

Anekant Education Society's
Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati
Department of Zoology
M.Sc. I Zoology SEM-I:(Autonomous) 2019-20

Question bank for ZOO: 4101 (T) Biochemistry and Bioenergetics (4C)

Multiple Choice Questions

1. If enthalpy change for a reaction is zero, then ΔG° equals to
 - a) $-T\Delta S^\circ$
 - b) $T\Delta S^\circ$
 - c) $-\Delta H^\circ$
 - d) $\ln k_{eq}$
2. ΔG° is defined as the
 - a) Residual energy present in the reactants at equilibrium
 - b) Residual energy present in the products at equilibrium
 - c) Difference in the residual energy of reactants and products at equilibrium
 - d) Energy required in converting one mole of reactants to one mole of products
3. For a reaction if ΔG° is positive, then
 - a) The products will be favored
 - b) The reactants will be favored
 - c) The concentration of the reactants and products will be equal
 - d) All of the reactant will be converted to products
4. Unfolding of regular secondary protein structure causes
 - a) Large decrease in the entropy of the protein
 - b) Little increase in the entropy of protein
 - c) No change in the entropy of the protein
 - d) Large increase in the entropy of the protein
5. The study of energy relationships and conversions in biological systems is called as
 - a) Biophysics
 - b) Biotechnology
 - c) Bioenergetics
 - d) Microbiology
6. The relationship between K'_{eq} and $\Delta G'^\circ$ is
 - a) $\Delta G'^\circ = RT \ln K'_{eq}$
 - b) $\Delta G'^\circ = -RT K'_{eq}$
 - c) $\Delta G'^\circ = RK'_{eq}$
 - d) $\Delta G'^\circ = -RK'_{eq}$
7. What does first law of thermodynamics state?
 - a) Energy can neither be destroyed nor created
 - b) Energy cannot be 100 percent efficiently transformed from one type to another
 - c) All living organisms are composed of cells

- d) Input of heat energy increases the rate of movement of atoms and molecules
8. If ΔG° of the reaction $A \rightarrow B$ is -40kJ/mol under standard conditions then the reaction
- Will never reach equilibrium
 - Will not occur spontaneously
 - Will proceed at a rapid rate
 - Will proceed from left to right spontaneously
9. What is the relationship between ΔG and ΔG° ?
- $\Delta G = \Delta G^{\circ} + RT\ln([\text{products}]/[\text{reactants}])$
 - $\Delta G = \Delta G^{\circ} - RT\ln([\text{products}]/[\text{reactants}])$
 - $\Delta G = \Delta G^{\circ} + RT\ln([\text{reactants}]/[\text{products}])$
 - $\Delta G = \Delta G^{\circ} - RT\ln([\text{reactants}]/[\text{products}])$
10. Which of the following statements is false?
- The reaction tends to go in the forward direction if ΔG is large and positive
 - The reaction tends to move in the backward direction if ΔG is large and negative
 - The system is at equilibrium if $\Delta G = 0$
 - The reaction tends to move in the backward direction if ΔG is large and positive
11. β -oxidation occurs in
- Mitochondria
 - Cytoplasm
 - Chloroplast
 - Nucleus
12. Which of the following amino acid is said to be helix breaker-
- Alanine
 - Glutamate
 - Glycine
 - Tyrosine
13. Which is simple amino acid
- Glycine
 - Proline
 - Glutamate
 - Phenylalanine
14. Cyanide is a strong poison, because it is an inhibitor of _____ of ETC.
- A) Complex I B) Complex II
C) Complex IV D) ATP synthase
15. Glycogen is major storage form of carbohydrate in animals, consists of chains of _____ D-glucose residues with branches that are attached by α -1,6 linkages.
- A) α -1,4-linked B) α -1,5-linked
C) α -1,2-linked D) α -1,3-linked
16. Ornithine cycle is also called as _____.

- A) Krebs cycle B) Ammonia cycle
 C) Uric acid cycle D) Urea cycle
17. Cells can produce purine and pyrimidine nucleotides by _____.
- A) *de novo* synthesis B) Salvage pathway
 C) both A and B
 D) obtaining solely from food
18. By β -oxidation the liver converts fatty acid to _____.
- A) Acetyl-CoA B) glycerol
 C) Pyruvate D) Glucose
19. The complete oxidation of glucose by 12 oxygen atoms yields ____.
- A) $12\text{CO}_2 + 12\text{H}_2\text{O} + \text{Energy}$
 B) $6\text{CO}_2 + 12\text{H}_2\text{O} + \text{Energy}$
 C) $12\text{CO}_2 + 6\text{H}_2\text{O} + \text{Energy}$
 D) $6\text{CO}_2 + 6\text{H}_2\text{O} + \text{Energy}$
20. In human body _____ are completely dependent on glycolysis as source of energy.
- A) Nerve cells B) Liver cells
 C) Spermatogonia D) RBC's

