

**CBSE Class 11 Biology**  
**Important Questions**  
**Chapter 9**  
**Biomolecules**

**1 Marks Questions**

**1. Which is the important energy carrier in the cell?**

**Ans.** Adenosine tri phosphate (ATP)

**2. Name the monomer subunits which form Nucleic acids?**

**Ans.** Nucleotide.

**3. What are macromolecules? Give example.**

**Ans.** Macromolecules are large complex molecules formed by polymerization of micromolecules & have high molecular weight.

**4. Identify the polymer which makes exoskeleton of insects.**

**Ans.** Chitin a polymer of glucosamine that forms exoskeleton of insects,

**5. Name the following:- i) sugar present in DNA ii) Base not found in DNA**

**Ans.** (i) Deoxyribose sugar (ii) Uracil

**6. Why proteins are called biological polymer?**

**Ans.** As proteins are able to perform multiple functions eg. Protection mechanical support, transportation, movement etc, they are called as biological polymers.

**7. Which molecule has the capacity to duplicate?**

**Ans.** Deoxyribonucleic acid (DNA)

**8.Name the abundant proteins in biosphere?**

**Ans.** RUBISCO

**9.Lipids are not biomacromolecules why?**

**Ans.** Lipids are not biomacromolecule because their molecular weight does not exceed 800.

**10.Which lipid can cause heart ailment?**

**Ans.** Cholesterol.

**11.What are micro- nutrients?**

**Ans.** Minerals required by plants in trace quantity eg. Mn, Co, Zn, B, etc. are called micronutrients.

**12.Why do oils generally remain in liquid state even in winters?**

**Ans.** Oils are unsaturated lipids, hence have lower melting points.

**13. Name an element found in proteins but not in lipids and carbohydrates.**

**Ans.** Nitrogen.

**14. What is the difference between RNA and DNA in terms of nitrogenous base?**

**Ans.** RNA has uracil instead of thymine.

**15. What does an enzyme do in terms of energy requirement of a reaction?**

**Ans.** Lowers the activation energy of reaction.

**16. What is the function of ATP in cell metabolism?**

**Ans.** Are the energy currency of cell.

**17. Name the protein which form the intercellular ground substance.**

**Ans.** Collagen.

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**2 Marks Questions**

**1. Differentiate between nucleotide & nucleoside?**

**Ans.**

NUCLEOTIDE	NUCLEOSIDE
i) Nucleotide is made up of base, sugar & phosphoric acid.	i) Nitrogenous base & sugar form a nucleoside
ii) Nucleotide of RNA is called ribonucleotide & nucleotide of DNA is called deoxyribonucleotide	ii) Nucleoside of RNA is called ribonucleoside & nucleoside of DNA is called deoxyribonucleoside
iii) E.g. adenylic acid, guanylic acid, thymidylic acid, uridylic acid	iii) Eg. Adenosine, guanosine, cytidine, thymidine, uridine

**2. How are glycosidic bonds formed?**

**Ans.** The glycosidic or ketone group of a monosaccharide can react & bind with an alcoholic group of another organic compound to join the two compounds together. This bond is known as glycosidic bond.

**3. What do you mean by steady state?**

**Ans.** An open system always remains in steady state i.e. the rate of input of energy & matter is always equal to the output of energy & matter.

**4. What is metabolism? Mention the role of enzymes in metabolism?**

**Ans.** Metabolism is defined as the sum total of the living processes in the body. Enzymes direct metabolic pathways. Enzymes act as catalysts. Enzymes are highly specialized organic

catalysts produced by living cell. Biochemical pathways refer to the reactions occurring in the cells in sequences. Enzymes guide the biochemical pathways along desired directions. They have active site. The substrate binds at active site of enzyme & form enzyme substrate complex.

### **5.Why are enzymes called as biocatalyst?**

**Ans.** The substances which changes the rate of chemical reaction without altering the equilibrium point of reaction is called catalyst. The catalysts of the organism are called enzymes & they are synthesized in the living cell. Hence called as Biocatalysts.

### **6.Give the functions of carbohydrates?**

**Ans.**

**(i)**Carbohydrates play role in all metabolic reactions of body & formed as intermediate compounds in pathways of the processes.

