



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

Tuesday 13th October 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. 1.1 Describe the effect of the following conditions on serum lipid levels.
- 1.1.1 Uncontrolled diabetes mellitus (25 marks)
- 1.1.2 Type I glycogen storage disease (25 marks)
- 1.2 Explain the biochemical basis of the following.
- 1.2.1 Development of osteomalacia in an adult who is bed ridden and on anticonvulsant therapy. (25 marks)
- 1.2.2 Chelation therapy for patients suffering from β thalassaemia major. (25 marks)
2. 2.1 A 36 year-old female with anorexia, fever and right hypochondrial pain for six days was admitted to a medical ward. She gave a history of dining outside few weeks ago. Clinical examination revealed icterus of sclera. Her investigation results are given below.
- | Investigation | Test | Reference range |
|--------------------------------------|----------|-----------------|
| Serum total bilirubin (mg/dL) | 13 | 0.3 - 1.0 |
| Serum alanine aminotransferase (U/L) | 550 | 10 - 40 |
| Serum alkaline phosphatase (U/L) | 150 | 40 - 125 |
| Fouchet's test for urine | Positive | |
- 2.1.1 Explain the biochemical basis of the above findings. (40 marks)
- 2.1.2 State the probable diagnosis. (10 marks)
- 2.2 Explain the biochemical basis of the following.
- 2.2.1 Poor skin pigmentation in classical phenylketonuria. (25 marks)
- 2.2.2 Myoglobinuria in McArdle disease. (25 marks)
3. Explain the biochemical basis of the following.
- 3.1 Development of cataract in diabetes mellitus. (25 marks)
- 3.2 Use of streptokinase in the treatment of acute myocardial infarction. (25 marks)
- 3.3 Occurrence of hypoglycaemia and hyperammonaemia in a chronic alcohol user admitted to hospital in an unconscious state. (50 marks)

4. Explain the biochemical basis for the estimation of the following.
- 4.1 Serum α -fetoprotein concentration at regular intervals in a 49-year old patient who has undergone treatment for testicular cancer. **(25 marks)**
- 4.2 Serum urea and creatinine concentrations in a patient admitted to hospital with crush injuries after a road traffic accident. **(50 marks)**
- 4.3 Serum C-reactive protein concentration to monitor the effect of treatment of an inflammatory disease condition. **(25 marks)**
5. 5.1 Describe the biochemical basis of the following findings related to abnormalities in the nucleotide metabolism.
- 5.1.1 Hyperuricaemia in Lesch -Nyhan syndrome **(25 marks)**
- 5.1.2 Excretion of orotic acid in urine **(25 marks)**
- 5.2 5.2.1 Briefly explain the significance of PCR technique in the prenatal diagnosis of genetically inherited diseases. **(25 marks)**
- 5.2.2 Explain how gene therapy is used as a treatment method for some hereditary diseases. **(25 marks)**
6. A healthy adult male of 50 kg body weight sleeps 6 hrs, engages in moderate activities for 10 hrs and spends energy at a rate of 1.6 BMR during the rest of the day. He consumes a mixed diet.
- Basal metabolic rate (BMR) of the individual = 20 kcal/kg/day
 Digestibility of a mixed diet = 80%
 Efficiency of conversion of dietary proteins to nitrogen = 16%
 Activity factors; Sleeping =1.0 , Moderate activities =2.5
- 6.1 6.1.1 Calculate his total energy expenditure. **(30 marks)**
- 6.1.2 Calculate the amount of energy that he obtains from carbohydrate and fat. **(20 marks)**
- 6.1.3 6.1.3.1 Calculate the intake of proteins, if the nitrogen excretion of the individual is 12 g/day. **(15 marks)**
- 6.1.3.2 State the assumption that you made in 6.1.3.1. **(05 marks)**
- 6.2 Explain the dietary recommendations for a 10 year-old child convalescing from a severe infection. **(30 marks)**
