metabolic pathway that lead to simpler structure from a complex structure.  
ii) Glucose becomes lactic acid in our skeletal muscles  
iii) Acetic acid becomes cholesterol.  
iv) Metabolic pathway that lead to more complex structure from a simpler structure.  
A) i & iii                      B) i & ii                      C) iv & ii                      D) iv & iii
102. Which of following expect to consume energy? [Pg- 153,H]  
i) When glucose is degraded to lactic acid  
ii) Assembly of protein from amino acid  
iii) Anabolic pathway  
iv) Catabolic pathway  
A) i & iii                      B) i & iv                      C) ii & iii                      D) ii & iv

103. How many of following is /are correct about glycolysis [Pg- 153,H]  
 i) Formation of glucose from lactic acid  
 ii) Occur in ten(10) metabolic step.  
 iii) Energy liberated during degradation is store in form of chemical bond.  
 iv) Formation of lactic acid from glucose  
 A) i, ii, iii                      B)ii, iii, iv                      C) i & ii                      D) i & iv
104. Energy currency in living system is –[Pg- 153,E]  
 A) Adenosine triphosphate                      B) Glucose  
 C) Protein                      D) Enzyme
105. Bioenergetics deals with- [Pg- 153,M]  
 A) How do living organism derive their energy  
 B) How do living organism store energy & in what form.  
 C) How do living organism convert energy into work.  
 D) All of these

### PARAGRAPH – 9.11 THE LIVING STATE

106. The blood concentration of glucose in normal healthy individuals is [Pg- 153,E]  
 A) Less than 2.4 mmol/L  
 B) More than 10 mmol/L  
 C) 4.2 mmol/L – 5.0 mmol/L  
 D) None of these
107. Living state is – [Pg- 153,M]  
 A) Equilibrium steady – state to be not to perform work.  
 B) Non – equilibrium steady – state to be not to perform work.  
 C) Equilibrium steady – state to be able to perform work.  
 D) Non – equilibrium steady – state to be able to perform work.
108. Living process is a constant effort to prevent falling into equilibrium. This is achieved by – [Pg- 153]  
 A) Energy output                      B) energy input  
 C) Both of these                      D) None of these

### PARAGRAPH – 9.12 ENZYMES

109. Enzymes are chemically – [Pg- 154,E]  
 A) Protein                      B) Carbohydrate                      C) Lipid                      D) Nucleic acid
110. Ribozymes are chemically [Pg- 154,M]  
 A) Protein                      B) Lipid                      C) Carbohydrate                      D) Nucleic acid
111. What is / are difference between inorganic catalyst and enzyme catalyst. [Pg- 154,H]  
 A) inorganic catalysts work efficiently at low temperature but enzyme of only thermophilic organism work efficiently at low temperature  
 B) Inorganic catalyst work efficiently at high temperature but enzyme get damaged at high temperature except of microbes that are live in sulphur springs  
 C) Inorganic catalyst are not efficient at high temperature but enzymes of all living organism work efficiently at high temperature.  
 D) None of these
112. Choose correct regarding “active site” [Pg- 154,M]  
 1) Substrate fits  
 2) Enzymes catalyst through active site show low rate  
 3) It forms by crevices or pocket made by primary protein only.  
 4) It form by crevices or pocket made by tertiary protein structure  
 A) 1, 2, 3                      B) 1, 2, 4                      C) 1, 3                      D) 1, 4

### PARAGRAPH – 9.12.1 CHEMICAL REACTION

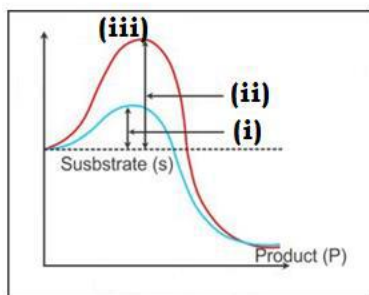
113. Physical change refers to – [Pg- 154,E]  
 A) Change in shape without breaking bonds.  
 B) Change in state of matter  
 C) Ice  water  water vapour.  
 D) All of these
114. Chemical change differ from physical change in [Pg- 154,M]

