QB365

Important Questions - Biomolecules

11th Standard CBSE

Biology Reg.No. : | | | | | | |

Time : 00:50:00 Hrs

Total Marks : 50

Section-A

1) Name the protein which forms the intercellular ground substance. **1**

2) What is the name given to a polysaccharide composed of two different monomers? Also give example for this. **1**

3) The enzyme that work only in presence of a cofactor or coenzyme is called **1**

4) Give an example of tetrasaccharide **1**

5) What is the role of haemoglobin? **1**

6) Why does starch turn blue black with iodine? **1**

7) Name one element invariably found in proteins, but not in all carbohydrates nd lipids. **1**

8) Give the role of DNA **1**

9) Which two changes does a chemical compou=nd undergo?Explain each with example. **1**

10) Starch, cellulose, glycogen, chitin are polysaccharides. From the options below, choose the one appropriate and write against each. **1**

Cotton fibre.....

Exoskeleton of cockroach.....

Liver.....

Peeled potato.....

Section-B

11) How do proteins act as carrier proteins? **2**

12) Starch is not a single material, but is regarded as a homopolysaccharide. Explain. **2**

13) Succinic dehydrogenase is an enzyme that cause the substrate,succinate,to breakdown into fumarate **2**

Malonate is a substance that resembles succinate and inhibits the activity of succinic dehydrogenase

Explain how this type of inhibition affects the activity of the enzyme

14) Find out and make a list of proteins used as therapeutic agents. Find other applications of proteins, e.g., cosmetics, etc. **2**

15) Nucleic acids exhibits secondary structure, justify with example. **2**

16) Differentiate between anabolism and catabolism, along with an example for each. **2**

17) Without metabolism, the living state can not exist Justify. **2**

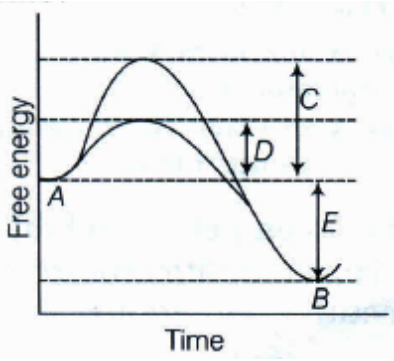
18) Comment on the statement 'living state is a non-equilibrium steady state to be able to perform work'. **2**

19) Observe the given figure related to enzyme action and answer the following questions. **2**

(i) What is the figure showing?

(ii) Name the substances marked as (A) and (B).

(iii) What does the arrows marked (C) to (E) indicate?



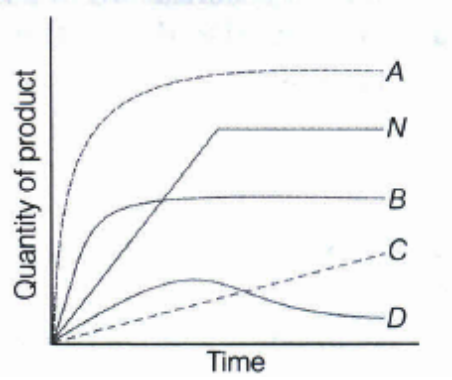
20) Describe the influence of temperature on enzyme action. **2**

Section-C

21) Enzymes are proteins.Proteins are long chains of amino acids linked to each other by peptide bonds.Amion acids have many functional groups in their structure. **5**

These functional groups are ionisable as they are weak acids and bases in chemical nature.This ionisation is influenced by pH of the solution.For many enzymes, activity is influenced by surrounding pH.This is depicted in the curve given explain briefly.

22) The lines A to D below show how change in temperature can affect the rate of enzyme reaction.Line N shows the rate of reaction under optimum temperature. **5**