**(ii)**Ribose & deoxyribose sugar are found in nucleic acids.

**(iii)**Glucose is oxidised in respiration to yield energy.

**(iv)**Glucose is used in synthesis of fats as well as proteins.

### **7.What do you meant by activation energy?**

**Ans.** Activation energy is the energy required to initiate a chemical or biochemical reaction. Activation energy overcomes the energy barriers of the reactants which occurs amongst the reactants due to i) presence of electrons over their surface ii) Absence of precise & forceful collisions essential for bringing the reactive sites of the chemical together.

### **8.List the different types of lipids.**

**Ans.** Lipids are of three types:-

**(i)** Simple lipids:- they are of alcohols or triglycerides containing fatty acid & glycerol.

**(ii) Compound lipids:-** They are simple lipids with a biologically active compound in them eg. glycolipids ( carbohydrate lipid) lipoprotein ( protein + lipids)

**(iii) Derived lipids:-** They are hydrolysed products of simple lipids such as fatty acids & alcohol.

### 9. Enlist three properties of enzymes?

**Ans. (i)** An enzyme is specific for a substrate & catalyses only a particular reaction. because of the specific shape of active site & substrate.

**(ii)** Every enzyme requires an optimum temperature for its functioning.

**(iii)** The enzymes are sensitive to PH & each enzyme shows its maximum activity at a specific PH called optimum PH.

### 10. Enumerate differences between DNA & RNA?

**Ans.**

DNA	RNA
<b>i) it consists of a double helical of two polynucleotide chains</b>	i) It consists of only one helical of single polynucleotide chain.
<b>ii) Deoxyribose sugar is present in the nucleotides.</b>	ii) Ribose sugar is present in nucleotide
<b>iii) Pyrimidine bases are thymidine &amp; cytosine.</b>	iii) Pyrimidine bases are uracil & cytosine
<b>iv) DNA contains all the genetic information</b>	iv) RNA helps in protein synthesis.

### 11. Why are monosaccharide's sugars are known as reducing sugars?

**Ans.** Monosaccharides sugars are called reducing sugars because they have a free aldehyde or ketone group & can reduce  $\text{Cu}^{2+}$  to  $\text{Cu}^{+}$ . Disaccharides like sucrose does not reduce  $\text{Cu}^{2+}$  to

Cu<sup>+</sup> so, it not a reducing sugar.

**12. How does temperature affects enzyme catalysed reaction?**

**Ans.** The temperature affects the velocity of enzyme action. When the temperature is high, there is a sudden decrease in enzyme action due to denaturation. Mostly enzymatic reactions occur below 45<sup>0</sup>c

**13. What is enzymatic competitive inhibition? Give one example?**

**Ans.** Some chemicals prevent the enzyme to function, are known as inhibitors. Enzymatic competitive inhibition is done by the substrate which very closely resembles the substrate in its molecular structure.

Enzyme + Inhibitor  $\longrightarrow$  Enzyme inhibitor complex.

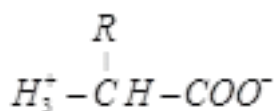
Eg. malonate inhibits the action of succinate dehydrogenase because it shows close resemblance with succinate substrate.

**14. Why are aminoacids also known as substituted methane?**

**Ans.** The  $\alpha$ -carbon has 4 substituted groups occupying the 4 valency position - H, -COOH,  $NH_2$  and -R group.

**15. Amino acid exist as zwitter ions. Give its structure. Why is it formed?**

**Ans.**



Due to ionizable nature of  $-NH_2$  and  $-COOH$  groups.

**16. Why do starch give blue black colour with iodine?**

**Ans.** Starch forms helical secondary structures which can hold  $I_2$

**17. Why are starch and glycogen more suitable than glucose as a storage product?**

**Ans.** Occupy lesser space as less bulky and can be hydrolysed to glucose when required.

**18. What would happen when salivary amylase which acts on starch in mouth and in stomach?**

**Ans.** In mouth, salivary amylase changes starch into maltose. Action of amylase stops in stomach as it cannot act in an acidic medium.

