BIOCHEMISTRY QUESTIONS

Protein Chemistry and Metabolism

LAQs[15 marks]

1.a) Define proteins. b) Explain the structural organisation of proteins(1°,2°, 3°, 4°).

c) Add a note on denaturation of proteins [2+9+4]

2.Describe UREA CYCLE**** under following headings :

a) Reactionsb) Energeticsc) Regulationd) Difference b/w CPS1 and CPS2.e) Metabolic disorders

SAQs and VSAQS

1. Write about biologically active peptides.

2.Add a note on ISOELECTRIC pH of proteins****.

3.Classify amino acids and give examples.

4.Write about Transamination and deamination.

5.Why are high levels of ammonia toxic?what it does to brain?

6.Add a note on BUN(blood urea nitrogen).(3marks)

7. Biochemical basis of HARTNUP DISEASE. (3MARKS)

8.One Carbon metabolism.

9.Synthesis,degradation, functions of POLYAMINES.

10.Examples of

a) Glucogenic, b) ketogenic c) both Glucogenic and ketogenic amino acids. d) sulphur containing amino acids. e) Aromatic amino acids (2+2+2+2+2)

11. Classify proteins based on their functions.

12. Describe structures of

a) Alpha helix b) Beta pleated sheath c) Collagen****(triple helix) d) Hemoglobin***** [3+3+3+3]

PLASMA PROTEINS AND IMMUNOGLOBULINS

SAQS/VSAQs

1.Write short note on Plasma proteins and their functions. (5)

2.Immunoglobulins:Types & Function. (5)

NUCLEOTIDE CHEMISTRY

LAQS

1. A) Describe the structure of DNA***.

B) Write the salient features of structure of DNA proposed by WATSON & CRICK***

C) CHARGOFFS RULE.

SAQs & VSAQs

1.A) Enumerate types of RNA.

Write About B) m-RNA C) t-RNA D) r-RNA. (3+3+3+3)

2.Add a note on RIBOZYME. (3MARKS)

3.Enumerate purines and pyramidines. (3marks)

NUCLEOTIDE METABOLISM

SAQS & VSAQS

1. DENOVO PYRAMIDINE synthesis.(5)

2. PURINE SALVAGE PATHWAY***.(5)

3.URIC ACID METABOLISM****. (5)

4.GOUT(1°,2°,Rx)****.(5)

5.LESCH NYHAN SYNDROME*****. (5)

6. Orotic Aciduria. (3)

MOLECULAR BIOLOGY

LAQS

1. Describe the process of DNA REPLICATION with a suitable diagram. Add a note on DNA repair mechanism. [9+6]

2. Describe the steps of TRANSCRIPTION with the help of diagram. Add a note on post transcriptional modifications****.[9+6]

3. Describe in detail about PROTEIN BIOSYNTHESIS(translation) in body.Add a note on post translational modification. [9+6]

4.Explain the steps involved & Tool required in Recombinant DNA is formed. Mention the applications of rDNA in daily life. [10+5]

SAQs & VSAQs

1.DNA polymerases.(3)

2.Telomere and telomerase. (3)

3.Inhibitors of replication, translation and transcription. (5)

4. Okazaki fragments. (3)

5.Add a note on Genetic code. (5)

6.Wobbles hypothesis***. (3)

7.point mutation and frameshift mutation. (5)

8.protein folding & protein targetting. (5)

9.LAC OPERON***. (5)

10.DNA finger printing. (5)

11.zymogens.(3)

12. Polymerase Chain Reaction. (5)

Biochemistry of Cancer

SAQS & VSAQS

1.What are oncogenes? Give two examples.(3)

2.What are tumor markers***? Explain with examples.(5)

3.Add a note on apoptosis.(3)

HEMOGLOBIN AND PORPHYRIAS

LAQS(15Marks)

1.Decribe the Biosynthesis of Heme and Regulation of Heme Synthesis.

SAQs&VSAQs

1. What are Porphyrias?Classify them.write in detail about ACUTE INTERMITTENT PORPHYRIA?******(3+5)

2. Write a detail Flowchart showing the process of Degradation of HEME in the human body?****(5M)

3. Enumerate Hemoglobin Derivatives.(3M)

4. Enumerate Types of normal Hemoglobins.(3M)

5. What are Hemoglobinopathies?describe Brefily!(5M)

6.Write in detail about Sickle Cell Anemia(molecular basis,mechanism of Sickling,Sickle cell Trait,biochemical test for diagnosis) (5M)

7.Write a Short note on Thalessemia.(5M).

8.What is jaundice?Mention types of jaundice,Causes of Jaundice, explain findings in Urine and Blood.(10M)

9.Write a Short note on Neonatal Physiologic Jaundice!(5M)

ORGAN FUNCTION TESTS

SAQs & VSAQs

1.Describe the various Biochemical liver Function test. (5)

2.Add a Note on Jaundice.

