

Biochemistry

CARBOHYDRATES

1. Mucopolysaccharides/heteropolysaccharides*
2. Glycosides
3. Classification of carbohydrate
4. Dietary fibre*
5. Lactose intolerance
6. Carbohydrate digestion and absorption
7. Glycolysis, energetics, inhibitors, regulation
8. Rappaport leubering shunt
9. Galactose metabolism * Fructose metabolism
10. Amphibolic cycle of citric acid
11. PDH complex* and its coenzyme
12. Vitamins used in citric acid cycle
13. Glycogen synthesis and breakdown
14. Regulation of glycogen breakdown *
15. Glycogen storage disorders *
16. Gluconeogenesis, regulation*
17. Reciprocal relationship of glycolysis and Gluconeogenesis
18. HMP cycle and its significance
19. Polyol pathway *
20. Essential pentosuria*
21. Galactosemia, Fructosuria
22. Homeostasis of blood sugar*
23. Mucopolysaccharadosis*
24. Energetics of complete oxidation of one molecule of glucose
25. Malate aspartate shuttle
26. Fate of acetyl Co A*, pyruvate, Glucose 6 PO4*
27. Fructose intolerance

LIPIDS

1. Essential fatty acid
2. PUFA and its clinical significance *
3. W3, W6 fatty acids
4. Classification of lipids* and fatty acids
5. Phospholipids and phospholipases
6. Composition and functions of phospholipids*
7. Spingolipids
8. Saponification number, Iodine number, Acid number
9. Role of bile salts in digestion and absorption of lipids*
10. Digestion and absorption of lipids
11. Alpha and omega oxidation
12. Carnitine transport
13. Energetics of beta oxidation of palmitic acids
14. Fatty acid synthase complex*
15. Adipose tissue metabolism
16. Fatty liver* and its stage
17. Ketone Bodies
18. Tests to Identify ketone bodies in urine

19. Ketogenesis & its clinical significance.
20. Define Ketosis. Name 2 conditions where it occurs..
21. Lipoproteins & their functions.
22. LDL metabolism.*
23. Role of LDL receptors in the metabolism of Low Density Lipoprotein and the disease caused by its defect
24. Metabolism of VLDL.
25. HDL cholesterol and atherosclerosis.
26. HyperLipoproteinemias & Frederickson's Classification
27. Lipoproteinemia.
28. Reverse cholesterol Transport
29. L- Cat
30. Lipases.
31. Apoproteins
32. Bile acids
33. Bile Pigments
34. Bile salts.
35. Prostaglandins
 - i. synthesis
 - ii. Functions & uses
36. Eicosanoids
37. Lipid storage Disease
38. Gaucher's Disease
39. Niemann - Pick Disease
40. Tay Sachs disease.
41. Pulmonary Surfactants and their importance(Short answer)*
42. Lipid Profile

Essay:

1. Define phospholipids. Classify them with suitable examples. Enumerate the various functions of phospholipids. *
2. Write in detail about.
 - α. oxidation of fatty acids in the following headings.
 - a). Definition
 - b). Site
 - c). Steps
 - d). Energetics of β oxidation of palmitic acid
3. Describe in detail the synthesis & utilization of ketone bodies. Name any 3 condition of increased the Laboratory Evaluation of ketoacidosis.
4. Name the ketone bodies. Enumerate the

steps in the synthesis of ketone bodies. How are they metabolized?

Explain the biochemical basis and consequences of excess production of ketone bodies in Diabetes mellitus & starvation. *

5. Discuss cholesterol synthesis and its regulation. Mention the various substances obtained from cholesterol

6. Describe in detail the synthesis of cholesterol in the body. What is the normal serum cholesterol level and mention the conditions where cholesterol level is altered.

7. How are lipoproteins classified? What are their functions. Describe the metabolism of LDL.

PROTEINS

Short Notes:

1. Digestion and Absorption of proteins

2. **Meister cycle** or γ Glutamyl cycle.

