



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

Wednesday, 25th March 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. Explain the biochemical basis of the following.
 - 1.1 Decreased insulin to glucagon ratio results in ketosis. (25 Marks)
 - 1.2 A low dose of aspirin is used to reduce the incidence of myocardial infarction. (25 Marks)
 - 1.3 Excessive consumption of alcohol and obesity lead to fatty liver. (25 Marks)
 - 1.4 Carnitine palmitoyl transferase 1 deficiency results in non ketotic fasting hypoglycaemia in infants. (25 Marks)

2. A previously healthy 62 year-old male patient presented with lower back pain for six months. He has not responded to routine analgesics. He also experienced loss of weight and lethargy for three months duration. His serum protein electrophoretogram showed an abnormal sharp discrete band in the gamma region. Serum and urine immunofixation electrophoresis identified a monoclonal IgG kappa. Results of the other laboratory tests are as follows.

Test	Result	Reference range
Total protein	10.0 g/dL	7.0 - 7.5 g/dL
Serum albumin	2.4 g/dL	3.5 - 5.0 g/dL
Haematocrit	27 %	36 - 46 %
Blood haemoglobin	9.8 g/dL	12.0 - 15.5 g/dL
Bence-Jones proteins	positive	

- 2.1 State the probable diagnosis. (10 Marks)
- 2.2 Explain the biochemical basis for the findings of each investigation. (70 Marks)
- 2.3 Comment on the albumin to globulin ratio. (20 Marks)

3. Explain the biochemical basis of the following.
- 3.1 Development of frequent hypoglycaemia in patients with von Gierke's disease. *(25 Marks)*
 - 3.2 Analysis of urine for bilirubin in obstructive jaundice. *(25 Marks)*
 - 3.3 Estimation of cardiac troponin concentration in acute myocardial infarction. *(25 Marks)*
 - 3.4 Development of cataract in diabetes mellitus. *(25 Marks)*
4. Explain the biochemical basis of the following.
- 4.1 Premature infants are at a special nutritional risk. *(25 Marks)*
 - 4.2 Vitamin A deficiency leads to poor adaptation to dim light. *(25 Marks)*
 - 4.3 Ingestion of cholera toxin results in diarrhoea and dehydration. *(25 Marks)*
 - 4.4 Electrophoretogram of a patient suffering from sickle cell anaemia is distinctly different from that of a normal individual. *(25 Marks)*
5. Explain the biochemical basis of the following.
- 5.1 Inherited deficiency of pyruvate kinase in erythrocytes causes haemolytic anaemia. *(25 Marks)*
 - 5.2 Long term intake of food and beverages rich in fructose leads to obesity. *(25 Marks)*
 - 5.3 Gout is a metabolic disorder of purine catabolism. *(25 Marks)*
 - 5.4 Polymerase chain reaction (PCR) is useful in forensic medicine. *(25 Marks)*
6. A lactating woman produces 500 mL of breast milk per day. Her height and weight are 1.5 m and 50 kg respectively.
- (Average protein concentration of breast milk = 11.5 g/L, efficiency of protein conversion in breast milk = 70 %, net protein utilization = 70 %, digestibility of a mixed diet = 85 %, non lactating safe reference level of protein = 0.75 g/kg/d)
- 6.1 Calculate her body mass index (BMI). *(15 Marks)*
 - 6.2 Calculate her total protein requirement assuming that she consumes a mixed diet. *(40 Marks)*
 - 6.3 State the methods that can be used to assess the nutritional status of a lactating woman. *(10 Marks)*
 - 6.4 Explain the main considerations in planning a diet for a lactating woman. *(35 Marks)*