- A) Dissociation of bond  
 B) Formation of new bond  
 C) A & B bond  
 D) There is no difference in both
115. Hydrolysis of starch into glucose is :- [Pg- 154,M]  
 A) Inorganic chemical reaction  
 B) Organic chemical reaction  
 C) Physical changes  
 D) A & B both
116. Rate of physical or chemical process refer to – [Pg- 154,M]  
 A) Amount of reactant formed per unit time  
 B) Amount to product dissociate per unit time  
 C) Differential of time with respect to produce  
 D) Differential of product with respect to time
117. Choose the correct [Pg- 154,H]  
 A) Rate can be called velocity if the direction is not specific.  
 B) Rate of physical & chemical processes are not influenced by temperature  
 C) Catalysed reaction proceeds at rates vastly lower than that of uncatalyzed ones.  
 D) Catalysed reaction proceeds at rates vastly higher than that of uncatalyzed ones.
118. Choose the correct response [Pg- 154,H]  
 A) For every increase by 10°C, rate is double  
 B) Rate decrease by one – fourth by decrease in temperature by 10°C.  
 C) When enzymes catalysed reaction are observed the rate would be vastly lower than the same but uncatalyzed reaction.  
 D) None of these
119. Choose correct response with respect to given equation:- [Pg- 155,H]  
 Carbon dioxide + water  $\rightleftharpoons$  carbonic acid  
 A) Carbonic anhydrase is enzyme required for accelerated reaction.  
 B) In absence of enzyme, still this reaction is fast enough  
 C) 200 molecules of H<sub>2</sub>CO<sub>3</sub> being per hour formed by enzyme accelerated reaction.  
 D) 600,000 molecules of H<sub>2</sub>CO<sub>3</sub> being formed every second in absence of any enzyme.
120. Which of the following is correct chemical formula for pyruvic acid? [Pg- 155,E]  
 A) C<sub>2</sub>H<sub>3</sub>O<sub>4</sub>                      B) C<sub>3</sub>H<sub>3</sub>O<sub>3</sub>                      C) C<sub>3</sub>H<sub>4</sub>O<sub>3</sub>                      D) C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>
121. Match column – I and column – II [Pg- 155,M]  
**Column – I (Metabolic pathway)**                      **Column – II (Occurrence)**  
 A. Formation of alcohol                      (i) Anaerobic condition of skeletal muscle  
 B. Formation of pyruvic acid                      (ii) Yeast  
 C. Formation of lactic acid                      (iii) Aerobic condition of normal human cell  
 A) A - I, B -iii, C -ii                      B) A-iii, B -ii, C -I  
 C) A -ii, B -I, C -iii                      D) None of these

### PARAGRAPH – 9.12.2 HOW DO ENZYMES BEING ABOUT SUCH HIGH RATES OF CHEMICAL CONVERSIONS?

122. Which of the following is correct about enzymes [Pg- 155,M]  
 A) It is 2 – D structure  
 B) Convert product into substrate  
 C) They have active site  
 D) All of these
123. Transition state structure is formed when – [Pg- 155,M]  
 A) Enzyme is free  
 B) Enzyme bound with product  
 C) 'ES' complex  
 D) Substrate structure do not change until product formed.
124. Which of following are unstable [Pg- 155,156,M]  
 A) Enzyme      B) Product      C) Reactant                      D) Intermediate structural states.

125. [Pg- 156,E]



(i)

(ii)

(iii)

- A) Activation energy without enzyme    Transition state    Activation energy with enzyme  
 B) Transition state    Activation energy without enzyme    Activation energy with enzyme  
 C) Activation energy with enzyme    Activation energy without enzyme    Transition state  
 D) Activation energy without enzyme    Activation with enzyme    Transition state
126. Choose correct response [Pg-156,E]  
 i) Y – axis represent potential energy  
 ii) X – axis represent substrate  
 iii) Y – axis represent progress of reaction  
 iv) X – axis represent state through transition state  
 A) i) & ii)                      B) iii) & iv)                      C) i) & iv)                      D) ii) & iii)
127. If 'P' (product) is at lower level than 's' (substrate), the reaction is \_\_\_\_\_ [Pg-156,H]  
 A) Endothermic reaction  
 B) Exothermic reaction  
 C) Spontaneous reaction  
 D) A & C both

### PARAGRAPH – 9.12.3

#### NATURE OF ENZYME ACTION

128. Which is correct way to represent enzyme action [Pg-157,E]  
 A)  $E + S \rightarrow ES \rightleftharpoons EP \rightleftharpoons E + P$   
 B)  $E + S \rightleftharpoons E + P$   
 C)  $E + S \rightleftharpoons ES \rightarrow EP \rightarrow E + P$   
 D)  $E + S \rightarrow ES \rightarrow EP \rightleftharpoons E + P$
129. ES complex is \_\_\_\_\_ and dissociates into \_\_\_\_\_ and \_\_\_\_\_ [Pg-156,E]  
 A) Long lived; product; changed enzyme  
 B) Short lived; reactant, changed enzyme  
 C) Long lived, reactant, unchanged enzyme  
 D) Short lived, product, unchanged enzyme
130. Arrange in correct sequence of catalytic cycle of an enzyme action- [Pg-157,H]  
 i) The active site of the enzyme, now in close proximity of the substrate breaks the chemical bonds of the substrate and the new enzyme product complex is formed  
 ii) The substrate binds to the active site of enzyme, fitting into the active site  
 iii) The enzyme release the products of the reaction and the free enzyme is ready to bind to another molecule of the substrate  
 iv) The binding of the substrate induces the enzyme to alter its shape, fitting more tightly around the substrate.  
 A) i □ ii □ iii □ iv                      B) i □ iii □ ii □ iv  
 C) ii □ iv □ iii □ I                      D) ii □ iv □ i □ iii