(Glutathione Role in A.A Transport)

3. Pepsin.

4. Biologically Important compounds derived from glycine.

5. Diseases associated with Glycine metabolism

(Less Important)

6. **Phenylketonuria.**

7. **Alkaptonuria.**

8. Biologically important compounds derived from Tyrosine

9. **Albinism**

10. **Biologically Important compounds derived from Tryptophan**

11. **Hartnups disease.**

12. **Carcinoid syndrome.**

13. **SAM active methionine.**

14. Transmethylation reactions

15. Biologically Important compounds derived from methionine.

16. Glutathione

17. Creatinine.

18. **Cystinuria**

19. **Cystinosis**

20. **Homocystinuria**

21. One carbon metabolism

22. **Maple syrup urine Disease(Methyl malonic aciduria)**

23. **Isovaleric academia**

24. Nitric oxide

25. Histidine (MCQS)

26. Lysine - Carnitine

27. GABA.

28. α Alanine

29. Selenocysteine

30. Polyamines

31. Transamination reactions

32. Oxidative Deamination

33. Glutamate dehydrogenase.

34. Urea cycle

35. **Urea cycle disorders**

36. Taurine

37. Cadaverine

38. Classification of Amino Acids

1) Structure

2) Metabolic fate

3) Nutritional

4) Polarity

39. Isoelectric pH or Zwitterion

40. Non α amino acids

41. Non protein amino acids

42. **Classification of proteins**

43. Peptide bond.
44. Biologically Important peptides
45. Essential amino acids
46. Metabolic Role of methionine
47. Determination of N Terminal amino acid of a polypeptide
48. Edman Degradation
49. One carbon metabolism.
50. Primary structure.
51. Secondary structure.
52. Tertiary structure.
53. Quaternary structure
54. Collagen
55. Plasma proteins.
56. Determination of primary structure of protein
57. Structure of protein.
58. Collagen.
59. Biologically important peptides.
60. Selenocysteine
61. Branched chain amino acids.
62. Levels of Organization of Proteins
63. Bence-Jones Proteinuria(Short Answer)
64. Immunoglobulins and their functions
65. Polyamines

Essay:

1. Describe in detail how amino nitrogen is disposed off from the body. Add a note on urea cycle disorders.

2. Describe urea cycle in the following headings

- 1) Site
- 2) Sources of amino group.
- 3) Steps.
- 4) Regulation
- 5) Urea cycle disorders
- 6) Clinical significance of urea

3. How is ammonia produced in the body? How is it detoxified? Give 2 causes & effects of Hyperammonemia.

4. Describe Glycine metabolism. Write the various compounds formed from glycine add a note on disorders associated with glycine metabolism.

5. Describe in detail the catabolism of phenyl Alanine. Add a note on Disorders associated with it.

6. Name the aromatic amino acids. Describe the

metabolism of Tryptophan. Name the important compounds synthesized from it and the metabolic disorders of Tryptophan metabolism.

7. Name the aromatic amino acid. Write the metabolism of phenylalanine

8. Discuss the metabolism of Tyrosine. Name the B.I compounds derived from Tyrosine. Add a note on I.B. Errors associated with it.

9. Name the sulphur containing Amino acids and the metabolism of anyone of them.

10. Write an essay on how proteins digested & Absorbed

11. Write in detail the various levels of organization of proteins. Various methods used in elucidation of primary structure.

VITAMINS

Essay:

1. Chemistry, Sources, RDA, Biochemical functions & Deficiency manifestations of folic acid.

2. Chemistry, Functions, deficiency manifestations and Hypervitaminosis of Vitamin A.

3. Sources, active form, Biochemical functions, Deficiency disease and its detection of Thiamine.

4. Sources, RDA, Coenzyme formation, functions and deficiency manifestations of Niacin.

5. Sources, Properties, Functions, Deficiency manifestations, RDA of Vitamin C.

6. Discuss the coenzyme functions of

1) Riboflavin,

2) Niacin,

3) folic acid,

4) Pantothenic acid

5) Biotin.

7. Describe the chemistry, sources, daily requirement, synthesis and biochemical role of cholecalciferol.

8. Name the important vitamins which require for the proper functioning of the nerve.

Describe the sources, biochemical functions, daily requirement and deficiency manifestations of any one of them.

9. Enumerate the anaemia causing vitamins. Explain in detail about any one of them.

10. Describe in detail about the sources RDA, active form, biochemical functions and deficiency manifestations of:

A) Thiamine.

B) Niacin.

C) Pyridoxine.

D) Vitamin C.

11. Describe in detail about the sources RDA, active form, Absorption, biochemical functions and deficiency manifestations of Vitamin B 12.

12. Describe in detail about the sources RDA, active form, Metabolism biochemical functions, deficiency manifestations, Therapeutic uses and antagonists of folic acid.

