

Rayat Shikshan Sanstha's

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Major Zoology, Paper VI Biochemistry

Question Bank

Unit I: Carbohydrate Metabolism (15 MCQs)

1. Which of the following is a monosaccharide?
A) Sucrose
B) Lactose
C) Glucose
D) Maltose
2. The main energy currency produced in glycolysis is:
A) NADH
B) ATP
C) FADH₂
D) GTP
3. Glycolysis occurs in the:
A) Mitochondrial matrix
B) Cytoplasm
C) Nucleus
D) Endoplasmic reticulum
4. The end product of glycolysis under anaerobic conditions is:
A) Pyruvate
B) Lactate
C) Acetyl-CoA
D) Oxaloacetate
5. The first step of the Krebs cycle is:
A) Oxidation of succinate
B) Formation of citrate
C) Conversion of pyruvate to lactate
D) Phosphorylation of glucose
6. The electron transport chain is located in:
A) Cytoplasm
B) Mitochondrial matrix
C) Inner mitochondrial membrane
D) Outer mitochondrial membrane
7. Gluconeogenesis mainly occurs in the:
A) Kidney and liver
B) Muscle

- C) Brain
- D) Heart
- 8. Glycogenesis is stimulated by:
 - A) Glucagon
 - B) Insulin
 - C) Epinephrine
 - D) Cortisol
- 9. Glycogenolysis is primarily activated by:
 - A) Insulin
 - B) Glucagon
 - C) Thyroxine
 - D) Vitamin D
- 10. The pentose phosphate pathway produces:
 - A) ATP
 - B) NADPH and Ribose-5-phosphate
 - C) FADH₂
 - D) Pyruvate
- 11. The first enzyme in glycolysis is:
 - A) Hexokinase
 - B) Phosphofructokinase
 - C) Pyruvate kinase
 - D) Aldolase
- 12. The final electron acceptor in ETC is:
 - A) Oxygen
 - B) NAD⁺
 - C) FAD
 - D) CO₂
- 13. Which carbohydrate is a disaccharide?
 - A) Glucose
 - B) Sucrose
 - C) Fructose
 - D) Galactose
- 14. Glycolysis yields a net of how many ATP per glucose molecule?
 - A) 2
 - B) 4
 - C) 6
 - D) 8
- 15. Glucose-6-phosphate is an intermediate in:
 - A) Glycolysis
 - B) Krebs cycle
 - C) Urea cycle
 - D) Fatty acid synthesis

Unit II: Lipid Metabolism (7 MCQs)

- 16. Lipids are mainly classified into:
 - A) Monosaccharides and disaccharides
 - B) Simple, compound, and derived lipids

- C) Amino acids and peptides
- D) Nucleotides
- 17. The main function of lipids is:
 - A) Energy storage
 - B) Enzyme catalysis
 - C) Genetic information
 - D) Signal transmission only
- 18. β -oxidation of fatty acids occurs in the:
 - A) Cytoplasm
 - B) Mitochondrial matrix
 - C) Nucleus
 - D) Ribosome
- 19. Each cycle of β -oxidation produces:
 - A) 1 Acetyl-CoA, 1 NADH, 1 FADH₂
 - B) 2 Pyruvate
 - C) 1 Glucose
 - D) 2 ATP
- 20. Which hormone stimulates lipolysis?
 - A) Insulin
 - B) Glucagon
 - C) Thyroxine
 - D) Vitamin D
- 21. Fatty acids are transported into mitochondria by:
 - A) Carnitine
 - B) NAD⁺
 - C) FAD
 - D) Coenzyme A
- 22. Lipids also act as:
 - A) Structural components of cell membranes
 - B) DNA templates
 - C) Electron acceptors in glycolysis
 - D) Vitamin precursors only

Unit II: Protein Metabolism (8 MCQs)