### PARAGRAPH – 9.12.4 FACTORS

#### AFFECTING ENZYME ACTIVITY

131. Which of the following can change enzyme activities? [Pg-157,H]  
 A) All such activities that can alter the tertiary structure of the protein  
 B) Temperature pH

- C) Substrate conditions  
D) All of these
132. Enzyme activity decline- [Pg-157,H]  
A) Above the optimum value  
B) Below the optimum value  
C) A & B both  
D) Enzyme activity never decline
133. Optimum pH refer to – [Pg-157,E]  
A) pH at which enzyme activity is lowest  
B) pH at which enzyme activity is highest  
C) pH at which enzyme activity started immediately  
D) pH at which enzyme activity ended completely
134. choose response with respect to enzyme activities [Pg-157,H]  
i) low temperature destroy enzyme  
ii) high temperature preserve enzyme in a temporarily inactive state  
iii) optimum temperature is temperature at which enzyme activity is highest  
iv) As temperature increase, enzyme activity increase until optimum and thereafter increase in temperature lead to decline in enzyme activities  
v) As temperature increase enzyme activities is zero until optimum temperature & thereafter increase in temperature lead to increase in enzyme activities  
A) i, iii, iv      B) ii, v      C) i, iv, v      D) iii, iv
135. As pH increase, enzyme activity- [Pg-157,M]  
A) Constantly increase  
B) Constantly decrease  
C) No effect  
D) Increase until optimum and decrease further pH
136. With increase in substrate concentration, the velocity of the enzymatic reaction – [Pg-158,H]  
A) Constantly increase  
B) Rise at first until  $V_{max}$  and further no rise  
C) No effect  
D) Decrease first until  $V_{max}$  and increase further
137. After reaching  $V_{max}$ , the enzymatic reaction does not exceed by any further rise in concentration of substrate because- [Pg-158,H]  
A) Enzymes molecules are fewer than substrate molecules  
B) After saturation of those enzyme molecules these are no free enzyme molecules to bind with additional substrate molecules  
C) A & B  
D) After saturation of those enzyme molecules, enzyme get changed in it's form.
138. When the binding chemical shut off enzyme activity, the process is called \_\_\_\_\_ and the chemical is called [Pg-158,M]  
A) Inhibition; inhibitor  
B) Inhibition; cofactors  
C) Exhibition, exhibitor  
D) None of these
139. What effect is observe on enzyme activity due to inhibitor [Pg-158,M]  
A) It fasten enzyme kinetics  
B) It decline enzyme kinetics  
C) It shut off enzyme kinetics  
D) No effect on enzyme kinetics
140. Inhibition of succinic dehydrogenase by malonate is due to [Pg-158,M]  
A) Malonate closely resembles with substrate succinate in structure  
B) Malonate is competitive inhibitor  
C) It binds with active site of succinic dehydrogenase in place of substrate  
D) All of these
141. Competitive inhibitors are often used in the control of – [Pg-158,M]  
A) Viral pathogen  
B) Bacterial pathogen  
C) Both A & B  
D) None of these

### PARAGRAPH – 9.12.5 CLASSIFICATION & NOMENCLATURE OF ENZYME

142. Enzyme are divided into how many classes- [Pg-158,E]  
A) 2      B) 4      C) 6      D) 8

143. Each classes of enzyme were further classification into \_\_\_\_\_ subclass and named by \_\_\_ digit [Pg-158,M]  
 A) 13; 4 – 13    B) 4 – 13; 13    C) 4 – 13; 4    D) 4; 4 – 13
144. S reduced + S' oxidised  $\rightarrow$  S oxidised + S' reduced [Pg-158,M]  
 A) Oxidoreductase    B) Dehydrogenase  
 C) Transferase    D) A & B both
145. Enzyme catalysing a transfer of a group i.e. hydrogen between pair of substrate S and S' is- [Pg-158,M]  
 A) Transferase    B) Oxidoreductase    C) Lyases    D) Ligases
146. Transferase enzyme catalyse a transfer of G between pair substrate S & S'.  
 G is other than – [Pg-158,E]  
 A) Oxygen    B) Amino    C) Hydrogen    D) Carbon
147. Hydrolases catalyse – [Pg-158,E]  
 i) Hydrolysis of ester, ether, peptide, glycosidic,  
 ii) C – C breakdown  
 iii) C – halide breakdown  
 iv) P – N breakdown  
 A) (i) only    B) (i) & (ii) only  
 C) (iii) & (iv) only    D) D) i, ii, iii & iv
148. Lysase catalyse \_\_\_\_\_ of groups from substrates by mechanism other than hydrolysis leaving \_\_\_\_\_ bond. [Pg-158,E]  
 A. Addition ; double    B. Removal ; double  
 C. Addition ; single    D. Removal ; triple
149. Isomerases catalyse inter-conversion of: [Pg-159,E]  
 A. Optical isomer    B. Geometrical isomer  
 C. Position isomer    D. All of these
150. Linking of two compound is achived by- [Pg-159,M]  
 A) Lyases    B) Transferase    C) Ligases    D) Hydrolase
151. Ligase catalyse- [Pg-159,E]  
 A) Joining of C-O  
 B) Oxidation – reduction of substrate  
 C) Hydrolysis of C-C  
 D) Conversion of optical isomer
- PARAGRAPH – 9.12.6 CO-FACTORS:**
152. Cofactors are:- [Pg-159,M]  
 A) Proteinous part of enzyme  
 B) Non-proteinous part of enzyme  
 C) Bound to substrate  
 D) Bound to enzyme to make enzyme catalytically retard
153. How many kind of cofactors may be identified-[Pg-159,E]  
 A) 1    B) 2    C) 3    D) Zero
154. Cofactors are \_\_\_\_\_ and apoenzyme are \_\_\_\_\_ part of enzyme. [Pg-159,M]  
 A) Protein; protein  
 B) Non-protein; non-protein  
 C) Protein; non-protein  
 D) Non-protein; protein
155. Prosthetic group are \_\_\_\_\_ and are distinguished from other cofactors in that they are \_\_\_\_\_ bound to apoenzyme. [Pg-159,M]  
 A) Organic compound; tightly  
 B) Organic compound; loosely  
 C) Inorganic compound; loosely  
 D) Inorganic compound; tightly
156. Which of following is/are correct? [Pg-159,H]  
 (i) Haem is prosthetic group.

