BIOMOLECULES

A. Fill in the blanks

1. NAD is the abbreviation of ……
2. A protein molecule is a polymer of ……
3. The most common energy carrier in the cells is ……
4. ……. is known as grape sugar.
5. Adenine and guanine are ……..
6. Slimy substance of bhindi is a ……..
7. Egg albumin is a type of …….protein.
8. Cotton fibres contain maximum quantity of ……
9. Chitin is a polysaccharide found in the …….. of crabs and prawn etc.
10. Neurotoxin, a protein, present in Cobra's venom act as, blocker of …… function.
11. When the production of the cell enzymes is inhibited by its own metabolites, this control is termed as ……..
12. When co-enzymes are present, the enzyme consists of two parts: a protein part called ……. and a non proteinic part ……. group.
13. At higher temperature, the enzyme action stops because the enzyme gets ……..
14. A compound with almost similar structure to the substrate can act as a ……..
15. Enzymes speed up the reactions by lowering ……

B. True and False

1. In a nucleotide, purine or pyrimidine nitrogenous base is joined by deoxyribose sugar. which is further linked to phosphate.
2. As compared to carbohydrates, the amount of oxygen is high in lipids.
3. Amino acids can be acidic, basic or neutral.
4. Waxes are long chain compounds belonging to class of esters.
5. Carbohydrates are components of large protein molecules called antibodies.
6. Cholesterol is the major component of plant cell walls and plant hormones.
7. The functional three dimensional form of a protein is called the native state.
8. Enzymes of glycolysis and Kreb's cycle are functional outside the cell.
9. Prostaglandins are fatty acid derivatives that are important for blood clotting and smooth muscle contraction.
10. In a RNA molecules adenine is hydrogen bonded to uracil.

C. Match the Column

(i) **Match the following**

	Mineral		Column I		Column II
1.	Sulphur	(a)	For bones, teeth, membrane permeability	(i)	Constituent of co–enzymes NAD^+
2.	Magnesium	(b)	Component of cytochrome oxidase	(ii)	Essential for nerve conduction
3.	Phosphorous	(c)	Present in chlorophyll and middle lamella	(iii)	Amino acids containing this mineral take part in protein synthesis
4.	Iron	(d)	Mottling of teeth	(iv)	Working of muscles, blood clotting
5.	Calcium	(e)	Important for thyroid	(v)	Sea food serve as its rich source

			functioning		
6.	Sodium	(f)	Component of biotin and thiamine	(vi)	Present in drinking water
7.	Copper	(g)	Component of myoglobin, cytochrome	(vii)	Activator of enzymes involved in fat metabolism
8.	Fluoride	(h)	Component of ATP and buffers	(viii)	Activator of nitrate reductase and aconitase
9.	Iodine	(i)	Maintaining osmotic concentration of tissue fluid	(ix)	Carbohydrate – nitrogen balance

(ii) Match the following

1.	Watson and Crick	(a)	DNA finger printing
2.	Emil Fischer	(b)	Protein synthesis
3.	Satellite DNA	(c)	L–shaped structure
4.	Transfer RNA	(d)	DNA double helix model
5.	Rheovirus	(e)	Lock and key hypothesis
6.	Ribosomal RNA	(f)	Double stranded RNA

D. Two Marks Questions

1. Why are the phosphate bonds of nucleotides known as higher energy bonds?
2. Why are phospholipids called amphipathic molecules?
3. What are reducing sugars? Give examples.
4. Name different types of RNA?
5. How are the vitamins classified?
6. What are macromolecules? Give examples.
7. Give two examples of storage polysaccharide.
8. What is chitin?
9. What is meant by tertiary structure of proteins?
10. Explain the composition of triglyceride?

E. Three Marks Questions

1. List the functions of oligosaccharides that are attached to cell membranes.
2. Define the following –
(a) Isozymes (b) Isomerases (c) Prostaglandins
3. Give the constituents (basic unit) which form the following molecules –
(a) Peptidoglycan (b) Cellulose (c) Sphingolipids
4. What is the structure of DNA?
5. Distinguish between prosthetic group and co–factors.
6. Illustrate the lock and key hypothesis of enzyme action.
7. Why allosteric inhibition is called feedback inhibition? Explain.
8. Name the categories into which the enzymes have been grouped according to IUB.
9. Mention the difference between saturated and unsaturated fat?
10. Write short note on: (a) Steroids (b) Wax

F. Five Marks Questions

1. What are mucopolysaccharides? Give its functions.
2. Categorize the following amino acids into acidic, basic neutral, aromatic or heterocyclic type
(a) Asparagine (b) Histidine (c) Lysine (d) Tryptophan (e) Leucine

(f) Arginine (g) Proline (h) Alanine (i) Glutamine (j) Tyrosine

3. List the differences between DNA and RNA.

4. Describe the important properties of enzymes.

5. Why is competitive inhibition? Compare it with allosteric inhibition?

G. Assertion and Reason

These questions consist of two statements each, printed as Assertion and Reason. While answering these questions, you are required to choose any one of the following four responses.

