

## **INTRODUCTION OF BIOCHEMISTRY**

### **Questions carry two marks:**

1. What are the most abundant biomolecules within cells?
2. Mention the abundant element present in the living organism.
3. Give the contribution/s to Biochemistry of the following eminent scientists.  
a) Wohler b) Miescher c) Buchner d) Pauling e) Sanger f) Watson and Crick g) Fischer  
h) Michaelis and Menten i) Embden, Meyerhoff and Parnas j) Krebs k) Khorana  
f) Avery, MacLeod and McCarty m) Subbarow n) Knoop.
4. "Water is the medium of life." Comment.
5. What is the significance of the following properties of water to living organisms:  
a) High specific heat b) High heat of vapouration c) High dielectric constant d) High tensile strength  
e) Maximum density at 4°C f) High melting and boiling points.
6. Mention the contribution of Dr. H. G. Khorana to the field of Biochemistry.
7. Mention the contribution of the scientist Knoop in the field of development of Biochemistry.
8. What was Fischer's contribution to Biochemistry?
9. Why is mitochondrion called as power house of cell?

### **Questions carry four marks:**

1. Write a note on elemental composition of the living organisms.
2. What are a)Major elements b)minor elements and c)Trace elements with reference to the composition of living systems? Give four examples of each.
3. List any four unique properties of water give the biological importance of each.
4. What are the two basic properties of water give its unique characteristics as the medium of life?

## **CARBOHYDRATES**

### **Questions carry two marks:**

1. Write the synthesis of N-acetyl glycosamine and N- acetyl galactoseamine.
2. Write the structure of glucose-D-phosphate and fructose-1, 6-diphosphate. Mention their biological importance.
3. Write the structure of isomaltose, cellobiose and trehalose. How are isomaltose and cellobiose obtained?
4. Based on their functions, how are polysaccharides classified?
5. Name the structural polysaccharides and two storage polysaccharides.

6. Give the structure of fructose-6-phosphate, fructose-1,6-diphosphate, glucose-1-phosphate, ribose-5-phosphate and deoxyribose-5-phosphate.
7. Name the storage polysaccharide present in plant kingdom. Write the structure of disaccharide formed after the partial hydrolysis of this polysaccharide.
8. Write the name and structure of a biologically important sugar phosphate.
9. Write the structure of D-glucuronic acid. What is its importance in metabolism?
10. Name and write the Haworth structures of monosaccharides present in sucrose.
11. Write the structure of N-acetyl neuraminic acid. Mention its biological importance.

### **Questions carry Four marks:**

1. What are amino sugars? Give the synthesis of D-glycosamine and D-galactosamine. Mention their biological importance.
2. What are sugar acids? Give one example each of aldaric acids and aldouronic acids and aldonic acids. Mention biological importance of  $\alpha$ -D-gluconic and  $\alpha$ -D-glucuronic acids.
3. Name the disaccharides formed by the partial hydrolysis of  
a. Amylose b. amylopectin c. glycogen d. cellulose.
4. Name the storage polysaccharides present in plants and animals. What are the structural differences between them?
5. Write the partial structure of glycogen. How does it differ from amylopectin of starch in its structure?
6. What are the components of starch? Indicate the structural difference between them.
7. What are oligosaccharides? How a glycosidic bond is formed between the adjacent monosaccharides? What is necessary condition for a disaccharide to be a non-reducing unit?
8. Name and write the Haworth structures of disaccharides obtained by the partial hydrolysis of amylose and amylopectin.
9. Write the partial structure of chitin and inulin. Mention their biological importance.

## **LIPIDS**

### **Questions carry two marks:**

1. Give the structure of following: a) palmitic acid b) stearic acid c) oleic acid d) linoleic acid e) arachidonic acid.
2. Define saponification number and iodine number.
3. A fat has a high saponification number and low iodine number. What does this signify?
4. Give the structure of a) 3-Sn-phosphatidyl ethanol amine (cephalin) b) 3-Sn-phosphatidyl choline (lecithin) c) 3-Sn-phosphatidyl serine.
5. Write the structure of amino alcohol present in lecithin.
6. What is significance of saponification number?
7. What is significance of iodine number?
8. Why linoleic acid have a higher iodine number than oleic acid?
9. What are antioxidants?
10. Lipids are insoluble in water, yet their interaction with water is of critical importance biochemically. Comment.
11. Explain critical micellar concentration.
12. What are liposomes? Mention their applications.