- (ii) Haem is apoenzyme.  
 (iii) Haem is not part of active site of peroxidase.  
 (iv) Haem catalyse the formation of hydrogen peroxide from water & oxygen.  
 (v) Haem is part of active site of peroxidase.  
 (vi) Haem catalyse the breakdown of hydrogen peroxide into water & oxygen.  
 A) i , iii , vi      B) ii , iv , v      C) i , v , vi      D) ii , v , vi
157. NAD & NADP contain- [Pg-159,E]  
 A) Vitamin niacin      B) Vitamin C      C) Vitamin D      D) Vitamin K
158. Full form of NAD is:- [Pg-159,E]  
 A) Nicotinamide adenine nucleotide  
 B) Nicotinamide adenine dinucleoside  
 C) Nicotinamide adenine dinucleotide  
 D) Nicotinamide adenine nucleoside
159. Choose correct response from following with respect to carboxypeptidase. [Pg-159,H]  
 A) Zinc are found as apoenzyme  
 B) It is proteolytic enzyme  
 C) Cofactor from covalent bond with side chain at active site  
 D) Between cofactor and substrate ionic bond is formed
160. How many coordination found in activity of carboxypeptidase? [Pg-159,M]  
 A) Only one ; between cofactor and side chain at active site  
 B) Two between cofactor and side chain at active site and at to many ; same time form one or more bond with substrate.  
 C) Zero  
 D) Only one ; between cofactor & substrate
161. Find mismatch. [Pg-159,H]
- | Column-I             | Column-II        |
|----------------------|------------------|
| (a) Carboxypeptidase | (i) Zinc         |
| (b) NADP             | (ii) Niacin      |
| (c) Haem             | (iii) Peroxidase |
| (d) NAD              | (iv) Zinc        |
162. When cofactor is removed from enzyme ; what effect is observed. [Pg-159,H]  
 A) Catalytic activity lost  
 B) Catalytic activity enhance  
 C) Catalytic activity fix at optimum  
 D) None of these

## NEET PREVIOUS YEARS QUESTIONS

1. The two functional groups characteristic of sugars are [2018]  
 (a) Hydroxyl and methyl      (b) Carbonyl and methyl  
 (c) Carbonyl and hydroxyl      (d) Carbonyl and phosphate
2. Which of the following are not polymeric? [2017]  
 (a) Proteins (b) Polysaccharides      (c) Lipids (d) Nucleic acids
3. Which one of the following statements is **correct** with reference to enzymes? [2017]  
 (a) Holoenzyme = Apoenzyme + Coenzyme      (b) Coenzyme = Apoenzyme + Holoenzyme  
 (c) Holoenzyme = Coenzyme + Co-factor      (d) Apoenzyme = Holoenzyme + Coenzyme
4. A typical fat molecule is made up of [2016]  
 (a) three glycerol molecules and one fatty acid molecule.  
 (b) one glycerol and three fatty acid molecules.  
 (c) one glycerol and one fatty acid molecule.      (d) three glycerol and three fatty acid molecules.