A. If both assertion and reason are true and reason is correct explanation of assertion.

B. If both assertion and reason are true but reason is not correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

1. Assertion : Milk becomes sour it kept at room temperature for a long time.
   Reason : The bacteria, *Streptococcus lactis*, convert the milk lactose into lactic acid.
2. Assertion : Polyunsaturates are considered good for health.
   Reason : They help reduce blood cholesterol level, thereby decreasing chances of heart attack.
3. Assertion : A protein may have amino acid not specified by the genetic code.
   Reason : Many amino acids found in the cell do not form proteins.
4. Assertion : Amino acids are monomers of nucleic acids.
   Reason : Proteins amino acids have an unlimited variety.
5. Assertion : Sucrose is a non-reducing sugar.
   Reason : It has glycosidic linkage.
6. Assertion : Liver of an adult human can store upto 0.91 kg. of glycogen.
   Reason : This glycogen can provide glucose for several days in fasting.
7. Assertion : Haemoglobin is a quaternary protein.
   Reason : It consists of 4 amino acid units.
8. Assertion : The two chains of DNA molecule are antiparallel.
   Reason : The 5' $\rightarrow$ 3' directions of the two DNA chains are opposite.
9. Assertion : Zymogens are inactive enzymes
   Reason : Pepsinogen and Trypsinogen are zymogens
10. Assertion : Glycoproteins are complex proteins
    Reason : Proteins are combined with a prosthetic group (carbohydrates) to form glycoproteins

H. Multiple Choice Questions

1. Glucosamine is a

(a) Fatty acid **(b)** Fat molecule
(c) Amino acid **(d)** Monosaccharide

2. Fructose has_____acid group

(a) Amino **(b)** Aldehydic
(c) Ketonic **(d)** Carboxylic

3. Aldose is

(a) Fructose **(b)** Erythrulose
(c) Glyceraldehyde **(d)** All of the above

4. Which of the following has common multiple ring structure

(a) Steroids **(b)** Lipids
(c) Coenzymes **(d)** Nucleotides

5. Terpenoid alcohol is
(a) Butyl alcohol **(b)** Phytol
(c) Lycopene **(d)** Carotene

6. Hemicellulose is a polysaccharide found in
(a) Cell wall of the plants **(b)** Cell wall of higher plants
(c) Cell of brown algae **(d)** Animal cells

7. Oligomeric proteins means proteins
(a) Having no polypeptide **(b)** Having one polypeptide
(c) Having two or more polypeptides **(d)** None of the above

8. Peptones and proteoses are
(a) Simple proteins **(b)** Conjugated proteins
(c) Derived proteins **(d)** Globular proteins

9. Oxygen transporting protein is haemoglobin, which one is oxygen storing protein
(a) Myoglobin **(b)** Actin
(c) Myosin **(d)** Caseinogen

10. A protein molecule is formed of
(a) Chain of amino acids **(b)** Chain of fatty acids
(c) Chain of monosaccharides **(d)** Chain of oligosaccharides

11. An anticoagulant mucopolysaccharide commonly present in animal body is
(a) Chondroitin sulphate **(b)** Keratin sulphate
(c) Heparin **(d)** Hyaluronic acid

12. A structural polysaccharide is
(a) Chitin **(b)** Hyaluronic acid
(c) Heparin **(d)** Keratan sulphate

13. Smoothening agent in ice-creams and brightening agent in detergents is
(a) Cellulose hypoxanthate **(b)** Cellulose xanthate
(c) Carboxymethyl cellulose **(d)** All the above

14. Glycosidic linkage at place of branching in starch and glycogen is
(a) α 1 $\longrightarrow$ 6 **(b)** α 1 $\longrightarrow$ 4
(c) β 1 $\longrightarrow$ 4 **(d)** β 1 $\longrightarrow$ 6

15. Main chain of glycogen and starch is helically coiled with each turn of helix having
(a) 10 — 14 glucose residues **(b)** 8 — 10 glucose residues
(c) 6 glucose residues **(d)** 4 glucose residues