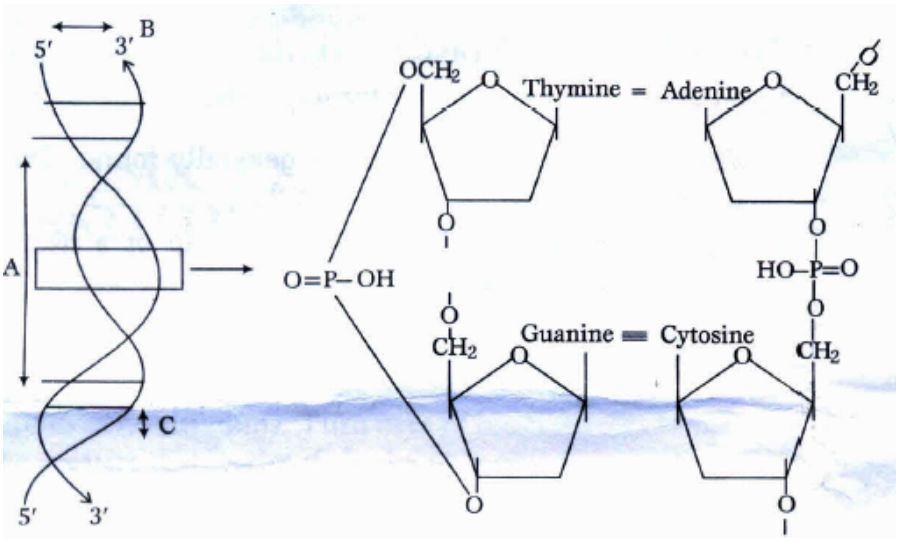


Which line A, B, C or D shows the rate of enzyme reaction at $60^{\circ}C$?

23) What is the concept of metabolism? What are the metabolic basis for living? **5**

24) (i) Identify the structure shown in figure. **5**

(ii) Write the measurement (distance) of the parts marked (A), (B), (C).



(iii) How many H-bonds are there at the place marked as(6)?

(iv) Which form of DNA is shown in the figure?

(v) Whether B type DNA has left-handed spiral structure or right-handed?

****

Section-A

1) Collagen forms the intercellular ground substance. **1**

2) **1**

The name given is heteropolysaccharide to the type of polysaccharide, which is composed of different types of monomers, e.g., pectin.

3) Apoenzyme works only in the presence of a cofactor or coenzyme **1**

4) stachyose **1**

5) Haemoglobin carries oxygen in the blood **1**

6) Appearance of blue colour with the addition of iodine is due to its reaction with amylose of starch. **1**

7) Nitrogen is found invariably in proteins, but not in all carbohydrates and lipids. **1**

8) DNA is a genetic material.It transferes hereditary characters from one generation to the next. **1**

9) **1**

Chemical compounds undergo following two types of changes.

Physical changes are those in which shape of a molecule or a substance changes without breaking of bonds or change in state of matter,e.g. melting of ice in water

Chemical changes are those in which the bonds are broken and new bonds are formed e.g

(i) $Ba(OH)_2 + H_2SO_4 \longrightarrow BaSO_4 + 2H_2O$

(inorganic chemical reaction)

(ii) Hydrolysis of starch into glucose(organic chemical reaction)

10) **Cotton fibre -** Cellulose **1**

Exoskeleton of cockroach - Chitin

Liver - Glycogen

Peeled potato - Starch

Section-B

11) **2**

Proteins act5s as a carrier protein in the following ways

(i) Some proteins act as carrier which bind and transport specific molecules across a membrane or in a body fluid.

(ii) Haemoglobin of RBCs transports oxygen in the body.

(iii) Myoglobin of muscles store oxygen.

(iv) Serum albumin carries fatty acids and lipids in the blood.

12) **2**

Starch consists of two components i.e., unbranched spirally coiled amylose molecules and branched amylopectin molecules. Both are glucose polymers hence it is called as homopolysaccharide.

13) **2**

The inhibitor competes with the substract for the active sites of enzyme molecules as it has a structure similar to the substract that allows it to combine with the active site, preventing any substract molecule from occupying that site.This reduces the rate of the reaction since, the subtract can only use the enzyme molecules that are not occupied by the inhibitor, resulting in the same quantity of product being formed at a slower rate

14) **Some proteins and their functions** **2**

Protein	**Function**
Collagen	Intercellular ground substance in tissue
Trypsin	Enzyme
Insulin	Hormone
Antibody	Fights infectious agents
Receptor	Sensory reception (smell, taste, hormone, etc)
GLUT-4	Enables glucose transport into cells

15) **2**

For nucleic acids, the building block is a nucleotide. A nucleotide has three chemically distinct components. One is a heterocyclic compound, the second is s monosaccharide and the third is a phosphoric acid or phosphate.

The heterocyclic compounds in nucleic acids are the nitrogenous bases named adenine, guanine, uracil, cytosine and thymine. Adenine and guanine are substituted purines while, the rest are substituted pyrimidines.

The skeletal heterocyclic ring is called as purine and pyrimidine, respectively. The sugar found in polynucleotide is either ribose (a monosaccharide pentose) or $2^{'}$ deoxyribose. A nucleic acid containing deoxyribose is called deoxyribonucleic acid (DNA), while that which contains ribose is called ribonucleic acid (RNA).

16) **2**

Difference between anabolism and catabolism are

Anabolism	**Catabolism**
The metabolic pathways that lead to the synthesis of complex molecules from simpler ones, constitute anabolism.	The metabolic pathways that lead to the formation of simpler molecules from a larger molecule by its breakdown, constitute catabolism
These are the biosynthetic pathways.	These are the degradative pathways.
Energy is stored in the form of chemical bonds.	Chemical bonds are broken and energy is released.
They consume energy, e.g., protein synthesis from amino acids	They release energy e.g., breakdown of glucose into pyruvic acid in glycolysis.

