



Date:

Registration number:

ST. JOSEPH'S COLLEGE (AUTONOMOUS), BENGALURU-27
M.Sc Chemistry - III SEMESTER
SEMESTER EXAMINATION: OCTOBER 2021
(Examination conducted in January-March 2021)
CH 9118 – BIOLOGICAL CHEMISTRY

Time- 2 ½ hrs

Max Marks-70

This question paper contains TWO printed pages and THREE parts

Part A

Answer any 6 out of 8 questions. Each question carries 2 marks.

[6 x 2 = 12]

1. Write the structure of BAL. How does it help in chelation therapy?
2. What are siderophores? Draw the metal chelating site of a siderophore.
3. What are ionophores? Give an example.
4. What is ping-pong mechanism. Give an example of a reaction that follows this mechanism.
5. Give any two biochemical importance of nitric oxide.
6. Why is ATP called – The currency of energy?
7. Give two examples of dipole-dipole interactions seen in biological system.
8. What is meant by the phenomenon of cooperativity in binding of oxygen to hemoglobin..

Part B

Answer any 4 out of 6 questions. Each question carries 12 marks.

[4 x 12 =

48]

9. (a) What is chelation therapy? Explain the use of gold and platinum complexes in the treatment of diseases.
(b) What are the factors affecting the oxygen saturation curves of hemoglobin and myoglobin? Explain using a graphical representation. (6+6)
10. (a) Discuss the role of Na⁺ K⁺ transporting ATPase activity, in active transport of Na⁺ and K⁺ ions.
(b) Write the schematic representation for the mechanism of nitrogen fixation, in bacterial nitrogenase system. (6+6)
11. (a) Give a schematic diagram of the active site of lysozyme, and explain the mechanism by which it cleaves its substrate.
(b) Myosin plays a central role in the sliding filament model of muscle contraction. Explain the mechanism by which this happens (6+6)
12. (a) Give the structure of lipoic acid, and explain how it can carry out its dual function in acyl group and electron transfer reactions?
(b) Give examples of reactions catalyzed by the following coenzymes
(i) Coenzyme A (ii) TPP (6+6)

13. (a) What is the mechanism involved, in the enzyme action of superoxide dismutase
 (b) Describe the coordination environment around the metal ion present in alcohol dehydrogenase. How it is involved in the mechanism of action of the enzyme. (6+6)
14. (a) Discuss the process by which of cholesterol regulation happens in biological systems.
 (b) What is wobble hypothesis? Mention any three salient features of the genetic code. (6+6)

Part C

Answer any 2 out of 3 questions. Each question carries 5 marks. [2 x 5 = 10]

- 15.(a) A sodium ion is situated in air at a distance of 4\AA , from a HCl molecule, with a dipole moment of 1.08D. Calculate the potential energy of interaction between the Na^+ ion and the HCl molecule in KJmol^{-1}

Given: $\mu = 1.08\text{D} = 3.60 \times 10^{-30}\text{C m}$

$q = 1.602 \times 10^{-19}\text{C}$

ϵ_0 (vacuum permittivity) = $8.854 \times 10^{-12}\text{C}^2/\text{N m}^2$

- (b) Explain the meaning of the following reaction:



- 16.(a) Trans-platin has no anticancer activity, though cis-platin is a promising anti-cancer drug. Explain.

- (b) Name any two forces of interaction that are involved in stabilizing the structures of Nucleic acids and carbohydrates in biological systems (3+2)

17. (a) Why are uncompetitive and mixed inhibitors generally considered to be more effective *in vivo* than competitive inhibitors.

- (b) For a Michaelis-Menten reaction $k_1 = 5 \times 10^7\text{ M}^{-1}\text{s}^{-1}$, $k_{-1} = 2 \times 10^4\text{ s}^{-1}$ and $k_2 = 4 \times 10^2\text{ s}^{-1}$. Calculate K_s and K_m for the reaction. Does substrate binding achieve equilibrium or the steady state? (2 +3)

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