5. Which one of the following statements is **incorrect**? [2016]  
 (a) Sucrose is a disaccharide. (b) Cellulose is a polysaccharide.  
 (c) Uracil is a pyrimidine. (d) Glycine is a sulphur containing amino acid.
6. The amino acid Tryptophan is the precursor for the synthesis of [2016]  
 (a) melatonin and serotonin. (b) thyroxine and triiodothyronine.  
 (c) estrogen and progesterone. (d) cortisol and cortisone.
7. Which of the following biomolecules does have phosphodiester bond? [2015]  
 (a) Monosaccharides in a polysaccharide. (b) Amino acids in a polypeptide.  
 (c) Nucleic acids in a nucleotide. (d) Fatty acids in a diglyceride.
8. Which one of the following statements is **incorrect**? [2015]  
 (a) In competitive inhibition, the inhibitor molecule is not chemically changed by the enzyme.  
 (b) The competitive inhibitor does not affect the rate of breakdown of the enzyme-substrate complex.  
 (c) The presence of the competitive inhibitor decreases the  $K_m$  of the enzyme for the substrate.  
 (d) A competitive inhibitor reacts reversibly with the enzyme to form an enzyme-inhibitor complex.
9. Which one of the following is a non-reducing carbohydrate? [2014]  
 (a) Maltose (b) Sucrose (c) Lactose (d) Ribose 5 - phosphate
10. Select the statement which is **not correct** with respect to enzyme action. [2014]  
 (a) Substrate binds with enzyme at its active site.  
 (b) Addition of lot of succinate does not reverse the inhibition of succinic dehydrogenase by malonate.  
 (c) A non-competitive inhibitor binds the enzyme at a site distinct from that which binds the substrate.  
 (d) Malonate is a competitive inhibitor of succinic dehydrogenase.
11. Which of the following glucose transporters is insulin-dependent? (NEET-2019)  
 (1) GLUT I (2) GLUT II (3) GLUT III (4) GLUT IV
12. Concanavalin A is : (NEET-2019)  
 (1) an alkaloid (2) an essential oil (3) a lectin (4) a pigment
13. Consider the following statements : (NEET-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) Both (A) and (B) are true. (2) (A) is true and (B) is false.  
 (3) Both (A) and (B) are false. (4) (A) is false and (B) is true.
14. Which of the following organic compounds is the main constituent of Lecithin? (NEET-2019 ODISSA)  
 (1) Arachidonic acid (2) Phospholipid (3) Cholesterol (4) Phosphoprotein
15. Prosthetic groups differ from co-enzymes in that :- (NEET-2019 ODISSA)  
 (1) they require metal ions for their activity.  
 (2) they (prosthetic groups) are tightly bound to apoenzymes.  
 (3) their association with apoenzymes is transient.  
 (4) they can serve as co-factors in a number of enzyme-catalyzed reactions.
16. Identify the statement which is incorrect. (NEET-2020 COVID-19)  
 (1) Sulphur is an integral part of cysteine.  
 (2) Glycine is an example of lipids.  
 (3) Lecithin contains phosphorus atom in its structure.  
 (4) Tyrosine possesses aromatic ring in its structure.
17. Identify the substances having glycosidic bond and peptide bond, respectively in their structure:

(NEET-2020)

- 1) Inulin, insulin      2) Chitin, cholesterol      3) Glycerol, trypsin      4) Cellulose, lecithin

18. Match the following:

(NEET-2020)

- |                                     |               |
|-------------------------------------|---------------|
| (a) Inhibitor of catalytic activity | (i) Ricin     |
| (b) Possess peptide bonds           | (ii) Malonate |
| (c) Cell wall material in fungi     | (iii) Chitin  |
| (d) Secondary metabolite            | (iv) Collagen |

Choose the correct option from the following:

- |          |       |      |      |          |      |       |      |
|----------|-------|------|------|----------|------|-------|------|
| (a)      | (b)   | (c)  | (d)  | (a)      | (b)  | (c)   | (d)  |
| 1) (ii)  | (iii) | (i)  | (iv) | 2) (ii)  | (iv) | (iii) | (i)  |
| 3) (iii) | (i)   | (iv) | (ii) | 4) (iii) | (iv) | (i)   | (ii) |

19. Which of the following statements is correct?

(NEET-2020)

- 1) Adenine does not pair with thymine
- 2) Adenine pairs with thymine through two H-bonds
- 3) Adenine pairs with thymine through one H-bond
- 4) Adenine pairs with thymine through three H-bonds

20. Which one of the following is the most abundant protein in the animals?

(NEET-2020)

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

21. Identify the basic amino acid from the following

(NEET-2020)

- 1) Valine      2) Tyrosine      3) Glutamic Acid      4) Lysine

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

[NEET-2021]

- 1) Amino acids, glucose      2) Vinblastin, curcumin  
3) Rubber, gums      4) Morphine, codeine

23. Match List - I with List - II

	List - I		List - II
a)	Protein	i)	C = C double bonds
b)	Unsaturated fatty acid	ii)	Phosphodiester bonds
c)	Nucleic acid	iii)	Glycosidic bonds
d)	Polysaccharide	iv)	Peptide bonds

- |    |    |     |     |     |
|----|----|-----|-----|-----|
|    | a  | b   | c   | d   |
| 1) | i  | iv  | iii | ii  |
| 2) | ii | i   | iv  | iii |
| 3) | iv | iii | i   | ii  |
| 4) | iv | i   | ii  | iii |

24. Identify the incorrect pair

[NEET-2021]

- 1) Toxin      -      Abrin  
2) Lectins      -      Concanavalin A  
3) Drugs      -      Ricin  
4) Alkaloids      -      Codeine

25. Following are the statements with reference to 'lipids'

[NEET-2021]

- a) Lipids having only single bonds are called unsaturated fatty acids
- b) Lecithin is a phospholipid
- c) Trihydroxy propane is glycerol.