Short Notes:

1. Synthesis & functions of active form of Vitamin D.

2. Biochemical role of vitamin B12 & deficiency disease.

3. Biotin.

4. Vitamin E.

5. Role of Vitamin D in Calcium metabolism.

6. Antioxidants.

7. Metabolic functions of cyanocobalamin with examples.

8. Write the RDA & deficiency manifestations of vitamins A.

9. Mention the functions & coenzyme of Riboflavin.

10. Beriberi.

11. Write the functions & coenzyme of cobalamin.

12. What are the sources and biochemical functions of pyridoxine?

13. Biochemical role and deficiency manifestations of Vitamin C.

14. Vitamin A.

- ✓ 15. Vitamin K role in blood coagulation
- ✓ 18. Synthesis and functions of active form of Vitamin D?
- ✓ 19. Wald's visual cycle.
- 20. Differences between fat soluble and water soluble vitamins.
- ✓ 21. Deficiency manifestations of vitamin A.
- ✓ 22. Deficiency manifestations of vitamin D.
- ✓ 23. Deficiency manifestations of vitamin K.
- ✓ 24. Vitamin K cycle /Gamma carboxylation.
- ✓ 25. Pellagra.
- 26. Biochemical functions of Pantothenic acid.
- ✓ 27. Biochemical functions of Biotin.
- ✓ 28. Biochemical functions of Vitamin C.
- ✓ 29. FIGLU.
- ✓ 30. One carbon metabolism.
- ✓ 31. Methyl folate trap.
- ✓ 32. Absorption of vitamin B 12.
- ✓ 33. Pernicious Anaemia.
- ✓ 34. Scurvy.
- ✓ 35. Haemorrhage manifestation of Vitamin C deficiency

ENZYMES

Short notes

- ✓ 1. Classify Enzymes with suitable examples
- ✓ 2. Factors affecting enzyme activity
- ✓ 3. Km value and its significance.
- 4. Line weaver - Burk Double reciprocal plot
- ✓ 5. Active site of an Enzyme
- ✓ 6. Metallo enzymes (MCQS)
- ✓ 7. Mechanism of action of enzyme.
- ✓ 8. Competitive Inhibition
- ✓ 9. Uncompetitive Inhibition
- ✓ 10. Noncompetitive Inhibition
- ✓ 11. Reversible Irreversible
- ✓ 12. Suicidal Inhibition (MCQ)
- ✓ 13. Allosteric regulation or modification of enzyme activity
- 14. Covalent modification (phosphorylation)
- ✓ 15. Specificity of Enzymes
- ✓ 16. Coenzymes (definition of various parts of it)
- (Non vitamin Coenzymes)
- ✓ 17. IsoEnzymes with suitable examples (2)
- ✓ 18. Michaelis - Menten equation
- ✓ 19. Clinical Enzymology
- ✓ 1) Cardiac enzymes (myocardial Infarction)
- ✓ 2) Liver enzymes
- ✓ 20. Therapeutic uses of enzymes
- 21. Non functional plasma enzymes
- ✓ 22. Allosteric enzymes & its feedback regulation

- 23. Enzyme Poisons
- 24. Cardiac Troponins
- ✓ 25. Isoenzymes of Lactate Dehydrogenase

✓ Essay:

1. Define Enzymes? What is the mechanism of their action? Describe in detail the factors influencing the enzyme action
2. Classify Enzymes? Describe the different types of enzyme inhibition. Add a note on clinical significance of enzymes.
3. Explain the effects of different factors on rates of enzyme catalysed reactions.
4. Regulation of enzyme activities

Heme Metabolism:

Essay:

Define jaundice classify with suitable example and the Biochemical tests to differentiate. Add a note a Congenital Hyperbilirubinemeias.

Short notes:

- ✓ 1. Porphyrrias types and causes
- ✓ 2. Acute Intermittent Porphyrria.
- ✓ 3. Congenital Hyperbilirubinemeias.
- ✓ 4. Vanden Bergh Test.
- ✓ 5. Hemolytic Jaundice.
- ✓ 6. Obstructive Jaundice.
- ✓ 7. Hepatocellular Jaundice.
- ✓ 8. Biochemical tests to differentiate various types of jaundice Blood &Urine.
- 9. Physiological Jaundice.
- ✓ 10. Haemoglobin S
- 11. Abnormal Haemoglobins
- ✓ 12. Thalassemia
- ✓ 13. Bilirubin formation and excretion
- ✓ 14. Heme synthesis

Purine Metabolism

Essay:

- ✓ Discuss in detail the Purine synthesis. Add a note in hyperuricaemia.

Short note:

- ✓ 1. Salvage Pathway.
- ✓ 2. How uric acid is formed in the body. Write its normal hyperuricaemia level. Add a note on
- ✓ 3. Gout.
- ✓ 4. Lesch-Nyhan syndrome.

