



All India Institute of Medical Sciences, Kalyani
First Professional MBBS Examination, October 2023

Time: 3 Hrs.

Biochemistry (Paper-I)

Marks: 100

INSTRUCTIONS:

- Answer all questions.
- Illustrate your answers with well labelled diagram wherever necessary.
- Answer each section in a separate answer book.

SECTION – A (50 MARKS)

1. A 16-year-old tribal boy from Odisha, presented with sudden onset abdominal pain and cramping, accompanied by chest pain and fever. He has had repeated episodes of pain and swelling of the fingers of both his hands since childhood. On examination, he is pale and has jaundice. His hemoglobin is 6g%, Total bilirubin is 10mg% and direct bilirubin is 0.5mg%. (3+3+4=10)
 - a. What is the patient likely to be suffering from? Justify.
 - b. What is the biochemical defect responsible for this clinical condition?
 - c. What further lab investigations are required to diagnose the condition?
2. Enlist and explain the various metabolic changes possible in Von Gierke's disease? (2+3)
3. Explain why:-
 - a. Chronic smoking leads to emphysema (2.5)
 - b. Glycogenolysis in muscle does not help in regulation of blood glucose (2.5)
4. What are endogenous and exogenous uncouplers of the oxidative phosphorylation? Provide their mechanism of action with suitable examples. (3+2)
5. What is fatty liver? How is it caused? What is the role of lipotropic factors in fatty liver? (5)
6. Explain the process of facilitated diffusion with appropriate diagrams. Cite suitable example. Compare it with active transport. (2.5+2.5)
7.
 - a. Describe role of citrate in fatty acid synthesis (2.5)
 - b. Compare and contrast: - Glycoprotein and proteoglycan (2.5)
8. Describe Rapoport-Luebering shunt. Explain its significance (2+3)
9. Compare and Contrast between smooth and rough endoplasmic reticulum. What is the function of free ribosomes? (3+2)

SECTION - B (50 MARKS)

1. A 51-year-old, diabetic overweight man visits the emergency room with a symptom of "indigestion" of 5 days' duration. He has also had bouts of sweating, malaise, and headache. His blood pressure is 140/105 mm Hg. An electrocardiogram (ECG) revealed changes from one performed 6 months earlier. After 6 hours of the onset of pain his blood test showed total CK level to be 490 IU/L (Ref range: <200 IU/L), CK-MB was 65 IU/L (Ref range: <7 IU/L) and Troponin-T was 0.6 ng/ml ((Ref range: <0.1ng/ml).
 - a. What is the diagnosis? Justify your diagnosis. (2+2)
 - b. Why does Diabetes Mellitus increase the risk of this disorder? (3)
 - c. What is the biochemical basis of use of Aspirin in this condition? (2)
 - d. What are isoenzymes? (1)
 2. Compare and contrast: - Wilson Disease and Menkes Disease. (5)
 3. Compare and contrast: - Role of Ceruloplasmin and Transferrin in iron absorption. (5)
 4. What are the biochemical functions of vitamin C? Why may a person with deficiency of vitamin C present with anemia? (3+2)
 5. What are the biochemical functions of vitamin A? Add a note on the therapeutic role of vitamin A. (3+2)
 6. Compare and contrast:-
 - a. Competitive inhibition and uncompetitive inhibition (2.5)
 - b. Hyperkalemia and pseudohyperkalemia (2.5)
 7. Explain why /how:-
 - a. Aldosterone is in the maintenance of water and electrolyte balance (2.5)
 - b. Reference range of ALP enzyme is higher for children than for the adults. (2.5)
 8. Write short notes on the following :-
 - a. Significance of K_m value of enzyme (2.5)
 - b. Plasma protein electrophoresis (2.5)
 9. A 55-year-old lady presented with complaints of fatigue, memory loss, difficulty in maintaining balance. On examination she was found to have pallor and neurological deficits. She had low levels of serum vitamin B12.
 - a. What are the causes of vitamin B12 deficiency? (2)
 - b. Explain the functions of vitamin B12 in the body. (3)
-



All India Institute of Medical Sciences, Kalyani
First Professional MBBS Examination, October 2023

Time: 3 Hrs.

Biochemistry (Paper-II)

Marks: 100

INSTRUCTIONS:

- Answer all questions.
- Illustrate your answers with well labelled diagram wherever necessary.
- Answer each section in a separate answer book.