- d) Palmitic acid has 20 carbon atoms including carboxyl carbon.  
e) Arachidonic acid has 16 carbon atoms.

Choose the correct answer from the options given below.

- 1) c and d only      2) b and c only      3) b and e only      4) a and b only

26. Read the following statements on lipids and find out correct set of statements: [NEET-2022]

- a) Lecithin found in the plasma membrane is a glycolipid  
b) Saturated fatty acids possess one or more  $C=C$  bonds  
c) Gingelly oil has lower melting point, hence remains as oil in winter  
d) Lipids are generally insoluble in water but soluble in some organic solvents  
e) When fatty acid is esterified with glycerol, monoglycerides are formed

Choose the correct answer from the options given below:

- 1) a, b and c only      2) a, d and e only  
3) c, d and e only      4) a, b and d only

27. A dehydration reaction links two glucose molecules to produce maltose. If the formula for glucose is  $C_6H_{12}O_6$  then what is the formula for maltose? [NEET-2022]

- 1)  $C_{12}H_{20}O_{10}$       2)  $C_{12}H_{24}O_{12}$       3)  $C_{12}H_{22}O_{11}$       4)  $C_{12}H_{24}O_{11}$

28. Match List-I with List-II [NEET-2022]

**List-I**

**(Biological Molecules)**

- (a) Glycogen  
(b) Globulin  
(c) Steroids  
(d) Thrombin

**List-II**

**(Biological functions)**

- (i) Hormone  
(ii) Biocatalyst  
(iii) Antibody  
(iv) Storage product

Choose the correct answer from the options given below:

- 1) (a) - (iii), (b) - (ii), (c) - (iv), (d) - (i)      2) (a) - (iv), (b) - (ii), (c) - (i), (d) - (iii)  
3) (a) - (ii), (b) - (iv), (c) - (iii), (d) - (i)      4) (a) - (iv), (b) - (iii), (c) - (i), (d) - (ii)

29. Cellulose does not form blue color with Iodine because

- (a) It is a helical molecule  
(b) It does not contain complex helices and hence cannot hold iodine molecules  
(c) It breaks down when iodine reacts with it  
(d) It is a disaccharide

[NEET 2023]

30. Lecithin, a small molecular weight organic compound found in living tissues, is an example of:

- (a) Amino acids      (b) Phospholipids  
(c) Glycerides      (d) Carbohydrates

[NEET 2024]

31. The cofactor of the enzyme carboxypeptidase is:

- (a) Zinc      (b) Niacin  
(c) Flavin      (d) Haem

[NEET 2024]

32. Inhibition of Succinic dehydrogenase enzyme by malonate is a classical example of:

- (a) Cofactor inhibition  
(b) Feedback inhibition  
(c) Competitive inhibition  
(d) Enzyme activation

[NEET 2024]

33. Match List-I with List-II

**List-I**

- A. GLUT-4
- B. Insulin
- C. Trypsin
- D. Collagen

**List-II**

- I. Hormone
- II. Enzyme
- III. Intercellular ground substance
- IV. Enables glucose transport into cells

Choose the correct answer from the options given below.

- (a) A-IV, B-I, C-II, D-III
- (b) A-I, B-II, C-III, D-IV
- (c) A-II, B-III, C-IV, D-I
- (d) A-III, B-IV, C-I, D-II

[NEET 2024]

34. Match List I with List II :

	List-I		List-II
A.	Lipase	I.	Peptide bond
B.	Nuclease	II.	Ester bond
C.	Protease	III.	Glycosidic bond
D.	Amylase	IV.	Phosphodiester bond

Choose the correct answer from the options given below :

- (a) A-IV, B-II, C-III, D-I
- (b) A-III, B-II, C-I, D-IV
- (c) A-II, B-IV, C-I, D-III
- (d) A-IV, B-I, C-III, D-II

[NEET 2024]

35. Given below are two statements:

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

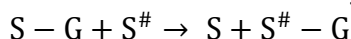
**Statement II :** When the inhibitor closely resembles the substrate in its molecular structure and inhibits the activity of the enzyme, it is known as competitive inhibitor.

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

- (a) Both Statement I and Statement II are false.
- (b) Statement I is true but Statement II is false.
- (c) Statement I is false but Statement II is true.
- (d) Both Statement I and Statement II are true.

[NEET 2023]

36.- Name the class of enzyme that usually catalyze the following reaction:



Where, G → a group other than hydrogen

S → a substrate

S<sup>#</sup> → another substrate

- (a) Hydrolase
- (b) Lyase
- (c) Transferase
- (d) Ligase

[NEET 2025]

37. Which one of the following enzymes contains 'Haem' as the prosthetic group?

- (a) RuBisCo
- (b) Carbonic anhydrase
- (c) Succinate dehydrogenase
- (d) Catalase

[NEET 2025]

38. Match List I with List II.

**List I**

- A. Adenosine
- B. Adenylic acid
- C. Adenine
- D. Alanine

**List II**

- I. Nitrogen base
- II. Nucleotide
- III. Nucleoside
- IV. Amino acid

Choose the option with all correct matches.

