



FACULTY OF MEDICINE, UNIVERSITY OF RUHUNA
Second Examination for Medical Degrees – June 2015
Biochemistry Paper II

Tuesday 30th June 2015

2.00 p.m. – 5.00 p.m.

Answer All Six Questions.

(Three hours)

Answer each question in a separate book.

Marks allocated to each part of a question are shown within parenthesis.

1. A 46 year-old male who consumes alcohol daily consulted a physician and complained of an abdominal discomfort. An ultrasound of the abdomen revealed fatty liver. Plasma lipid levels were analyzed after a 12 hour fast and the results are given below.

Plasma	Test result	Reference range
Appearance	turbid	
Total cholesterol	9.7 mmol/L	<5.0 mmol/L
Triglycerides	9.1 mmol/L	0.3-1.7 mmol/L

- 1.1 Which type of lipoprotein is elevated significantly in blood? **(10 marks)**
- 1.2 Explain the sequence of events that lead to the development of fatty liver in this patient. **(25 marks)**
- 1.3 Briefly explain how LDL-cholesterol is synthesized from VLDL-cholesterol. **(25 marks)**
- 1.4 Elevated level of LDL-cholesterol cause atherosclerosis. Explain. **(25 marks)**
- 1.5 Briefly explain why Eskimos have a low risk for atherosclerosis. **(15 marks)**
2. A 76 year-old patient with type 2 diabetes mellitus underwent a surgery. On the 6th postoperative day, the patient became unconscious. Findings of the investigations carried out are given below.

Investigation	Test result	Reference range
Blood glucose	700 mg/dL	70 - 125 mg/dL
Serum osmolarity	378 mOsm/L	280 - 295 mOsm/L
Serum sodium	150 mmol/L	135 - 144 mmol/L
Blood urea	90 mg/dL	16.2- 39.0 mg/dL
Blood pH	Normal	
Acetone ketone bodies	Negative	

1. Suggest a probable diagnosis. **(10 marks)**
2. Explain the chemical basis for the results given above. **(40 marks)**
3. Explain the underlying mechanism for unconsciousness in this patient. **(15 marks)**
4. Suggest a treatment for the patient. **(10 marks)**
5. Explain the chemical basis for the estimation of glycated haemoglobin in patients with diabetes mellitus. **(25 marks)**

3.0 Explain the biochemical basis of the following.

- 3.1 Increased cyclic GMP concentration by atriopeptides has a direct effect on the kidney and vascular smooth muscle cells. (25 marks)
- 3.2 Foetal haemoglobin (HbF) has a higher affinity for oxygen compared to adult haemoglobin (HbA). (25 marks)
- 3.3 Absorption of iron from the small intestine is tightly regulated. (25 marks)
- 3.4 Succinate dehydrogenase enzyme activity is impaired in patients with angular stomatitis. (25 marks)

4.0 Explain the biochemical basis of the following.

- 4.1 Changes are observed in the serum protein electrophoretogram in patients with chronic liver disease. (25 marks)
- 4.2 A methionine-restricted diet is used in homocystinuria. (25 marks)
- 4.3 Alanine aminotransferase concentration is estimated in the diagnosis of acute hepatitis. (25 marks)
- 4.4 Carcinoma of the head of the pancreas causes jaundice. (25 marks)

5.0 Explain the biochemical basis of the following.

- 5.1 Hexose monophosphate pathway plays an important role in the antioxidant defense in red blood cells. (25 marks)
- 5.2 Galactose 1-phosphate uridyl transferase deficiency leads to cataract formation. (25 marks)
- 5.3 Allopurinol is used in the treatment of gout. (25 marks)
- 5.4 Tandem repeats of DNA sequences are valuable tools in forensic medicine. (25 marks)

6.0 6.1 Explain the biochemical basis for the use of following in liver failure.

- 6.1.1 Metronidazole (25 marks)
- 6.1.2 Lactulose (25 marks)

6.2 Explain the biochemical basis of the following.

- 6.2.1 A high carbohydrate diet with adequate protein is given to patients with renal failure. (25 marks)
- 6.2.2 A low calorie diet is recommended for an obese individual with diabetes mellitus. (2)
