



FACULTY OF MEDICINE, UNIVERSITY OF RUHUNA  
Second Examination for Medical Degrees-May 2018  
Biochemistry-Paper II

15<sup>th</sup> May 2018

Answer All Five Questions.

2.00 p.m- 5.00 p.m

Answer each question in a separate book.

(Three hours)

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

1. A 25 year-old female patient with type 1 diabetes mellitus was admitted to a medical ward with fever and shortness of breath. She was diagnosed with severe lower respiratory tract infection and was dehydrated. She had not been on her treatment for diabetes for the past two weeks.

Findings of her laboratory investigations are given below.

Analyte	Patient sample	Reference ranges
Random blood glucose (mg/dL)	786.0	< 200.0
Serum potassium (mEq/L)	5.8	3.5 - 5.1
Serum sodium (mEq/L)	160.0	135.0 -145.0
Blood bicarbonate (mEq/L)	17.0	22.0 -29.0
Blood pH	7.2	7.35 -7.45
Rothera's test for urine	Positive	

- 1.1 Briefly explain the biochemical basis for the laboratory findings. **(50 Marks)**
- 1.2 State the probable diagnosis. **(10 Marks)**
- 1.3 State the main pharmacological treatment that is recommended for this patient. **(05 Marks)**
- 1.4 Briefly explain the methods that can be used for the monitoring of the glycaemic control of this patient. **(35 Marks)**
2. 2.1 A 28 year-old male was presented to the out patient's department (OPD) with fatigue, weight gain, lethargy and hoarseness of voice. Biochemical investigations revealed the following.
- Serum
- |                   |      |                  |
|-------------------|------|------------------|
| T <sub>4</sub>    | 16   | nmol/L (60-160)  |
| TSH               | >40  | mIU/L (<5.5)     |
| Total cholesterol | 10.3 | mmol/L (<5.2)    |
| Triglycerides     | 1.7  | mmol/L (0.3-1.7) |
- 2.1.1 Explain the biochemical rationale for the results obtained for each investigation. **(25 Marks)**
- 2.1.2 State the main treatment option for this patient. **(05 Marks)**
- 2.2 List the treatment options available and their modes of action to reduce the serum cholesterol level in a patient suffering from hypercholesterolaemia. **(20 Marks)**

2.3 Explain the biochemical basis of the following.

2.3.1 Occurrence of haemolytic anaemia in pyruvate kinase deficiency. **(25 Marks)**

2.3.2 Development of cataract in galactosemia. **(25 Marks)**

3. 3.1 Explain the biochemical significance of the following.

3.1.1 Performance of urine protein electrophoresis in paraproteinaemia. **(25 Marks)**

3.1.2 Administration of glucose infusion along with a thiamine preparation in hepatic encephalopathy. **(25 Marks)**

3.2 Explain the effects of the following on protein biosynthesis.

3.2.1 Diphtheria toxin **(25 Marks)**

3.2.2 Rifampicin **(25 Marks)**

\* 4. 4.1 A healthy adult female of 60 kg body weight sleeps 8 hours, engages in moderate activities for 8 hours, discretionary activities for 4 hours and spends energy at a rate of 1.5 BMR during the rest of the day.

Basal metabolic rate 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, discretionary activities-2.8

4.1.1 Calculate her total energy expenditure. **(20 Marks)**

4.1.2 Calculate the amount of energy that she obtains from carbohydrate, fat and proteins. **(15 Marks)**

4.1.3 Calculate the dietary requirement of carbohydrate for this woman, if she becomes pregnant. **(20 Marks)**

4.1.4 Explain the dietary recommendations for a pregnant woman diagnosed with iron-deficiency anaemia. **(25 Marks)**

4.2 Explain the biochemical basis of the following.

Calcitriol is an essential component of the drug regime of a patient with chronic renal failure. **(20 Marks)**

5. 5.1 Explain the significance of PCR technique in the diagnosis of infectious diseases. **(25 Marks)**

5.2 Explain the biochemical basis for the use of following.

5.2.1 Fouchet's test in the diagnosis of hepatobiliary diseases. **(25 Marks)**

5.2.2 Lactate dehydrogenase as a tumour marker. **(25 Marks)**

5.2.3 3'- Azido - 3'- deoxythymidine (AZT) as an antiviral drug. **(25 Marks)**