- (a) A-III, B-IV, C-II, D-I
- (b) A-III, B-II, C-IV, D-I
- (c) A-III, B-II, C-I, D-IV
- (d) A-II, B-III, C-I, D-IV

[NEET 2025]

39. The protein portion of an enzyme is called:

- (a) Cofactor
- (b) Coenzyme
- (c) Apoenzyme
- (d) Prosthetic group

[NEET 2025]

## NCERT LINE BY LINE QUESTIONS – ANSWERS

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

111) B	112) D	113) D	114) C	115) A	116) D	117) D	118) A	119) A	120) C
121) D	122) C	123) C	124) D	125) C	126) C	127) B	128) C	129) D	130) D
131) D	132) C	133) B	134) D	135) D	136) B	137) C	138) A	139) C	140) D
141) B	142) C	143) C	144) A	145) A	146) C	147) D	148) B	149) D	150) C
151) A	152) B	153) B	154) D	155) A	156) C	157) A	158) C	159) B	160) B
161) D	162) A								

## NEET PREVIOUS YEARS QUESTIONS-ANSWERS

1) C	2) C	3) A	4) B	5) D	6) A	7) C	8) C	9) B	10) B
11) 4	12) 3	13) 3	14) 2	15) 2	16) 2	17) 1	18) 2	19) 2	20) 3
21) 4	22) 1	23) 4	24) 3	25) 2	26) 3	27) 3	28) 4		
29) b	30) b	31) a	32) c	33) a	34) c	35) d	36) c		
37) d	38) c	39) c	40)	41)	42)	43)	44)		

## NEET PREVIOUS YEARS QUESTIONS-EXPLANATIONS

1. (c) Sugar is a carbohydrate. These are polyhydroxy aldehyde, ketone or their derivatives, which means they have carbonyl and hydroxyl groups in its structure.
2. (c) – Nucleic acids are polymers of nucleotides.  
– Proteins are polymers of amino acids.  
– Polysaccharides are polymers of monosaccharides.  
– Lipids are the tri-esters of fatty acids with glycerol.
3. (a) Holoenzyme is conjugated enzyme which consists of a protein part called apoenzyme and a non-protein called cofactor. Coenzyme are also organic compounds but their association with apoenzyme is only transient and acts as cofactors.
4. (b)
5. (d) Glycine (abbreviated as Gly or G) is the smallest of the 20 amino acids commonly found in proteins, and indeed is the smallest possible (having a hydrogen substituent as its side-chain). The formula is  $\text{NH}_2\text{CH}_2\text{COOH}$ . Its codons are GGU, GGC, GGA, GGG of the genetic code
6. (a)
7. (c) Nucleic acids have phosphodiester bond in a nucleotide.
8. (c)  $K_m$  increases but  $V_{max}$  remains the same in competitive inhibition. This is because, on slightly increasing the substrate concentration, the effect of inhibitor is removed.
9. (b) Sucrose is classified under non reducing sugars because it does not have any free aldehyde or keto group.
10. (b) Inhibitions of succinic dehydrogenase by malonate is an example of competitive inhibition. Thus, it is reversible reaction. On increasing the substrate (succinate) concentration the effect of inhibitor is removed and  $V_{max}$  remain same.
17. Inulin is polymer of fructose, these sugars linked by glycosidic bond  
Insulin is polymer of amino acids, these amino acids linked by peptide bond
18. (a) Malonate is competitive inhibitor of enzyme succinic dehydrogenase enzyme  
(b) Collagen is most abundant animal protein. Amino acids of these proteins are linked by peptide bonds  
(c) Chitin is cell wall material in fungi

- (d) Ricin is a secondary metabolite
19. Adenine pairs with thymine through two H-bonds, guanine pairs with cytosine with 3 hydrogen bonds in a DNA molecule
  20. The most abundant protein in animals is collagen
  21. Lysine is basic amino acid
  22. Amino acids, glucose
  23.
    - In a polypeptide or a protein, amino acids are linked by a peptide bond which is formed when the carboxyl ( $-\text{COOH}$ ) group of one amino acid reacts with amino ( $-\text{NH}_2$ ) group of the next amino acid with the elimination of a water moiety.
    - Unsaturated fatty acids are with one or more  $\text{C} = \text{C}$  double bonds.
    - In nucleic acids, a phosphate moiety links the 3'-carbon of one sugar of one nucleotide to the 5'-carbon of the sugar of the succeeding nucleotide. The bond between the phosphate and hydroxyl group is an ester bond. As there is one such ester bond on either side, it is called phosphodiester bond.
    - In a polysaccharide, the individual monosaccharides are linked by a glycosidic bond
  24. Option (3) is incorrect because ricin is a toxin obtained from Ricinus plant. Vinblastin and curcumin are drugs.
    - \*Morphine and codeine are alkaloids.
    - \* Abrin is also a toxin obtained by plant Abrus.
    - \* Concanavalin A is a lectin.
  25. \* The correct option is (2) because lipids having only single bonds are called saturated fatty acids and lipids having one or more  $\text{C} = \text{C}$  double bonds are called unsaturated fatty acids.
    - \* Palmitic acid has 16 carbon atoms including carboxyl carbon.
    - \* Arachidonic acid has 20 carbon atoms including the carboxyl carbon.
    - \* Lecithin is a phospholipid found in cell membrane.
    - \* Glycerol has 3 carbons, each bearing a hydroxyl ( $-\text{OH}$ ) group.
  26. Lecithin is a phospholipid and saturated fatty acids do not have  $\text{c} = \text{c}$  bends
  27. Maltose is a disaccharide formed from two glucose molecules by dehydration
  28. Glycogen – Storage product  
Globulin – Anti body  
Steroids – Hormone  
Thrombin – Biocatalyst

