

Roll No.

E-759

**M. Sc. (Third Semester)
EXAMINATION, Dec.-Jan., 2020-21**

CHEMISTRY

Paper Second

(Chemistry of Biomolecules)

Time : Three Hours]

[Maximum Marks : 80

[Minimum Pass Marks : 16

Note : Attempt all Sections as directed.

Section—A

1 each

(Objective/Multiple Choice Questions)

Note : Attempt all questions.

Choose the correct alternative :

1. The oxidation of iron in met-haemoglobin is :
 - (a) two
 - (b) three
 - (c) four
 - (d) five
2. Iron-sulphur clusters in biological system are involve in :
 - (a) Proton transfer
 - (b) Atom transfer
 - (c) Group transfer
 - (d) Electron transfer

P. T. O.

3. Which statement is correct about Hemoglobin ?
- (a) Contain four-six member ring and four-five member ring
 - (b) Contain four-six member ring and two-five member ring
 - (c) Contain two-six member ring and four-five member ring
 - (d) Contain four-six member ring and thr-five member ring
4. The terminal member of mitochondrial electron transfer chain is :
- (a) Cytochrome P-450
 - (b) Cytochrome-c-oxidase
 - (c) Cytochrome-c
 - (d) Cytochrome-c₁
5. In biological system, the metal ion involve in dioxyvgen transport besides Fe is :
- (a) Co
 - (b) Zn
 - (c) Mg
 - (d) Cu
6. The catalytic hydration of CO₂ by carbonic anhydrase, CO₂ first interacts with :
- (a) OH group of the active site of the enzyme and then with the zinc

- (b) H_2O of the active site of the enzyme and then with the zinc
 - (c) Zn of the active of the enzyme and then with the OH group
 - (d) Zn of the active of the enzyme and then with the H_2O
7. Which of the following amino acid is chiral ?
- (a) Arginine (Arg)
 - (b) Glycine (Gly)
 - (c) Histidine (His)
 - (d) Cysteine (Cys)
8. Which statement correctly describes the function of cytochrome P-450 ?
- (a) Cytochrome P-450 act as mono-oxygenases and catalase the insertion of O into a C-H bond
 - (h) Cytochrome P-450 couple to cvtochrome-c in the mitochondrial electron-transfer chain
 - (c) Cytochrome P-450 act as dioxygenase
 - (d) Cytochronie P-450 contain high spin Fe(III) : this directly bind O_2 and act as O_2 career
9. Carbonic anhydrase is an example of :
- (a) Hydrolysis enzyme
 - (b) Redox enzyme
 - (c) O_2 transport protein
 - (d) Heme protein

10. Studies of Zn(II) – containing proteins often make use of Co(II) – for Zn(II) substitution. Which statement is correct ?
- (a) Tetrahedral coordination is one of several environments observed for both Co^{2+} and Zn^{2+} .
 - (b) Tetrahedral Co^{2+} and Zn^{2+} are both diamagnetic.
 - (c) The ionic radius of Co^{2+} is significantly smaller than that of Zn^{2+} .
 - (d) The visible spectra of complex of Co^{2+} are similar to those of related complex of Zn^{2+} .
11. Which of the following statements about the nature of enzyme catalysis is correct ?
- (a) An enzyme can change the equilibrium position of the reaction it catalyses by lowering the energy of activation of that reaction.
 - (b) An enzyme can lower the energy of activation of the reaction it catalyses by increasing the molecular collisions between the molecules.
 - (c) An enzyme lowers the free energy difference between substrate(s) and product(s) but it cannot change the equilibrium position of the reaction it catalyses.
 - (d) An enzyme cannot change the equilibrium position of the reaction it catalyses but it lowers the energy of activation of that reaction.