Pyrimidine Metabolism

- ✓ 1. Pyrimidine Degradation.
- ✓ 2. Orotic aciduria.
- ✓ 3. Salvage pathway.

Mineral Metabolism

- ✓ 1. Iron absorption.
- ✓ 2. Mucosal Block theory.
- ✓ 3. Deficiency manifestation of Iron. (Investigation done)
- ✓ 4. Hypocalcaemia.
- ✓ 5. Hypercalcaemia.
- 6. Iodine (its relation in thyroid synthesis and thyroid disease)
- 7. Selenium.
- 8. Zinc.
- 9. Magnesium.
- 10. *Calcium Homeostasis
- 11. Functions of phosphorus
- 12. Trace elements (with clinical importance of any 2)
- 13. Wilson's disease
- 15. Fluorometry

GENETICS

Essay:

*Discuss in detail the synthesis of DNA. Add a note on its repair mechanism

Replication

Short note:

1. DNA polymerase
 - Prokaryotes
 - Eukaryotes
2. Topoisomerase.
3. DNA damage & Repair mechanisms.
- 4.
5. Replication fork (Bubble)
- 6.
7. Cell cycle.
8. Cyclins.
9. Organisation of DNA.
10. Inhibitors of Replication
11. Replisome
12. Xeroderma pigmentosum
13. *Define & explain point mutation with examples
14. Differences between DNA and RNA
15. *Mutation

Transcription:

Essay:

Discuss detail the process of transcription.

-Prokaryotes

-eukaryotes

SHORT NOTES

1. Structure & Function of tRNA.
2. Structure & Function of mRNA.
3. RNA Polymerase
4. *Post Transcriptional modifications

-Prokaryotes

-Eukaryotes

5. *Inhibitors of Transcription.

6.

7. Codons

Translation

Essay:

Discuss in detail the process of translation in prokaryotes and/or eukaryotes

1. Genetic Code.
2. *Post translational modifications.
3. Inhibitors of Translation/ Inhibitors of protein Biosynthesis

*Regulation of Gene Expression

1. Lac operon
2. Regulation of gene expression in Eukaryotes.
3. Oncogenes
4. Tumour markers
5. Mutations

Genetic Techniques:

Techniques:

1. Blotting Techniques;
 1. Southern blotting.
 2. Northern blotting.
 3. Western blotting.
2. *Recombinant DNA technology.
 1. Technique.
 2. Uses of Recombinant DNA Technology.
 3. Restriction Endonuclease.
 4. Chimeric DNA.
 5. Vectors.
 6. Plasmid.
3. *PCR
4. Electrophoresis and its applications

5. Application of genetic engineering

6. Gene therapy

Nutrition

Short notes:

1. Caloric requirement and its recommended distribution in adult male

2. *Protein energy malnutrition (PEM)

3. Kwashiorkor

4. Marasmus

5. RDA (recommended dietary allowances)

6. *Balanced diet

7. Dietary fiber

8. Calorimeter

9. SDA

10. Total Parenteral Nutrition and its importance

Miscellaneous

Short notes:

1. Environmental pollutant

2. Occupational hazards

3. Heavy metal poison – write biochemical consequences and diagnosis of any 2

4. BMR

5. Structure of Cell Membrane

6. Chloride Shift

7. Chromatography

8.

9. Functions of Mitochondria

10. *Metabolic adaptations in Fed state and/or fasting state

11. Alcohol Metabolism

12. *Renal Regulation of Blood pH

13. Buffer system in the body

14. Detoxification of xenobiotics

14. Metabolic acidosis

15. Role of lungs in acid-base balance

16. Flame Photometer

17. *Colorimetry and the laws of colorimetry

18. Distribution of water in the body

19. Water toxicity

20. Dehydration

21. *Anti-oxidants

22. Tubular function tests

23. Creatinine clearance

Electron transport chain

Essay:

*Discuss in detail the complexes of ETC ,

inhibitors, uncouplers and the process of oxidative phosphorylation. Add a note on ATP synthase complex

Short notes:

1. Complexes of ETC
2. Oxidative phosphorylation
3. *Inhibitors of ETC
4. Uncouplers of oxidative phosphorylation
5. *ATP synthase complex
6. Chemiosmotic theory
7. Brown adipose tissue/ thermogenesis
8. Cytochrome P450

HORMONES

1. Insulin
2. Cyclic AMP as a second Messenger.