16. A globular protein is
(a) Elastin **(b)** Keratin
(c) Albumin **(d)** Collagen

17. Most abundant protein in the human body is
(a) Haemoglobin **(b)** Keratin
(c) Collagen **(d)** Immunoglobulin

18. The tuberculosis bacteria uses a wax to increase its pathogenecity? Name the wax?
(a) Spermaceti **(b)** Paraffin
(c) Wax D **(d)** Wax T

19. The most abundant molecule of protoplast is
(a) Proteins **(b)** Lipids
(c) Carbohydrates **(d)** Nucleic acids

20. Quarternary structure is present in
(a) Haemoglobin **(b)** Histone

(c) Globulin **(d)** Elastin

21. Secondary structure of proteins is

(a) α — helix **(b)** β — pleated

(c) β — helix **(d)** Both a and b

22. Fats and their derivatives are called

(a) Steroids **(b)** Lipids

(c) Sterols **(d)** Prostaglandins

23. $C_nH_{2n}O_2$ is the general formula of

(a) Carbohydrate **(b)** Fatty acid

(c) Fat **(d)** Nucleic acid

24. A fat molecule has

(a) 3 glycerol and one fatty acid molecule **(b)** One glycerol and 3 fatty acid molecules

(c) One glycerol and 4 fatty acid molecule **(d)** 3 glycerol and 3 fatty acid molecules

25. Water is liquid because of

(a) Hydrogen bonding **(b)** Ionic bonding

(c) Electrostatic forces **(d)** All of the above

26. Co–enzyme is–

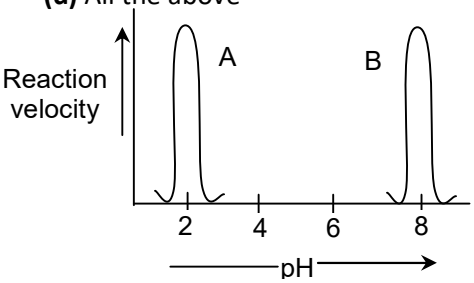
(a) Non–protein organic group which gets attached to apoenzyme to form holoenzyme

(b) Specific for an enzyme

(c) Thermolabile in nature

(d) All the above

27.



Above graph shows functions of two enzymes (A and B) at pH 2 and 8 respectively. A and B could be

(a) Salivary amylase and Pepsin **(b)** Pepsin and Trypsin

(c) Sucrase and Pepsin **(d)** Trypsin and Salivary amylase

28. What is false about feedback inhibition of enzyme action

(a) It is reversible inhibition

(b) It is also called allosteric modulation

(c) The inhibitor resembles the substrate and binds at the active site

(d) Both b and c

29. Restriction endonucleases are

(a) Obtained from bacteria **(b)** Highly specific in their action

(c) Used for breaking DNA **(d)** All the above

30. Enzymes that cause rearrangement of a molecular structure are called

(a) Transferases **(b)** Isomerases

(c) Lyases **(d)** Ligases

31. The most abundant element in cell / living matter is

(a) C **(b)** H

(c) O **(d)** N

32. Which one of the following is alcoholic amino acid pair
(a) Tyrosine and serine **(b)** Threonine and serine
(c) Phenylalanine and tyrosine **(d)** Tryptophan and phenylalanine

33. An antifertility steroid is
(a) Diosgenin **(b)** Cortisol
(c) Estradiol **(d)** Progesterone

34. Raffinose has three monosaccharide units. These are
(a) Glucose, fructose, galactose **(b)** Glucose, pentose and maltose
(c) Glucose, glucose and galactose **(d)** Fructose, glucose and galactose

35. Glucose is
(a) Aldose hexose sugar **(b)** Ketose hexose sugar
(c) Pyranose pentose sugar **(d)** Furanose pentose sugar

36. In brain, most common lipids are
(a) Glycolipids **(b)** Lipoproteins
(c) Phospholipids **(d)** Steroids

37. Glucose is also called
(a) Dextrose **(b)** Corn sugar
(c) Grape sugar **(d)** All of these

38. Find the odd man out
(a) Palmitic acid, stearic acid **(b)** Oleic acid, linoleic acid
(c) Linoleic acid, oleic acid **(d)** Tripalmitin, linolenic acid

39. Which one of the following is a non–polar amino acid
(a) Alanine **(b)** Glutamic acid
(c) Serine **(d)** None of these

40. Which is important in nitrogen metabolism
(a) Cu **(b)** Mn
(c) Mo **(d)** Zn

41. What is bone dust
(a) Otoliths present in bone **(b)** The matrix of bone used as fertilizer
(c) Bone of embryo **(d)** None of these