**Questions carry Four marks:**

1. How are lipids classified? Give one example under each class.
2. What are essential fatty acids? Write their structures.
3. Write a note on biological importance of triacetyl glycerol.
4. What is oxidative rancidity? Who is this prevented?
5. What is hydrolytic rancidity? How is this prevented?
6. Point out the biological importance of phospho glycerides.
7. With a neat illustration, give a description of the fluid mosaic model of membrane structure.
8. What is chemical composition of cell membrane? Write its function.
9. Write a note on monolayer and bilayer lipid.
10. Discuss the classification of lipoproteins.
11. Discuss the disorders and chemical significance of lipoproteins.
12. What are cholesterols? Discuss their disorders in the biological systems.

**PROTEINS**

**Questions carry two marks:**

1. Explain the reactions of:
  - i. Sanger's reaction.
  - ii. Edman's reaction.
  - iii. Ninhydrin reaction.
  - iv. Sakaguchi reaction.
2. What is a peptide bond? Explain with an example.
3. What is biuret reaction?
4. What are C and N terminals of a peptide?
5. Name and write the structure of an optically inactive amino acid.
6. Why are all the atoms in the peptide in one plane?
7. Write the name and structure of an amino acid present in protein which does not contain an amino group.
8. Describe a standard test for the deletion of peptide bond in proteins.
9. How does  $\alpha$ -amino acid reacts with
  - i. Ethanol
  - ii. Formaldehyde
  - iii. Carbon dioxide
10. Mention any two colour reactions of amino acids.
11. Mention any three non-protein amino acids and their importance.
12. Mention three biologically important peptides. Give its importance.
13. Name and write the structure of the amino acid with
  - a) Phenolic group in the side chain
  - b) Heterocyclic ring in the side chain
14. What is meant by isoelectric point/ isoelectric pH ?

**Questions carry Four marks:**

1. How are amino acids classified on the basis of polarity of their side chain?
2. Define 'zwitter ion' with respect to amino acid. Write its structure and show how it can act as an acid and a base.
3. How are proteins classified on the basis of composition and function? Give an example of each class.
4. Define primary, secondary, tertiary and quaternary structures with reference to proteins.
5. Briefly explain  $\alpha$ -helix,  $\beta$ -pleated sheet and triple helix. How are they stabilised? Give an example of a molecule in which these structures are seen.
6. Write a note on the factors stabilizing tertiary structure.
7. What is denaturing of protein? Mention the factors which cause it.
8. What are conjugated proteins? How are they classified? Give an example for each class.
9. Explain Anfinsen's experiment to show denaturation and renaturation of ribonuclease.

**NUCLEIC ACID**

**Questions carry two marks:**

1. Write the structure of the following,  
a) ATP b)GTP c)CTP d)UTP e)d ATP f)d GTP g)d CTP h)d TTP.2. Name the base present in RNA but not in DNA.
2. Write the partial structure of a nucleotide chain.
3. What is Chargaff's rule of base equivalence? Explain.
4. A and G composition (in mole per cent) of one of the strands of DNA double helix is A=27 and G=30. What would be the T and C contents of the complementary strand?
5. Which of the following are base pairs in DNA (T-C, A-T, T-G, T-A, A-C, G-C, G-A, G-T, C-T, G-T).

**Questions carry Four marks:**

1. What is the difference between nucleoside and nucleotide?
2. How do you account for the two strands of DNA to be a) Complementary b) Antiparallel?
3. Write the structural difference between DNA and RNA.
4. Name the different types of RNA. Mention their roles.
5. Give the salient features of Watson – Crick model of DNA.

**BIOENERGITICS AND BIOLOGICAL OXIDATION**

**Questions carry two marks:**

1. Give various stages of energy transformation in living organisms.
2. Differentiate  $\Delta G^1$  and  $\Delta G^{01}$ .
3. Mention the biochemical standard state.
4. What is energy rich compound? Give an example other than ATP.
5. Define standard Red- Ox potential.

6. Mention the difference between positive and negative Red-Ox potential.
7. What is oxidative phosphorylation? Mention its salient features.
8. Explain the terms with an example oxidation phosphorylation and substrate level phosphorylation.
9. Define P : O ratio
10. Why NADH is capable of generating 3 ATP, while FADH<sub>2</sub> is generates 2 ATP in the ETC.
11. What are exergonic and endergonic rations? Give an example each.

**Questions carry Four marks:**

1. What is energy coupling in living organisms? Give example.
2. Why is ATP a high energy compound?
3. Biological oxidation of a metabolite takes place in stages. Why?
4. Compare biological oxidation with combustion.
5. Explain the arrangement of electron carriers of the ETC.
6. What are mobile electron carriers? How are they arranged?
7. Explain NHI proteins and their role.
8. Explain the mechanism of oxidation phosphorylation taking chemiosmotic theory.
9. Illustrate diagrammatically the arrangement of the different electron carriers of the mitochondrial electron transport chain. Mention the sites of ATP synthesis.