### 29. Ans.(b)

#### Explanation

Option (B) is the correct answer because cellulose does not contain complex helices and hence cannot hold iodine molecules.

Option (A), (C) and (D) are not correct as cellulose is a polysaccharide

### 30. Ans.(b)

#### Explanation

The correct answer is option (b).

Some lipids have phosphorous and a phosphorylated organic compound in them. These are phospholipids. They are found in cell membrane. Lecithin is one example.

Option (3) is incorrect as glycerides are another group of lipids in which both glycerol and fatty acids are present.

Option (1) and (4) are incorrect as amino acids and carbohydrates are separate groups of biomolecules.

**31. Ans. (a)**

**Explanation**

The correct answer is option (a) as the cofactor of the enzyme carboxypeptidase is zinc. Niacin is associated with coenzyme NAD and NADP.

Option (4) is incorrect as haem is the prosthetic group in peroxidase and catalase.

**32. Ans. (c)**

**Explanation**

Correct answer is option (c) because malonate shows close structural similarity with the substrate and it competes with the substrate for the substrate binding site of the enzyme succinic dehydrogenase. Option (1), (2) and (4) are incorrect as enzyme activation, co-factor inhibition are not showing structural similarity with substrate

**33. Ans. (a)**

**Explanation**

Correct answer is option (a)

A. GLUT-4

B. Insulin

C. Trypsin

IV. Enables glucose transport into cells

D. Collagen

I. Hormone

II. Enzyme

III. Intercellular ground substance

**34. Ans. (c)**

**Explanation**

The correct answer is option (c) as

A.	Lipase	-	Digests ester bond found in lipids.
B.	Nuclease	-	Helps in digestion of phosphodiester bonds found in nucleic acids.
C.	Protease	-	Helps in digestion of peptide bond found in proteins.

D.	Amylase	-	Digests/breaks the glycosidic bonds found in carbohydrates i.e., digest starch into smaller molecules, ultimately yielding maltose, which in turn is cleaved into two glucose molecules by maltase.
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**35.Ans.(d)**

**Explanation**

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

This statement is true. Low temperatures can slow down enzyme activity but do not typically denature the enzyme, essentially preserving it in an inactive state. High temperatures, on the other hand, can cause the enzyme (which is a protein) to denature, or lose its structure, which leads to a loss of enzymatic activity.

**Statement II :** When the inhibitor closely resembles the substrate in its molecular structure and inhibits the activity of the enzyme, it is known as a competitive inhibitor.

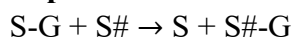
This statement is also true. A competitive inhibitor is a substance that binds to the active site of an enzyme, preventing the substrate from binding and thus inhibiting the enzyme's activity. Because it competes with the substrate for the same active site, a competitive inhibitor often has a structure that closely resembles that of the substrate.

So, the correct answer is :

Option D : Both Statement I and Statement II are true

**36.Ans.(c)**

**Explanation**



Where:

- G is a group other than hydrogen,
- S and S# are substrates.

The transfer of a functional group (G) from one molecule (S) to another (S#).

Such reactions are catalyzed by Transferases, which are enzymes that transfer functional groups from one molecule to another.

**37.Ans.(d)**

**Explanation**

In peroxidase and catalase enzyme, which catalyze the breakdown of hydrogen peroxide to water and oxygen, haem is the prosthetic group.

**38.Ans.(c)**

**Explanation**

List -I	List -II
Adenosine	Nucleoside
Adenylic acid	Nucleotide

Adenine	Nitrogenous base
Alanine	Amino acid

**39.Ans.(c)**

**Explanation**

The protein portion of the enzyme is called the apoenzyme.

## About us

BioResire (NEET | CSIR NET | Biotech Internships) is a life sciences research and training organization dedicated to bridging the gap between academic learning and industry skills. We provide internships, projects, and programs in Bioinformatics, Biotechnology, Molecular Biology, Cancer Research, Neuroscience, and related fields, helping students build job-oriented scientific careers.

*"The future belongs to those who explore the unseen — where biology meets innovation and discovery begins."*