- 23. Proteins are polymers of:
 - A) Fatty acids
 - B) Amino acids
 - C) Monosaccharides
 - D) Nucleotides
- 24. Transamination involves:
 - A) Transfer of phosphate group
 - B) Transfer of amino group
 - C) Removal of amino group
 - D) Oxidation of fatty acids
- 25. Deamination mainly produces:
 - A) Glucose
 - B) Ammonia

- C) ATP
- D) Lactate
- 26. The urea cycle occurs in:
 - A) Mitochondria and cytoplasm of liver
 - B) Kidney only
 - C) Muscle
 - D) Pancreas
- 27. The main nitrogen excretory product in humans is:
 - A) Ammonia
 - B) Urea
 - C) Uric acid
 - D) Creatinine
- 28. Essential amino acids:
 - A) Can be synthesized by the body
 - B) Must be obtained from the diet
 - C) Are lipids
 - D) Are carbohydrates
- 29. The enzyme responsible for deamination of glutamate is:
 - A) Glutamate dehydrogenase
 - B) Hexokinase
 - C) Lipase
 - D) Pyruvate kinase
- 30. Transamination requires which coenzyme?
 - A) NAD⁺
 - B) PLP (Pyridoxal phosphate)
 - C) Coenzyme A
 - D) FAD

Unit III: Enzymes (10 MCQs)

- 31. Enzymes are:
 - A) Lipids
 - B) Proteins
 - C) Carbohydrates
 - D) Nucleic acids
- 32. Isoenzymes are:
 - A) Different enzymes catalyzing the same reaction
 - B) Same enzyme with different substrates
 - C) Coenzymes
 - D) Vitamins
- 33. Coenzymes are:
 - A) Inorganic molecules
 - B) Organic molecules required for enzyme activity
 - C) Structural proteins
 - D) Nucleotides
- 34. Cofactors are:
 - A) Only organic molecules
 - B) Only inorganic ions

- C) Amino acids
- D) Lipids
- 35. Lock and key model explains:
 - A) Enzyme inhibition
 - B) Enzyme specificity
 - C) Electron transport
 - D) Lipid metabolism
- 36. Induced fit model:
 - A) Enzyme changes shape on substrate binding
 - B) Substrate changes enzyme permanently
 - C) Enzyme is destroyed
 - D) Substrate is a coenzyme
- 37. Enzyme nomenclature is based on:
 - A) Molecular weight
 - B) Substrate and type of reaction
 - C) Location in the cell
 - D) Color
- 38. Allosteric enzymes are regulated by:
 - A) Temperature
 - B) Activators and inhibitors
 - C) pH only
 - D) Coenzymes only
- 39. Apoenzyme + cofactor =
 - A) Holoenzyme
 - B) Isoenzyme
 - C) Zymogen
 - D) Substrate
- 40. Vitamins act as:
 - A) Substrates
 - B) Coenzymes or coenzyme precursors
 - C) Enzymes
 - D) Hormones only

Unit III: Vitamins (10 MCQs)

- 41. Vitamin B1 (Thiamine) deficiency causes:
 - A) Scurvy
 - B) Beriberi
 - C) Rickets
 - D) Night blindness
- 42. Vitamin B12 is required for:
 - A) Carbohydrate metabolism
 - B) Red blood cell formation
 - C) Fat absorption
 - D) Collagen synthesis
- 43. Vitamin C deficiency causes:
 - A) Rickets
 - B) Scurvy

- C) Osteoporosis
- D) Night blindness
- 44. Vitamin A is important for:
 - A) Blood clotting
 - B) Vision
 - C) Energy production
 - D) Bone resorption
- 45. Vitamin D deficiency leads to:
 - A) Beriberi
 - B) Rickets
 - C) Scurvy
 - D) Pellagra
- 46. Vitamin E acts as:
 - A) Antioxidant
 - B) Hormone
 - C) Coenzyme
 - D) Electron carrier
- 47. Vitamin K is essential for:
 - A) Bone mineralization
 - B) Blood clotting
 - C) Vision
 - D) Carbohydrate metabolism
- 48. Water-soluble vitamins include:
 - A) A, D, E, K
 - B) B-complex, C
 - C) B12 only
 - D) D, K
- 49. Fat-soluble vitamins are stored mainly in:
 - A) Liver and adipose tissue
 - B) Kidneys
 - C) Muscle
 - D) Blood only
- 50. Excess of fat-soluble vitamins can cause:
 - A) Deficiency symptoms
 - B) Toxicity
 - C) No effect
 - D) Immediate excretion

