



All India Institute of Medical Sciences, Kalyani
1st Professional MBBS Examination 2021
Biochemistry (Paper-II)

Time: 3 Hrs.

Marks: 100

- Answer all questions and draw well labeled diagrams wherever necessary
- Answer Section A and B in separate answer booklets and write answer in sequence

SECTION A (50 Marks)

Structured long answer question

[2X5=10]

1. 12 yrs. old boy presented with H/O 4-5 kg weight loss, increased thirst and urination. On examination he was drowsy and had kussmaul breathing. His random blood glucose was 450mg/dl. Samples were sent for arterial blood gas analysis (ABG) and urine analysis.
 - a. What could be the probable diagnosis and etiology for the same?
 - b. What do you intend to check in urine? Name the test for it.
 - c. What changes do you expect with pH and bicarbonate levels in ABG?
 - d. How do you explain kussmaul breathing in this case?
 - e. What will be the status of circulating free fatty acids and why?

Short answer questions

2. Development of monoclonal antibodies. Enumerate their applications in the field of medicine. [5]
3. Compare the free radical scavenging mechanisms of vitamin E and glutathione peroxidase. [5]
4. Describe the phase I reaction in detoxification by liver. [5]
5. A 20-yr. old college student consumed methanol accidentally. [3+2=5]
 - a. What would be the antidote and why?
 - b. Why methanol is toxic?
6. Define basal metabolic rate. Explain how BMR changes in following conditions [2+3=5]
 - a. Hyperthyroidism
 - b. Pyrexia
 - c. Cold climate
7.
 - a. Low glycemic index foods are preferred in diet- Justify [2.5x2=5]
 - b. Types of Fibre in our diet and its importance
8. What is titratable acidity of urine? Explain how ammonia genesis at the level of kidney helps in acid excretion. [2+3=5]
9. Explain the immunological effector mechanism for the following [5x1=5]
 - a. TB Pathogen by macrophages
 - b. Antibody dependent cell lysis
 - c. Anaphylactic reaction
 - d. Inactivated COVID vaccine
 - e. Incompatible Blood transfusion.

SECTION B (50 Marks)

Structured long answer question

1. A 21-year old student has been complaining of flu-like illness for the past three days with vomiting and abdominal tenderness in the right upper quadrant since the past 24 hours. Recently the child had eaten food from the street vendor. On examination, the student was found to have jaundice. Investigations revealed: T Bil (3.3mg/dL), D Bil (1.2mg/dL), ALT - 2543 IU/L, AST - 1407 IU/L, ALP -134 U/L, GGT- 67 IU/L. Bile pigments in urine was positive. [1+2+2+2+3 =10]
- What is the most common cause of this disorder and give a probable diagnosis?
 - Which enzyme was altered maximally and why?
 - How will you differentiate this case from a case of alcoholic hepatitis?
 - Why was bile pigments positive in the urine?
 - What do you mean by Jaundice? Which type of jaundice is found in this case and Why?

Short answer questions

2. A 5-yr. old boy is exhibiting a tendency to bite his lips as well as chewing of this fingers to the point it bleeds. On examination joints were swollen and tender. [1+2+2=5]
- What will you look for in the blood work up?
 - Name the disease and enzyme deficiency associated with it.
 - Name a drug to treat this condition and its mechanism of action. [2.5×2=5]
3. Explain Why
- Methotrexate therapy can cause drug resistance in cancer
 - p53 mutation can cause cancer.
4. A 9-month-old infant is suffering from kernicterus due to severe nonhemolytic jaundice. Serum analysis showed an increased concentration of indirect-reacting bilirubin with no detection of conjugated bilirubin [2+2+1=5]
- Name the disorder and the associated enzyme deficiency.
 - Explain the pathology behind kernicterus.
 - How do you treat hyperbilirubinemia in this case?
5. 51-year-old female patient complaints of losing weight, yet is continuously hungry and eating more than usual. She also reports that she is experiencing irritability, insomnia, diarrhea, muscle weakness, heart palpitations, and intolerance to heat. You suspect Graves' disease. [2+1+2=5]
- What will the picture of thyroid function test in this case?
 - Name a test to diagnose this condition.
 - Explain the cause of loss in weight and hunger with increased food intake. [3+2=5]
6. a. Enlist different mechanisms of DNA repair. [3+2=5]
b. Explain how DNA repair occurs in UV induced DNA damage. [5×1=5]
7. Name the tumour where levels of following markers are increased
- Calcitonin
 - Bence jones protein
 - Beta hCG
 - CA-125
 - Vanillyl Mandelic Acid
8. A 35 yrs. old apparently healthy individual on medical examination for insurance was found to have hemoglobin electrophoresis report as follows: HbA₁: 62%, HbS: 35%, HbF:1%, HbA₂: 1%. He is not anaemic. [1]
- What is your probable diagnosis? [1]
 - Name the defect and explain as how you will diagnose this condition using Restriction Fragment Length Polymorphism. [1+2=3]
 - What is the probability that his child can develop the disease? [1]
9. Compare and contrast the mechanism of action of insulin and thyroid hormones [5]