17) **2**

The most important fact of biology systems is that all living organisms exist in a steady-state characterised by the concentration of each of the biomolecule. These biomolecules are in a metabolic flux. Any chemical or physical process moves spontaneously to equilibrium. Thus, the steady state is a non-equilibrium state.

As living organisms work continuously, they cannot afford to reach equilibrium. Hence, the living state is a non-equilibrium steady-state to be able to perform work. This is achieved by energy input.

Metabolism provides a mechanism for the production of energy.

Hence, the living state and metabolism are synonymous. Without metabolism, there cannot be a living state.

18) **2**

The most important fact of biology systems is that all living organisms exist in a steady-state characterised by the concentration of each of the biomolecule. These biomolecules are in a metabolic flux. Any chemical or physical process moves spontaneously to equilibrium. Thus, the steady state is a non-equilibrium state.

As living organisms work continuously, they cannot afford to reach equilibrium. Hence, the living state is a non-equilibrium steady-state to be able to perform work. This is achieved by energy input.

Metabolism provides a mechanism for the production of energy.

Hence, the living state and metabolism are synonymous. Without metabolism, there cannot be a living state.

19) **2**

(i) Figure is showing the activation energy requirement for non-catalysed and enzyme catalysed reactions.

(ii) Substances marked on arrows A and B are A - Substrate B - End products

(iii) Arrows marked shows

C-Energy of activation without enzyme.

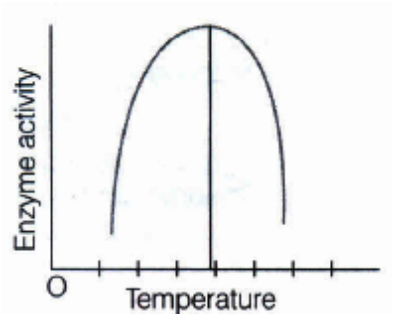
D-Energy of activation with enzymes.

E-Free energy difference between the substrate and the end product.

20) **2**

Enzymes generally function at a narrow range of temperature.The temperature at which the enzyme shows its maximum activity, is called its optimum temperature.The enzyme activity decreases at temperatures below and above the optimum temperature.

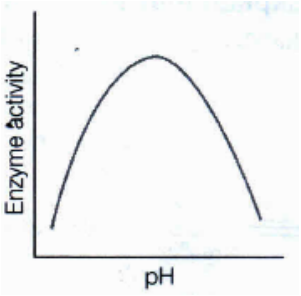
At low temperatures, the enzyme is inactive, while at high temperature, the enzyme is denatured and so it loses its activity.



Section-C

21) **5**

Enzymes, generally function in a narrow range of pH.Each enzyme shows its highest activity at a particular optimum pH.Activity declines both below and above the optimum value. The graph shows maximum enzyme activity at optimum pH.The rate of enzyme activity decreases above and below that optimum pH.



22) **5**

Line B, will show the rate of reaction at $60^{\circ}C$ because the rate of reaction initially is more rapid, but then decreases as the enzyme becomes denatured by the high temperature.Thus, the quantity of product remains constant at a lower amount compared to line N.

23) **5**

The continuous process of breakdown and synthesis of biomolecules through chemical reactions occurring in the living cells is called metabolism.

(i) Each of the metabolic reaction results in a transformation of biomolecules.

(ii) Most of these metabolic reactions do not occur in isolation but are always linked with some other reactions.

(iii) In these reactions, the metabolisms are converted into another metabolite in a series of linked reactions called metabolic pathways.

(iv) Each metabolite has a define rate and direction during the flow through a metabolic pathways called the dynamic state.

In living systems, metabolism involves two following types of pathways

(i) **The anabolic pathways** is called biosynthetic pathway. It leads to a more complex structure from a simpler structure, e.g., the pathway involving the conversion of acetic acid into cholesterol. These pathways consume energy.

(ii) **The catabolic pathways leads** to simpler structure from a complex structure, e.g., the pathways involving conversion of glucose into lactic acid in our skeletal muscles. This pathway leads to the release of energy, e.g., energy is liberated when glucose is degrated to lactic acid in our skeletal muscles.

24) (i) Double helix model of DNA (Waston-Crick model of DNA). **5**

(ii) (A) 2 nm (B) 3.4 nm (C) 0.34 nm.

(iii) The bonds between C and G are three.

(iv) This is B-form of DNA.

(v) B-DNA is right - handed spiral structure.