Short Answer Questions

1. Explain Allosteric enzymes with suitable example.
2. What are the sources of Vitamin B12?
3. Explain sources and functions of Vitamin A.
4. What is cofactor?
5. Explain enzyme specificity with suitable examples.
6. What is buffer? Name two biological buffers.
7. Explain the source and functions of Vitamin - E.
8. What are Isoenzymes?
9. Explain the function of cobalt as a cofactor.
10. Draw the structure of Vitamin K and explain its biological role.
11. What is Scurvy?
12. Explain sources and function of B12.
13. Explain helical structure of proteins.
14. Name two basic aminoacids.
15. State first law of thermodynamics.
16. What is transamination?
17. What is peptide bond?

18. Define ketogenesis
19. What is ionic product of water?
20. Draw the basic structure of phospholipid.

Long Answer Questions

1. What are monosaccharides? Classify them with suitable examples.
2. Explain the non-covalent bonds responsible for maintaining the protein structure.
3. What are steroids? Explain their biological significance.
4. Water is universal solvent, Explain.
5. How does substrate concentration affect enzyme activity?
6. What are Isozymes? Explain with suitable example
7. Draw the structure of following polypeptide.----Pro – Met – Gly
8. Proteins are most important biomolecules, Explain.
9. What are triglycerols? Explain the saponification reaction and give its significance?
10. Write a note on quaternary structures of proteins.
11. Explain any two enzyme catalysed reactions where CoA is involved.
12. State laws of thermodynamics. Discuss their role in biochemistry.
13. What are simple lipids? Distinguish between Saturated and Unsaturated fatty acids.
14. What are conjugate proteins? Explain them with examples.
15. What is storage polysaccharide? Add a note on their structure and functions.
16. How does pH affect enzyme activity?
17. Explain reversible enzyme inhibition
18. What are co-enzymes? Explain with suitable example
19. Explain the role of enzymes in C terminal detection of polypeptide.
20. Derive M-M equation.
21. Draw the structure of following polypeptide---Gly-Met-Ser
22. Biological buffers
23. Fat soluble vitamins.
24. Allosteric Enzymes
25. Explain the different ways by which metabolic pathways are regulated.
26. Write a note on free energy.
27. Write a brief note on regulation of glycolysis by PFK and hexokinase.
28. Explain the role of branching enzyme and debranching enzyme in glycogen metabolism
29. What is the role of cAMP in glycogen metabolism?
30. Explain the conversion of Oxaloacetate to citrate
31. Explain the fate of pyruvate.
32. Enlist the enzymes of PDH complex and give their importance.
33. Explain in detail complex II (succinate dehydrogenase) of the mitochondrial electron transfer chain.

34. Explain the deamination reaction of amino acid catabolism
35. Explain in brief urea cycle
36. Explain the β -oxidation of fatty acid.
37. Explain the pyrimidine degradation.
38. Explain the conversion of GMP to uric acid
39. Write a note on ketone bodies.
40. Discuss the structure, Biochemical functions & deficiency of Vitamin D
41. Write a note on lipid bilayer with suitable diagram
42. Give the classification of fatty acids with suitable examples.
43. Elaborate on the various classes of carbohydrates & their features.
44. Explain the significance of storage lipid in our body
45. Write a note on α -helix.
46. Write a note on conjugated proteins. Give examples.
47. Describe the super secondary structure of proteins.
48. Describe the sangers method of protein sequencing
49. Describe the Tertiary structure of proteins.
50. Give structure of any two aromatic amino acids.
51. Write a note on Ramachandran plot
52. Elaborate on the biological functions of proteins.
53. Peptide bond is rigid and planer. Justify.
54. Classify amino acids on the basis of their 'R' groups.
55. Discuss the chemical unity in diverse living organisms.
56. Give the significance of Ramachandran plot.
57. Give the features of peptide bonds.
58. Interpret features of titration curve of glycine.
59. Elaborate steps involved in determination of primary structure of proteins.
60. Write a short note on structure of haemoglobin.
61. Show the steps involved in synthesis of triacylglycerol.
62. Give the structure and significance of ATP.
63. What is glycogenolysis? Name the key enzymes & their role in the pathway
64. Elucidate the glycolysis pathway and its significance in detail.
65. Explain pyrimidine biosynthesis by denovo pathway
66. Explain the mechanism how the buffers maintain the constant pH in a solution