42. Iodine in mammals is present as
(a) Protein bound I_2 of blood **(b)** Inorganic I_2
(c) Thyroid hormones **(d)** All of these

43. Tick the correct statement about water
(a) Good solvent, ability of dissolving substances for transport
(b) Ability to form layer which help to keep membranes moist
(c) Ability to store large quantities of heat which help to regulate body temperature
(d) All of these

44. Interferon is
(a) A protein **(b)** A potential use for the treatment of cancer
(c) Carbohydrate **(d)** A steroid

45. Biological membranes consist primarily of two kinds of molecules
(a) Carbohydrates and lipids **(b)** Nucleic acids and proteins
(c) Phopholipids and proteins **(d)** Proteins and carbohydrates

46. Phytohormones are
(a) Precursors of hormones
(b) Functional animal hormones

(c) Chemical compounds regulating growth in higher plants
(d) Hormones required in large quantities

47. If T = 20%, C = 30% then G =?
(a) 40% **(b)** 20%
(c) 30% **(d)** 25%

48. Unwinding of DNA is done by
(a) Topoisomerase **(b)** Exonuclease
(c) Helicase **(d)** Ligase

49. The similarity between RNA and DNA is
(a) Both are made up of same pyrimidines **(b)** Both are single stranded
(c) Both have same sugar **(d)** Bot have nucleotide polymers

50. Ketone bodies are by products of metabolism of
(a) Carbohydrates **(b)** Fat
(c) Protein **(d)** All of the above

PREVIOUS YEAR QUESTIONS

1. Which one of the following pairs of nitrogenous bases of nucleic acids, is wrongly matched with the category mentioned against it? **[2008]**
(a) Thymine, Uracil - Pyrimidines
(b) Uracil, Cytosine - Pyrimidines
(c) Adenine, Thymine - Purines
(d) Guanine, Adenine - Purines

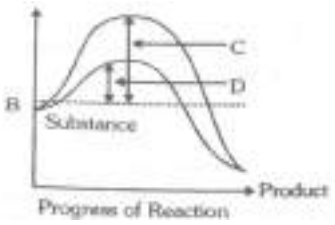
2. In the DNA molecule
[2008]
(a) the total amount of purine nucleotides and pyrimidine nucleotides is not always equal
(b) there are two strands which run parallel in the 5'⟶ 3' direction
(c) the proportion of adenine in relation to thymine varies with the organism
(d) there are two strands which run antiparallel-one in 5'⟶ 3' direction and other in 3'⟶ 5'

3. A competitive inhibitor of succinic dehydrogenase is
[2008]
(a) malonate **(b)** oxaloacetate
(c) a-ketoglutarate **(d)** malate

4. There is no DNA in
[2009]
(a) A mature spermatozoan **(b)** Hair root
(c) An enucleated ovum **(d)** Mature RBCs

5. Three of the following statements about enzymes are correct and one is wrong. Which one is wrong?
[Mains 2010]
(a) Enzymes are denatured at high temperature but in certain exceptional organisms they are effective even at tempera¬tures 80°-90°C
(b) Enzymes are highly specific
(c) Most enzymes are proteins but some are lipids
(d) Enzymes require optimum pH for maximal activity

6. The figure given below shows the conversion of a substrate into product by an enzyme. In which one of the four options (1-4) the components of reaction labelled as A, B, C and D are identified correctly?

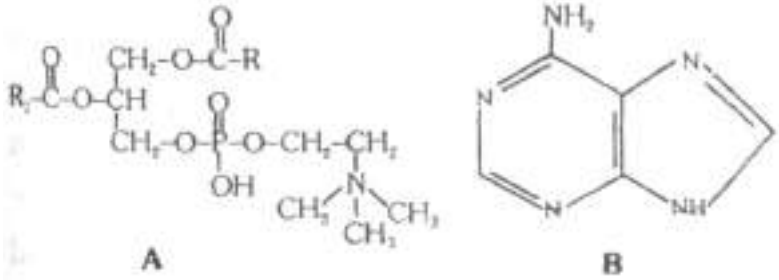


[Main 2010]

Options:

A	B	C	D
(a) Transition state	Potential energy	Activation energy with-out enzyme	Activation energy with enzyme
(b) Potential energy	Transition state	Activation energy without enzyme	Activation energy with enzyme
(c) Activation energy with enzyme	Transition stage	Activation energy without enzyme	Potential energy
(d) Potential energy	Transition state	Activation energy with enzyme	Activation energy without enzyme

