



All India Institute of Medical Sciences, Kalyani
First Professional MBBS Examination, August 2024

Time: 3 Hrs.

Biochemistry (Paper-I)

Marks: 100

INSTRUCTIONS:

- Answer all questions.
- Illustrate your answers with well labelled diagram wherever necessary.
- Answer section A and B in a separate answer booklets.

SECTION – A (50 MARKS)

1. A 6-year-old boy presented to the outpatient department of AIIMS with complaints of shortness of breath, and occasional syncopal attacks. On examination, the boy showed severe pallor, frontal bossing and significant hepato-splenomegaly. His parents informed that the child underwent blood transfusions few times before.
 - a. What is your provisional diagnosis and why? (1+2)
 - b. How hemoglobin and myoglobin differ from each other? Describe the structure-function relationship demonstrated by these haemo-proteins. (4)
 - c. What is oxygen dissociation curve of hemoglobin? Name two factors that cause right shift of the curve. (1+2)
2. What are Prions Protein? Explain the secondary structure of Proteins with a suitable example. (2+3)
3. What is Phospholipid? Mention the clinical significance of any two phospholipids. (1+4)
4. Name any FOUR special products of Glycine? Explain the biochemical basis of the presence of glycine in quaternary structure collagen. (2+3)
5. How is ammonia handled in our body? Why is ammonia toxic? (3+2)
6. Describe and explain the significance of Rapoport-Luebering shunt in high altitude. (5)
7. Write brief notes on: (2.5+2.5)
 - a. Ketone bodies.
 - b. Carnitine.
8. Describe chemiosmotic theory. Explain its significance. (2+3)
9. Write short notes on Glycogen storage disorders. (5)

SECTION – B (50 MARKS)

1. Explain the competitive and non-competitive inhibition of enzyme activity with 2 suitable examples in each case. Comment on the k_m value of enzyme and mention with reason that in which type of inhibition of enzyme action k_m may apparently decrease? (5+3+2)
2. How is the regulation of calcium and phosphorus homeostasis is maintained in our body (5)
3. A 5-year-old child was brought to the primary health centre with malnutrition and complaint of poor vision after evening. On examination a white foamy looking dry spot on the conjunctiva was noticed. Name the vitamin that might be deficient in this case? Enlist some important dietary sources. Explain the role of this vitamin in physiological condition. (1+2+2)
4. Enumerate TWO enzymes which contain zinc. What is the zinc deficiency disorders? What are the dietary sources of zinc? (2+2+1)
5. What is multiple myeloma? What are the serum protein electrophoretic pattern and the urine findings? (2+2+1)
6. Enumerate FIVE cardiac bio-markers and show their rise and fall graphically. (5)
7. What is hyperkalemia and mention any two causes? Give reasons why hyperkalemia is treated by giving glucose and insulin? (1+2+2)
8. Compare and contrast: (2.5+2.5)
 - a. Dry and wet beriberi
 - b. Vitamin C and Vitamin E
9. Write short notes on: (2.5+2.5)
 - a. Physiological significance of Hepcidin
 - b. Biochemical basis of Wilson's disease



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Biochemistry (Paper-II)

Marks: 100

INSTRUCTIONS:

- Answer all questions.
- Illustrate your answers with well labelled diagram wherever necessary.
- Answer section A and B in a separate answer booklets.

SECTION – A (50 MARKS)

1. A 60- year- old man was brought to the OPD of AIIMS with chief complaints of nausea, loss of appetite, excessive vomiting and abdominal pain. On examination his blood pressure was 130/70 mm of Hg, pulse rate of 92/min, respiratory rate of 12/min. Abdominal USG showed gastric obstruction secondary to peptic ulcer. (2+2+3+3)

ABG analysis showed:

Parameter	Result	Normal Level
pH	7.6	7.35-7.45
PaCO ₂	85 mm of Hg	35-75 mm of Hg
PaO ₂	43.5 mm of Hg	75-100 mm of Hg
HCO ₃ ⁻	82 mmol/L	22-26 mmol/L

Other biochemical parameters :

Serum urea 28mg/dl

Serum Sodium : 142 mEq/L

Serum Potassium: 2.6 mEq/L

Serum Chloride : 50 mEq/L

- a. What is your provisional diagnosis?
 - b. Explain the biochemical basis of the disorder
 - c. Enumerate the compensatory mechanisms that will try to restore the pH of this patient
 - d. Define anion gap. Calculate the anion gap for this patient
2. Give reasons/Justify: (2.5+2.5)
- a. Treatment with vaccines but not immunoglobulins can provide active immunity.
 - b. Secondary response to an antigen exposure is usually higher than primary response.
3. What is Kwashiorkor? Mention three important features which distinguishes it from Marasmus. (2+3)
4. What are Xenobiotics? Explain the role of glutathione in the process of detoxification. (2+3)
5. Define Dietary Fiber and write a brief note on limiting amino acids. (2.5+2.5)
6. Explain the following : (2.5+2.5)
- a. Type IV hypersensitivity reaction
 - b. Protein has the highest SDA
7. Explain with diagram/flowchart (2.5+2.5)
- a. Structure of immunoglobulin
 - b. Lipid peroxidation
8. What are Reactive oxygen species and therapeutic uses of antioxidants in our body? (2+3)
9. Classify vaccines with example (5)

SECTION – B (50 MARKS)

1. A 2-year-old boy was brought to the Pediatrics OPD with complaints of delayed milestones and inactive nature. On examination- his posterior fontanelle was patent, he had a protuberant tongue, hypotonic muscle and was mentally retarded. (5x2)

Lab results for TFT were as follows with their normal levels in brackets:

S.T3: 0.06 ng/ml (1.2-1.9 ng/ml)

S.T4: 1.5 µg/dl (5-12 µg/dl)

S.TSH :70 µIU /ml (0.5-5 µIU/ml)

- a. What is the diagnosis? Justify your answer.
 - b. Is the mental retardation preventable? Give reason for your answer.
 - c. Name another condition causing delayed closure of fontanelles and its basis?
 - d. Name two inborn errors of metabolism causing mental retardation?
 - e. Name two methods of hormone estimation.
2. What is Western Blotting? Describe the principle and steps. Give an account of its applications. (1+2+2)
3. What are the tests done for Glomerular Function? What do you understand by tubular function tests? What is e GFR? (2+2+1)
4. Explain regulation of gene expression in prokaryotes with the help of the Lac Operon model. Enumerate the importance of epigenetic regulation of gene expression with suitable examples. (2+3)
5. Mention any two abnormalities associated with purine metabolism along with the biochemical cause and clinical findings. (2+3)
6. Give example of any two antibiotics and their mechanisms of action. (2.5+2.5)
7. Explain the role of p53 in cancer. Name a genetic disorder leading to cancer due to DNA repair defect? (4+1)
8. A 5 day old neonate who was discharged on the 3rd day of life was readmitted with yellowish discoloration of the skin noticed by the mother. He was feeding well and his cry and activity was normal with no fever. The urine output was adequate and he was passing normal stools as well. O/E He looked well with normal activity and cry and had jaundice till the lower abdomen. The palms and soles were spared. Stools were golden yellow and urine was clear. (5x1)
Her Lab reports are as follows:
Total bilirubin- 10.5mg/dl
Direct bilirubin- 0.2 mg/dl
- a. Identify the abnormal lab report(s).
 - b. What is the diagnosis?
 - c. What is the first line of treatment?
 - d. What is biochemical basis of this condition and treatment?
 - e. What is breast milk jaundice?
9. What is G-Protein and why it is called so. Enlist three hormones which acts through G Protein associated receptors? (2+3)