**19. Differentiate between homopolysaccharides and heteropolysaccharides.**

**Ans.**

Homopolysaccharides	Heteropolysaccharides
a) Constituted of single type of monosaccharide units	Constituted by two or more type of monosaccharide unit and their derivatives
b) e. g., starch, glycogen, cellulose	e.g., Peptidoglycans, chitin

**20. Why do physicians recommend vegetable oils rich in polyunsaturated fat for persons suffering from cardiovascular diseases?**

**Ans.** Polyunsaturated oils contain fatty acids having one or more double bonds which does not clog arteries due to high proportion of polyunsaturated fatty acids

**21. Why does the shelf life of fruits and vegetables increase in a refrigerator?**

**Ans.** Low temperature prevents growth of food spoiling micro organisms and also inhibits the action of enzymes in the food, because enzymes are inactivated at low temperature.



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**3 Marks Questions**

**1.Enumerate the functions of lipids?**

**Ans. i)**Most of the plants & animals fats constitute storage compound. Fat is stored mainly in adipose cells in the animals.

**ii)**In oil seed plants, oil provides nourishment to developing embryo during seed germination. Oil extracted from these seeds is used in cooking.

**iii)**Fats provide energy to the body.

**iv)**Fats serve as insulators & protect body from cold. It gets deposited underneath skin.

**v)** Phospholipid form an structural component of all bio- membranes in cell.

**vi)**Cholesterol acts as precursor for synthesis of various hormones, vitamins & bile salts.

**vii)**The lipid form the white matter, grey matter of brain & myelin sheath of neurons.

**2.Describe the lock & key hypothesis of enzyme action?**

**Ans.** According to Fischer's lock & key hypothesis of enzyme action:- if the right key fits in the right lock, the lock can be opened otherwise not. To explain the above in context with enzyme action it is bedewed that molecules have specific geometric shapes. Proteins are able to act as enzyme because their shape provides space configuration into which other molecules can fit. The molecules which are acted upon by the enzymes are called substrates of the enzymes.

Under the above assumption only those substrate molecule with proper geometric shape can fit into the active site of the enzymes. However, under special circumstances some other molecules which are similar to the substrate can also combine with active site of enzyme. In

such cases molecules may compete with substrate & the reaction may either slow down or stop. This is called competitive inhibition.

### 3. Describe the structure & function of ATP?

**Ans.** ATP is primary & universal carrier of chemical energy in the cell living cell capture store & transport energy in a chemical form, largely ATP & it is the ATP which is the carrier & intermediate source of chemical energy to those reactions in the cell which do not occur simultaneously. These reactions can take place only if chemical energy is released.

The ATP molecule consists of a nitrogenous base adenine a pentose sugar of ribose type & three inorganic phosphate molecules two phosphate bonds are high energy bonds & one is relatively poor in energy.

Energy released in living cell is thus stored in the chemical bonds of the ATP molecule which then serve as major energy yielding & energy requiring substance in the cell. ATP is broken down into ADP whenever energy is needed.

ATP  $\rightarrow$  ADP + ip + energy.

### 4. Differentiate between cofactors, coenzymes & prosthetic group.

**Ans.**

COFACTORS	COENZYMES	PROSTHETIC GROUP
<b>i) It is a non protein substance or group that gets attached to an enzyme.</b>	i) it is a non protein group which is loosely attached to the open enzyme in a functional enzyme	i) it is a non protein part or group which gets attached to open enzyme.
<b>ii) It is essential for functioning it may be organic or inorganic or metallic factor</b>	ii) NAD is coenzyme for dehydrogenase	ii) Some prosthetic group have porphyrin of the cytochrome.

## **5.How does enzymes brings about high rate of chemical conversions?**

**Ans.** A chemical that is converted into a product is known as the substrate. Therefore the enzymes with tertiary structures including an active site convert a substrate into a product. The substrate 'S' must bind enzymes at its active site within a given cleft. So an obligatory formation of an ES substrate complex occurs. At a state when the substrate is bound to an enzyme active site, a new structure of substrate is formed.

In the graph, if 'P' is at lower level than 'S' reaction is exothermic i-e energy is supplied to make product 'P'. The 'S' has to go through much higher energy state known as "transition state. The enzymes brings down energy barrier making transition of 'S' to 'P' more easy. The difference in average energy content between that of 'S' & this transition state is termed as activation energy.

## **6.What are nucleic acids? Describe the structure of DNA.**

**Ans.** Nucleic acids are found in acid soluble fraction of living tissue. They are linear polymers of deoxyribonucleotides or ribonucleotides A nucleotide has 3 distinct components.