Differential diagnosis of JAUNDICE***. (Pre-hepatic,Hepatic, Post-Hepatic) (4+6)

[potential Clinical Question]

3.VandenBerghs reaction. (3)

4.Fouchets test. (3)

5. Write short note on ALT and ALP. (5)

6.RENAL FUNCTION TEST- (3+3+3)

(a) Inulin clearance (b) Creatinine clearance*** (c) Urea clearance

7.Write Short note on Gastric Function test. (3)

8.Name the Thyroid Function test with diagnostic importance of each. (5)

9. Short Note on Glucose Tolerance test(G.T.T). (3)

XENOBIOTICS

LAQ (15marks)

1. Describe how Xenobiotics are metabolised in the body. [write in detail about phase1 and phase2 reactions] Give a detailed account of cytochrome P450 in hydroxylation reactions.

Acid-Base Balance

SAQS & VSAQS

1.Define a buffer. Describe the types of buffers. (5)
2. Add a note on handerson-hesselbach equation.(3)
3.Explain the different mechanisms of regulation of blood pH(respiratory and renal) (5+5)
4.Add a note on disorders of acid base balance.(5)
5.Add a note anion gap.(3)
6.Explain: (5+5+5+5)
(a) Metabolic Acidosis***
(b) Metabolic Alkalosis***
(c Respiratory Acidosis***
(d) Respiratory Alkalosis***

Water and Electrolytes

VSAQS 👇

1.Define osmolarity and osmolality.(3)
2. Add a note on osmolality of plasma(3)
3.Normal Plasma levels of (3)
a) Sodium b) potassium c) Calcium d) chloride e) Creatinine f) Urea

CARBOHYDRATE CHEMISTRY AND METABOLISM

LAQs

1. GLYCOLYSIS under the following headings :
a) Salient features
b) Reactions of glycolysis***
c) Inhibitors of glycolysis.***
d) Fate of pyruvate.
(conversion of pyruvate to lactate)
e) Energetics of glycolysis.***
f) Regulation of Glycolysis.***
2. Describe KREBS CYCLE under the following headings :
a) Location
b) Reactions & products
c) Inhibitors of TCA***
d) Energetics of TCA*****
e) Regulation of Krebs cycle [1+7+2+3+2]
3 a. Define GLUCONEOGENESIS
b. Significance of it
c. What are its Substrates and pathway involved. [Reactions of gluconeogenesis]
d. Energetics of gluconeogenesis
e. Write a note on regulation of gluconeogenesis. [1+2+5+2+5]

4. GLYCOGEN METABOLISM
a. Define Glycogenesis and Glycogenolysis.
b. Write in detail aboutthe pathway of glycogenesis and glycogenolysis
c. Explain how are this pathways are regulated.***** [2+8+5]
5. Write in detail about HMP PATHWAY under the following headings.
a) Reactions of the pathway
- oxidative phase
- Non oxidative phase
b) Dynamics of HMP Shunt
c) Significance of HMP Shunt***** [7+3+5]

SAQs and VSAQs

1. Describe RAPAPORT LEUBERING CYCLE*****. + significance of 2,3 - BPG.

2. Define Epimer***. Name any two Epimers. (3)

2.Write about Mutarotation. (3)

3.Derivatives of Monosaccharides (oxidative and Reductive). (3)

4. Types of Dissacharides with examples.(Reducing and Non Reducing) (3)

5. Describe about Sucrose and Lactose along with their sources. (3)

6.PDH complex****. (Name the coenzymes +Reaction+Regulation of PDH)[5marks]

7.Fate of acetyl Co-A (3marks).

8.Amphibolic pathway/Role of Citric Acid Cycle***[5marks]

9. Anaplerotic reactions of Citric acid cycle***[5marks]

10. What is glycogen storage disorder (Defination). write in detail about Von gierke's disease*****. [1+4]

11. Write a short notes on

a) G6PD deficiency.**** b) Wernicke-korsakoff syndrome.*** [3+2]

12. Describe Blood glucose Homeostasis.*******

(a) Factors affecting (b) Regulation (c) Glycemic status (d) Role of Hormones

(e) Hypoglycemic & Hyperglycemic effect. [10marks]

13. Add a short note on Uronic acid pathway. [5marks]

14. Describe Lactose intolerance.

15.Glycogen storage disorders types**** and write few points regarding each. (6types)

LIPID METABOLISM

LAQs

1.Explain Denovo Synthesis of fatty acids*****. (Fatty acid synthase complex, Reactions&Regulation).