Long Questions

Unit I: Carbohydrate Metabolism

1. Classify carbohydrates and explain their **biological significance** with suitable examples.
2. Describe the **glycolysis pathway**, its steps, regulation, and energy yield.
3. Explain the **Krebs cycle (TCA cycle)** in detail along with its significance in energy metabolism.

4. Write an account of the **Electron Transport Chain (ETC)** and oxidative phosphorylation.
5. Explain the process of **gluconeogenesis**, including its importance and key steps.
6. Describe the **glycogenesis pathway** and its regulation.
7. Explain **glycogenolysis**, its steps, and role in glucose homeostasis.
8. Discuss the **Pentose Phosphate Pathway (HMP shunt)** – significance, steps, and products formed.

Unit II: Lipid & Protein Metabolism

Lipid Metabolism

1. Classify lipids and explain their **biological importance**.
2. Describe the **β -oxidation of fatty acids**, steps, and energy yield.

Protein Metabolism

3. Explain the **structure and classification of proteins** along with their biological roles.
4. Write a note on **transamination** and its role in amino acid metabolism.
5. Explain the process of **deamination** and its significance.
6. Describe the **Urea cycle (Ornithine cycle)** in detail with significance.

Unit III: Enzymes and Vitamins

Enzymes

1. Define enzymes. Explain the **classification and nomenclature of enzymes** with examples.
2. Discuss the **mechanism of enzyme action** with the lock and key model and induced fit model.
3. Write short notes on **isoenzymes, co-enzymes, and co-factors** with suitable examples.

Vitamins

4. Discuss the **sources, functions, and deficiency diseases of water-soluble vitamins (B-complex and Vitamin C)**.
5. Describe the **sources, roles, and deficiency symptoms of fat-soluble vitamins (A, D, E, K)**.

Short Notes

Unit I – Carbohydrate Metabolism

1. Classification of carbohydrates.
2. Biological significance of carbohydrates.
3. Write short notes on glycolysis.

4. Write a note on the fate of pyruvate.
5. Krebs cycle – significance.
6. Electron Transport Chain (ETC).
7. What is oxidative phosphorylation?
8. Write a note on gluconeogenesis.
9. Glycogenesis – definition and significance.
10. Glycogenolysis – definition and significance.
11. Pentose Phosphate Pathway (HMP Shunt).
12. Biological significance of PPP.

Unit II – Lipid & Protein Metabolism

1. Lipid Metabolism

1. Classification of lipids.
2. Biological significance of lipids.
3. Write a short note on β -oxidation of fatty acids.
4. Energy yield in β -oxidation.

2. Protein Metabolism

1. Structure and classification of proteins.
2. Biological significance of proteins.
3. Transamination – definition and role.
4. Deamination – definition and role.
5. Urea cycle/Ornithine cycle – significance.
6. Write a note on the fate of amino acids.

Unit III – Enzymes & Vitamins

1. Enzymes

1. Definition and importance of enzymes.
2. Classification of enzymes (with examples).
3. Enzyme nomenclature.
4. Mechanism of enzyme action (lock & key model, induced fit).
5. Isoenzymes – definition and examples.
6. Co-enzymes – role and examples.
7. Co-factors – definition and significance.

2. Vitamins

1. Sources and functions of Vitamin B-complex.
2. Sources, role and deficiency of Vitamin C.
3. Write a note on Vitamin A – source, role, deficiency.
4. Vitamin D – role in calcium metabolism.
5. Vitamin E – source, role, deficiency.
6. Vitamin K – role in blood clotting.