12. Which of the following statements about nicotinamide adenine dinucleotide (NAD^+) is correct ?
- (a) NAD^+ is the initial electron donor in many metabolic oxidation reactions.
 - (b) NADH is the initial electron acceptor in many metabolic oxidation reactions.
 - (c) NAD^+ is the initial electron acceptor in many metabolic oxidation reactions.
 - (d) NAD^+ is a prosthetic group for several dehydrogenases.
13. The most modern hypothesis about enzyme action is called :
- (a) Lock and key hypothesis
 - (b) Lock and substrate hypothesis
 - (c) Induced-fit hypothesis
 - (d) Enzyme substrate hypothesis
14. Restriction enzyme are also called :
- (a) Molecular knives
 - (b) Molecular scalpels
 - (c) Molecular scissors
 - (d) All of the above
15. The chelate rings made by macrocyclic ligand in Vitamin B_{12} are :
- (a) One-five membered ring and three-six membered ring
 - (b) Two-five membered ring and two-six membered ring
 - (c) Three-five membered ring and three-six membered ring
 - (d) Four-six membered ring

16. Which of the following colligative properties can provide molar mass of proteins (or polymers or colloids) with greater precision ?
- (a) Elevation of boiling point
 - (b) Osmotic pressure
 - (c) Relative lowering of vapour pressure
 - (d) Depression of freezing point
17. Which of the following statements about the mechanism of the Na^+/K^+ pump is correct ?
- (a) The Na^+/K^+ ATPase uses energy to pump Na^+ outside the cell and K^+ inside.
 - (b) The Na^+/K^+ ATPase uses energy to pump Na^+ inside the cell and K^+ outside.
 - (c) The Na^+/K^+ ATPase uses energy to bind both Na^+ and K^+ in turn.
 - (d) The phosphorylation of the Na^+/K^+ ATPase does not change its conformation.
18. Which of the following statements about the functions of cell membranes is not correct ?
- (a) Cell membranes maintain the shape of cells.
 - (b) Cell membranes retain the contents of cells.
 - (c) Cell membranes are impermeable to most molecules.
 - (d) Cell membranes are permeable to most inorganic ions.
19. In the formation of a macromolecule, what type of bond would join two amino acid subunit ?
- (a) Ionic bond
 - (b) Phosphodiester bond
 - (c) Hydrogen bond
 - (d) Peptide bond

20. Which of the following statements about the structure of the thick and thin filaments in skeletal muscle is correct ?
- (a) Thick filaments of skeletal muscle have plus and minus ends.
 - (b) Thin filaments of skeletal muscle have plus and minus ends.
 - (c) Thin filaments of skeletal muscle have globular heads.
 - (d) Thin filaments of skeletal muscle are held in the correct orientation by the protein titin.

Section—B

2 each

(Very Short Answer Type Questions)

Note : Attempt all questions.

1. Write a reaction for conversion of ATP from ADP.
2. Write the role of myoglobin.
3. What are ionophores ?
4. What are calixarenes ?
5. What are coenzymes ?
6. What are the role of lipoic acid ?
7. Define nerve conduction.
8. Define osmotic pressure.

Section—C

3 each

(Short Answer Type Questions)

Note : Attempt all questions.

1. Write a short note on oxidative reaction of hemerythrin.
2. What are edergonic and exergonic reaction ?
3. Discuss about host-guest chemistry with suitable example.
4. Describe the role and mechanism of carbonic anhydrase.
5. What are DNA recombination technology ? Explain.

6. Discuss the role of NADP^+ .
7. Explain various types of binding process in biologic system.
8. Define hydrogen ion titration curve.

Section—D

5 each

(Long Answer Type Questions)

Note : Attempt all questions.

1. Explain the structural function and role of iron-sulphur proteins.

Or

Discuss the following :

- (a) Hemocyanin
- (b) Hemoglobin

2. Describe the role of cytochrome P-450.

Or

Discuss the following :

- (a) Carboxypeptidase-A
- (b) Superoxide dismutase

3. Discuss the structure and biological function of Vitamin B_{12} .

Or

Discuss the following :

- (a) F-fit hypothesis
- (b) Methods of immobilization

4. Explain structure and function of cell membrane and ion transport through cell membrane.

Or

Discuss the following :

- (a) Nerve conduction
- (b) Muscular contraction