2. Describe the process of beta oxidation***** of fatty acids. Add a note on energetics of the pathway.

3. a) Biosynthesis of Cholesterol*****b) Regulation of cholesterol synthesis**** c) Degradation of Cholesterol*****

4. Metabolism of LIPOPROTEINS*****:

(a) CHYLOMICHRONS (b) VLDL (c)HDL******** (d) LDL

5. Describe Ketone bodies****** under the following headings :

a) Synthesis and Degradation of ketone bodies

b) Utilization of ketone bodies

c) What happens when there is a excess production of ketone bodies?

d) Biochemical basis of KETOSIS in starvation and Diabetes mellitus. [7+3+2+3]

[Note:Also study how rotheras test is done to confirm the presence of ketone bodies in urine]

SAQs and VSAQs

1. Role of CARNITINE.*****

2. Add a note on Reverse cholesterol transport.

3. Add a note on Diabetic Keto acidosis*****.

4. What are ketone bodies and write about ketonuria.(3marks)

5.Fatty liver and its causes (3marks)

6. Write about Essential fatty acids and their functions. (3marks)

7. Explain How LIPIDS are digested and absorbed.

VITAMINS

LAQs

1.Give an account on VITAMIN - A under the following headings.

a) Sourcesb) Chemistry c) Biochem functions : { Role of Vit-A in vision, Wald's Visual cycle***

as antioxidants ,other Biochemical functions}

d) Daily requirement/RDA

e) Deficiency manifestations{-Night Blindness - Xeropthalmia- Bitot-spots and Keratomalacia

- Extra-ocular Manifestations of Vit-A}

f) Vitamin A Toxicity.

2. Give an account on Vitamin-D under the following headings.

a) sourcesb) Chemistryc) Biochemical Functions{Action on Intestine, Bone, and Kidneys}

d) Daily requirements/RDAe) Deficiency manifestations {-Rickets- Osteomalacia}

f) vit-D toxicity.

3. Give an account on VITAMIN-C under the following headings.

a) Chemistry b) Biochemical Functions c) sourcesd) Daily requirements and dietary sources
e)Deficiency manifestations****f) Vitamin-C toxicity

SAQs and VSAQs

1)Functions and deficiency manifestations of thiamine(VIT- B1)

2) Folic acid(Sources&Functions) and Folate trap****

3)Biochemical Functions of Vit-B12

4)Biochemical Functions of Vit-K

5) Pellagra

6) Co-enzymes of Niacin*** and write 2-3 Biochemical reactions of it.

7)Wald's Visual cycle ****

8)Explain why Thiamine deficiency is one of the causes for Lactic acidosis.

Mineral metabolism

LAQs

1. Describe the Metabolism of CALCIUM under the following headings :

a) Sourcesb) RDA c) Functions (any4) d) Regulation of plasma calcium e) Deficiency manifestations***.

2. Explain the IRON metabolism under the following headings :

a) Source b) Daily requirements c) Absorption and transport*** d) Functions e) Clinical Manifestations.

SAQS & VSAQS

1. Sources and functions of copper(5)

2 .Menkes & Wilsons disease(5).

3.Biochemical functions of*****(3+3+3)

a) IODINE

b) ZINC

c) SELENIUM

4.Biological Role of Fluorine and Add a note on Fluorosis. (5)

5. CERULOPLASMIN. (3)

ENZYMES

LAQs

1. a) Define Enzyme. b) Factors affecting Enzyme activity(draw graphs where ever needed).

c) Michael's menten(Km) and its significance.***d) Lineweaver-burk plot.(only equation and its use).

2. a) Write the classification of ENZYMES giving examples.

b) Mechanism of action of Enzymes[10+5]

3. a) What are ISOENZYMES?

b) What are the different ways in which Isoenzymes are identified?

c) Discuss clinical Importance of Isoenzymes of CK and LDH [2+7+6]

SAQs

1 . COENZYMES

2. Write about ENZYME INHIBITION****.(competitive inhibition with few examples ~is important)

3.Diagnostic importance of enzymes. (Amylase, ALT, AST, ALP, LDH, CK ~write 2-3 points about each)

4. Write about metallic enzymes & Pro enzymes.

5.Enzymes as therapeutic agents! [VSAQ]

6.Absolute Enzyme Specificity.

BIOLOGICAL OXIDATION

LAQ

1.a) Explain the formation of ATP in Electron transport chain.

b) components of the Respiratory chain

c)Mention the ATP synthesizing sites.

d) Inhibitors of ETC. [7+3+2+3]

SAQs

1. Write about Oxidative phosphorylation/Chemiosmotic Hypothesis.******

2. Add a note on Malate Aspartate shuttle.

Cell & cellular organelles + Extracellular matrix.

SAQs & VSAQs

1. Fluid Mosaic model***.(5)

2. Facilitated diffusion. (3)

3. Active transport. (5)

4.Phagocytosis.(3)

5.Structure of Collagen. (5)

Nutrition

SAQs & VSAQs

1. What is BASAL METABOLIC RATE***. How it is determined in clinical laboratory. Add a note on factors affecting BMR. (5)

2. Write the calorific values, respiratory quotient and Specific Dynamic Action(SDA) of (5)

A) Carbohydrates B) Proteins C) Lipids

3.Dietary fiber*** and it's role.(5)

4.Glycemic index.(3)

5.Kwashiorkor and Marasmus(5)