DNA is a double stranded structure & each strand is a polymer of deoxyribonucleotide. The backbone of the nucleic acid is uniformly consisting of alternating pentose sugar & phosphate group

**i)**The steps composed of nitrogenous bases adenine guanine cytosine & thymine & hydrogen bonds hold two strands together.

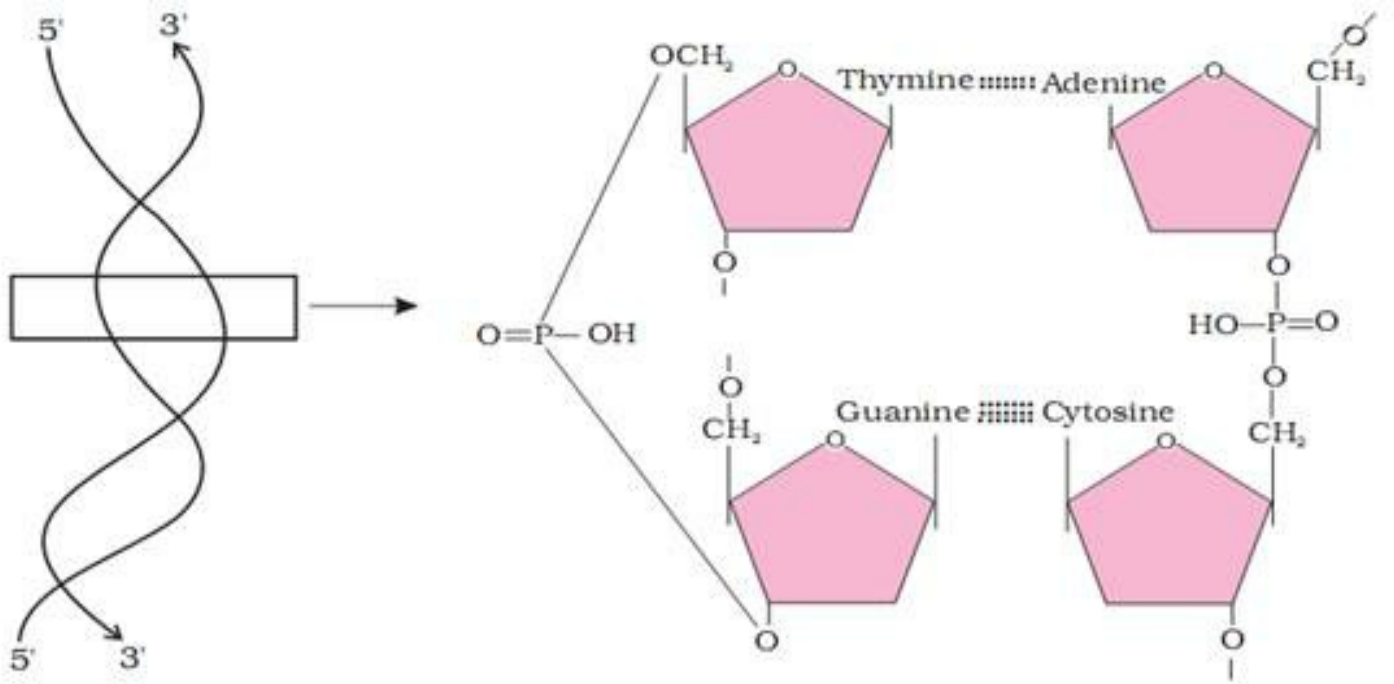
**ii)**Two strands are complementary to each other.

**iii)**They run in an antiparallel manner.

**iv)**It is genetic material in all organisms.

**v)**It has the property to replicate

**vi)**At one end of strand, 5-c of pentose sugar is free on other end; third carbon of pentose is free.



7. (a) What is an enzyme?

(b) Give an example of co-enzyme.

(c) Distinguish between apoenzyme and co-enzyme.

Ans. (a) Are biocatalysts.

(b) NADP, NAD

(c) The enzymes which work only in the presence of co-factors are known as apoenzymes.

An organic non-protein cofactor which is easily separable from the apoenzyme is called co-enzyme.

