



UNIVERSITY OF JAFFNA, SRI LANKA
FIRST EXAMINATION FOR MEDICAL DEGREES - JULY 2026
ACADEMIC YEAR 2023/2024

BIOCHEMISTRY PAPER II

09.07.2026

Three Hours (9.00 am to 12.00 noon)

Answer all 10 questions.

Marks allocated to each part are indicated in brackets.

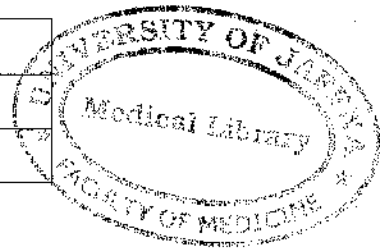
Answer each question in separate answer books.

1. A 45-year-old social worker was brought to the hospital in a semi-comatose state on his 9th day of hunger strike. On examination, he was hyperventilating and had a fruity odour on his breath. Laboratory investigation revealed the following.
Urine analysis report revealed positive for Rothera's Test and negative for Benedict's Test.
Blood analysis report
 - Glucose of 51 mg/dL
 - pH of 7.20
 - Bicarbonate 20 mEq/L (Normal range 22-26 mEq/L)
 - 1.1 1.1.1 State the probable diagnosis of this patient. (10 Marks)
 - 1.1.2 Explain the biochemical basis for the above diagnosis mentioned in 1.1.1. (40 Marks) - 1.2 Explain the biochemical basis for the observed value of the following.
 - 1.2.1 pH value (25 Marks)
 - 1.2.2 Bicarbonate level (25 Marks)
2. 2.1 List five (5) hormones that contribute to the development of gestational diabetes mellitus. (25 Marks)
- 2.2 Explain the biochemical events occurring in overnight fasting. (30 Marks)
- 2.3 List four (04) important functions of cholesterol in the body. (20 Marks)
- 2.4 Outline the effects of cyanide on oxidative phosphorylation. (25 Marks)

3. 3.1 A 55-year-old obese and hypertensive female patient is diagnosed with acute myocardial infarction (AMI).
- 3.1.1 State the serum biomarker that could be used to confirm the diagnosis.
(10 Marks)
- 3.1.2 List two (02) serum enzymes that can be elevated in this patient.
(10 Marks)
- 3.1.3 Explain the rationale for the elevation of above mentioned enzymes.
(25 Marks)
- 3.2 Name five (05) inherited amino acid disorders and the respective deficient enzymes.
(25 Marks)
- 3.3 An 8-year-old girl was diagnosed with homocystinuria. blood tests showed elevated methionine and homocysteine levels with low cysteine levels. Her condition improved with pyridoxine therapy. Explain the biochemical basis for the above observation.
(30 Marks)
4. 4.1 Explain giving three (03) examples, the necessity of proteases to be secreted as zymogen.
(30 Marks)
- 4.2 List five (05) enzymes required for DNA replication.
(25 Marks)
- 4.3 4.3.1 List three (03) different types of RNA.
(15 Marks)
- 4.3.2 Outline the role of the above RNA (listed in 4.3.1) in protein synthesis.
(30 Marks)
5. 5.1 A 45-year-old male presents with pain and swelling of the right big toe for two days. He had a history of excessive alcohol consumption and a diet rich in red meat. He was diagnosed with gouty arthritis with markedly elevated serum uric acid.
- 5.1.1 Explain the biochemical basis of gouty arthritis.
(35 Marks)
- 5.1.2 Name two (02) other disorders of purine metabolism?
(10 Marks)
- 5.2 State the major classes of plasma proteins and give one function each.
(30 Marks)
- 5.3 List the classes of immunoglobulins.
(25 Marks)

6. 6.1 6.1.1 Outline the main steps involved in thyroid hormone synthesis. (35 Marks)
- 6.1.2 Briefly explain the transport of thyroid hormone in blood. (20 Marks)
- 6.2 Illustrate the absorption and release of monosaccharides in the enterocytes. (25 Marks)
- 6.3 Fill the following table regarding ABO blood group antigens and antibodies in plasma. (20 Marks)

Blood group	A	B	AB	O
Antigens in RBC				
Antibodies in plasma				



7. 7.1 A 38-year-old man with chronic pancreatitis presents with bleeding gums and ecchymosis (bruising). He had steatorrhea and weight loss. Laboratory findings revealed prolonged Prothrombin Time.
- 7.1.1 Name the probable micronutrient deficiency in this patient. (10 Marks)
- 7.1.2 Give the biochemical basis for prolonged prothrombin time and steatorrhea. (40 Marks)
- 7.1.3 Outline the consequences of administering warfarin to treat this patient. (30 Marks)
- 7.2 "Neostigmine is used in the treatment of patients with myasthenia gravis". Explain the biochemical basis for the statement. (20 Marks)
8. 8.1 8.1.1 Name two (02) enzymes involved in ethanol metabolism. (10 Marks)
- 8.1.2 "Chronic alcoholism leads to fatty liver". Explain the biochemical basis. (35 Marks)
- 8.1.3 Explain the use of statins in the treatment of hypercholesterolaemia. (30 Marks)
- 8.2 State five (05) different types of eicosanoids giving one function each. (25 Marks)

9. A 51-year-old female presents with yellowish discolouration of the sclera, dark urine, and pale stools. Based on the laboratory findings, she was diagnosed with obstructive jaundice.

Plasma Analysis	Results	Reference Range
Total Bilirubin ($\mu\text{mol/L}$)	88	2 – 17
Alkaline Phosphatase activity (U/L)	652	40 – 125
Gamma Glutamyl Transferase activity (U/L)	217	10 – 55

Urine Analysis	Results
Bilirubin	Present
Urinary urobilinogen	Absent

- 9.1 9.1.1 List three (03) possible causes for the above diagnosis. (15 Marks)
- 9.1.2 Explain the biochemical basis for the above laboratory findings. (40 Marks)
- 9.2 9.2.1 List two (2) causes of haemochromatosis. (10 Marks)
- 9.2.2 State the biochemical test used to screen haemochromatosis. (10 Marks)
- 9.2.3 Explain the biochemical basis of this disorder. (25 Marks)
10. 10.1 A 32-year-old woman (height = 165cm; weight = 70kg; Physical Activity Level=1.2) has recently been diagnosed with hypertension. Her daily diet includes 400g of carbohydrate, 50g of fat, and 40g of protein.
- 10.1.1 Comment on her Body Mass Index (Based on the South Asian cut-off values). (15 Marks)
- 10.1.2 Calculate the ideal weight for her height? (10 Marks)
- 10.1.3 Comment on her energy intake. (30 Marks)
- 10.1.4 Calculate the Total Energy Expenditure (TEE) per day after reaching her ideal weight. (20 Marks)
- 10.2 State five (05) benefits of including dietary fibre in the diet. (25 Marks)