SECTION - A (50 MARKS)

1. A 34-year-old labourer was admitted to the casualty in an unconscious state after consuming local made cheap liquor. His arterial blood gas analysis shows blood pH = 7.1, $\text{HCO}_3^- = 13\text{mEq/L}$ and pCO_2 was low and pO_2 is raised. Anion gap was higher than normal. The patient sample sent to external referral lab showed presence of formate in blood. (3+2+3+2=10)
 - a. Identify and explain the type of pH imbalance?
 - b. What is the cause of such condition?
 - c. What is anion gap and what is the normal level; why it is increased in this condition?
 - d. Which type of compensation may be expected in this case?
2. Discuss the phase I reactions of detoxification. (5)
3. Write short notes on: Innate and adaptive immunity. (5)
4. Write short notes on: (2.5+2.5)
 - a. Graft versus-Host reaction
 - b. Antibody diversity
5. Write a note on cell-mediated immunity with suitable examples. (5)
6. Define: Recommended dietary allowance (RDA), Biological value and Net protein utilization. What is the difference between positive and negative nitrogen balance. (1+1+1+2)
7. Explain with reasons:- (2.5+2.5)
 - a. BMR of a hyperthyroid person is higher than normal person.
 - b. Edema occurs in Kwashiorkor but not in Marasmus.
8. Write notes on: Buffer systems of our body. (5)
9. Write notes on Antioxidant defense mechanism in RBC with suitable schematic diagram. (5)

SECTION - B (50 MARKS)

1. A 45 year-old male patient presented to orthopaedic OPD with history of pain and swelling of great toe. He consumes alcohol and prefers non vegetarian diet. He gave history of occasional such pain particularly after a night of alcohol consumption. On examination the great toe is swollen, red and tender. His blood investigation revealed uric acid level 10mg/dL. (1+2+2+2+1+2=10)
 - a. What is the probable diagnosis?
 - b. Explain the biochemical basis for the clinical symptoms
 - c. Explain how alcohol precipitates this condition?
 - d. What is the difference between primary and secondary hyperuricemia?
 - e. What is the reference range of uric acid?
 - f. What is the line of management of such clinical condition?
2. Explain why /how:- (2.5+2.5)
 - a. Retinoblastoma protein prevents cancer
 - b. Telomerase activity may be therapeutic target for cancer
3. What is cDNA library? Describe its biomedical applications. (2+3)
4. A 16-year-old girl of a low-income family from a remote hilly area presented with a round swelling on the right side of the neck. Examination showed a diffusely enlarged, non-tender thyroid gland with a firm consistency. The TFT values are as follows:
TSH-35 μ IU/ml (Normal 0.36-5.5 μ IU/L); T_4 - 50 nmol/L (reference value, 70-150 nmol/L); T_3 -1 nmol/L (reference value, 0.9- 2.8 nmol/L); serum-free T_4 , 1 pg/ml; (reference value, 4.4-12 pg/ml), and normal free T_3 , 2.7 pg/ml; (reference value, 1.0-4.3 pg/ml). Serum thyroglobulin was 701.5 ng/ml; (reference value, <60 ng/ml). (2+1+2)
 - a. Explain the possible diagnosis of the above condition?
 - b. Which element is needed for thyroid hormone synthesis?
 - c. What is free thyroid hormone and why it is important to measure?
5. "Creatinine clearance is a sensitive indicator of renal function than serum creatinine." Comment. What is meant by estimated GFR? (3+2)
6. Describe the steroid hormone receptor and its action. What is steroid response element? (3+2)
7. Explain how:- (2.5+2.5)
 - a. Explain how eukaryotic topoisomerase inhibitors act as anticancer agents?
 - b. Explain how Alpha Amanitin in mushroom causes poisoning?
8. A 65-year-old man presents with complains of pain abdomen, weight loss and itching, yellow discoloration of skin and sclera. He has been passing high coloured urine and pale stools. His bilirubin values are 20mg%, direct bilirubin is 15mg%. (2+1+1+1)
 - a. Which type of jaundice is he likely to be suffering from? Justify.
 - b. Comment on the bilirubin values.
 - c. Which enzymes are raised?
 - d. What is the reason for itching?
9. Explain the following statements: (2.5+2.5)
 - a. Cushing's disease is a specific type of Cushing's syndrome.
 - b. Regular use of proton pump inhibitors may increase plasma gastrin level.