7. Which one of the following structural formulae of two organic compounds is correctly identified along with its related function? **[Pre. 2011]**

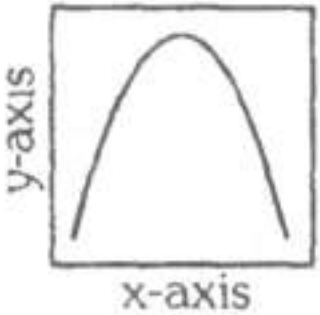


(a) B: adenine - a nucleotide that makes up nucleic acids
(b) A: Triglyceride-major source of energy
(c) B: Uracil - a component of DNA
(d) A : Lecithin - a component of cell membrane

8. The curve given below shows enzymatic activity with relation to three conditions (pH, temperature and substrate concentration) **[Pre. 2011]**

What do the two axises (x and y) represent ?

x-axis	y-axis
(a) Enzymatic activity	pH
(b) Temperature	Enzyme activity
(c) Substrate concentration	Enzymatic activity
(d) Enzymatic activity	Temperature



9. Which one of the following biomolecules is correctly characterised ? **[Mains 2012]**

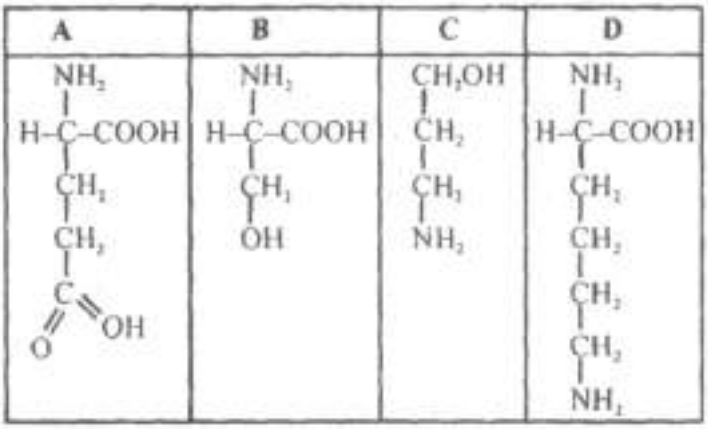
(a) Palmitic acid - an unsaturated fatty acid with 18 carbon atoms

(b) Adenylic acid - adenosine with a glucose phosphate molecule

(c) Alanine amino acid - Contains an amino group and an acidic group anywhere in the molecule

(d) Lecithin - a phosphorylated glyceride found in cell membrane

10. Which one out of A-D given below correctly represents the structural formula of the basic amino acid? **[Pre. 2012]**

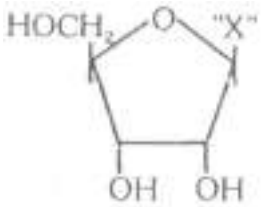


Options

(a) A **(b)** B

(c) C **(d)** D

11. 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



Category	**Component**
(a) Nucleotide	Adenine
(b) Nucleoside	Uracil
(c) Cholesterol	Guanin
(d) Amino acid	NH_2

12. Which one is the most abundant protein in the animal world ? **[Pre. 2012]**

(a) Collagen **(b)** Insulin

(c) Trypsin **(d)** Haemoglobin

13. Transition state structure of the substrate formed during an enzymatic reaction is **[2013]**

(a) Transient but stable

(b) Permanent but unstable

(c) Transient and unstable

(d) Permanent and stable

14. A phosphoglyceride is always made up of **[2013]**

(a) Only a saturated fatty acid esterified to a glycerol molecule to which a phosphate group is also attached

(b) Only an unsaturated fatty acid esterified to a glycerol molecule to which a phosphate group is also attached

(c) A saturated or unsaturated fatty acid esterified to a glycerol molecule to which a phosphate group is also attached

(d) A saturated or unsaturated fatty acid esterified to a phosphate group which is also attached to a glycerol molecule

15. Macro molecule chitin is **[2013]**

(a) nitrogen containing polysaccharide **(b)** phosphorus containing polysaccharide
(c) Sulphur containing polysaccharide **(d)** Simple polysaccharide

16. Which one of the following statements is incorrect? **[2015]**

(a) The presence of the competitive inhibitor decreases the Km of the enzyme for the substrate.
(b) A competitive inhibitor reacts reversibly with the enzyme to form an enzyme inhibitor complex.
(c) In competitive inhibition, the inhibitor molecule is not chemically changed by the enzyme.
(d) The competitive inhibitor does not affect the rate of breakdown of the enzyme substrate complex.