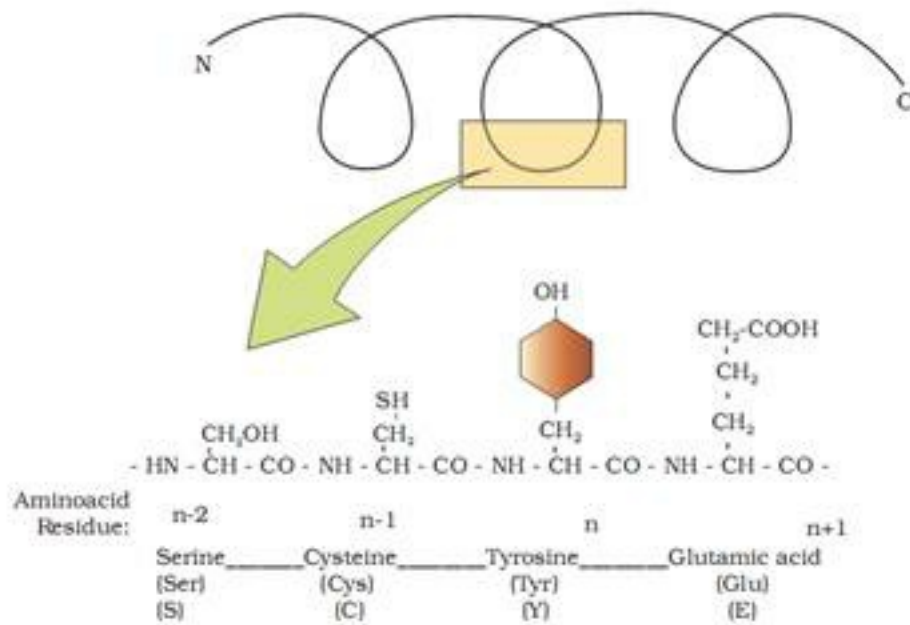
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**5 Marks Questions**

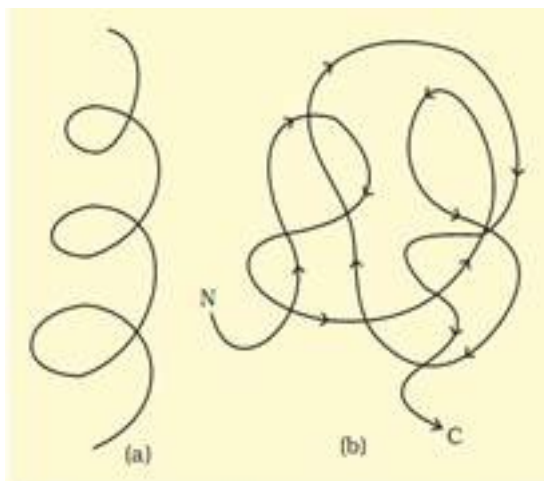
**1. Explain briefly four levels of protein structure?**

**Ans.** FOUR LEVELS OF PROTEIN STRUCTURE:-

- a) PRIMARY STRUCTURE:-** The protein exists as a long chain of amino acids arranged in a particular sequence such a polypeptide is non- functional
- b) SECONDARY STRUCTURE:-** first amino acid is N-terminal amino acid & last is known as c-terminal amino acid. There is interaction between every fourth amino acid by formation of hydrogen bond the polypeptide is folded in a helical shape eg. keratin. When two or more polypeptide chains are held together by intermolecular hydrogen bonds the structure is known as pleated sheet.
- c) TERTIARY STRUCTURE:-** The polypeptide becomes stabilized by folding & coating by the formation of ionic bonds or hydrophobic bonds or disulfide bridges. It is called tertiary structure. It gives a three dimensional view of proteins. Biological activity of protein depends on its tertiary structure.
- d) QUATERNARY STRUCTURE:-** Such proteins are formed of more than one polypeptide or subunits each one having primary secondary & tertiary structure. This is called quaternary structure. Each polypeptide chain functions as subunit of the proteins.



**Figure 9.3** Primary structure of a portion of a hypothetical protein. N and C refer to the two termini of every protein. Single letter codes and three letter abbreviations for amino acids are also indicated.



**Figure 9.4** Cartoon showing : (a) A secondary structure and (b) A tertiary structure of proteins