

**UNIVERSITY OF JAFFNA, SRI LANKA**  
**FIRST EXAMINATION FOR MEDICAL DEGREES - OCTOBER 2022**  
**ACADEMIC YEAR 2019/2020**  
**BIOCHEMISTRY PAPER II (42<sup>ND</sup> BATCH)**

07.10.2022

Time: 3 Hours

**Answer all 10 questions.**

**Marks allotted to each part are indicated in brackets.**

**Answer Each Question on Separate Answer Book.**

1. 1.1 Explain how the serum calcium level is maintained in a normal adult. (40 Marks)
- 1.2 Copper is essential for wound healing. Explain (20 Marks)
- 1.3 Fluoride prevents dental caries. Explain (20 Marks)
- 1.4 Explain the biochemical basis of lactose intolerance and give the problems faced by a patient having this condition. (20 Marks)
  
2. 2.1 Explain the molecular basis of  $\beta$ -thalassemia. (30 Marks)
- 2.2 Explain the biochemical basis for the altered laboratory findings on serum bilirubin and urinary bilirubin & urobilinogen levels of a  $\beta$ -thalassemia patient. (40 Marks)
- 2.3 Explain the expected changes in the serum ferritin and Total Iron Binding Capacity (TIBC) levels of a  $\beta$ -thalassemia patient. (30 Marks)
  
3. 3.1 List the different forms of vitamin A. (15 Marks)
- 3.2 Explain how the vitamin A is absorbed, transported and stored. (30 Marks)
- 3.3 Explain the biochemical basis of developing night blindness in vitamin A deficiency. (30 Marks)
- 3.4 Thiamine deficiency leads to neurological symptoms. Explain. (25 Marks)

4. 4.1 4.1.1 Give the biochemical basis of multiple myeloma. (30 Marks)
- 4.1.2 Give the serum electrophoretic pattern of a patient with multiple myeloma comparing with that of a normal person. (20 Marks)
- 4.2 Explain how the thermogenin helps to maintain the body temperature. (20 Marks)
- 4.3 Explain how the structure of tRNA is suited for its function. (30 Marks)

5. A 55 year old male of 1.8m height with 110kg body weight had the following biochemical levels.

	Patient	Normal
Serum triacylglycerol (mg/dl)	928.0	200
Total Cholesterol (mg/dL)	397.0	<200
HDL Cholesterol (mg/dL)	30.0	>60

The patient was advised to take the hypolipidemic drug (fibrate- gemfibrozid-600mg) twice a day and advised to control his diet and to perform regular exercise.

- 5.1 How triacylglycerol is transported in blood? (10 Marks)
- 5.2 List the probable causes for elevated triacylglycerol level in a patient. (10 Marks)
- 5.3 Give the biochemical explanation for the elevation in triacylglycerol level under the conditions listed in **Question 5.2**. (30 Marks)
- 5.4 Give the probable biochemical defect in the above mentioned patient. (10 Marks)
- 5.5 Give reasons for the elevated total cholesterol level in this patient. (20 Marks)
- 5.6 Give the biochemical basis of the use of fibrates to a patient with elevated triacylglycerol level. (20 Marks)

6. Two years later the patient mentioned in **Question 5** was presented with polyuria, polydipsia and 'feeling dry' for the past two months. On investigation, the following results were observed.

Serum triglyceride (mg/dl)	570.0
Total Cholesterol (mg/dL)	250.0
HDL Cholesterol (mg/dL)	60.0
Serum Glucose (mg/dL)	397.0

In addition to the hypolipidemic drug he was advised to take regular insulin. Further he was directed to a dietician and to perform regular exercise.

- 6.1 Name the additional condition that has developed in the patient after two years. **(10 Marks)**
- 6.2 Name the main cause of the condition developed in the patient after two years. **(10 Marks)**
- 6.3 Explain the biochemical basis for the development of the condition mentioned in **Question 6.1**. **(25 Marks)**
- 6.4 6.4.1 Name a test that could be performed to confirm the condition developed in the patient after two years. **(10 Marks)**
- 6.4.2 Give the expected results of the test mentioned in **Question 6.4.1**. **(15 Marks)**
- 6.5 Give the biochemical basis for the reduction in the total cholesterol level of this patient after the
- 6.5.1 diet modification. **(15 Marks)**
- 6.5.2 fibrate intake **(15 Marks)**
7. 7.1 Explain how the anaemic conditions caused by the deficiencies of iron and vitamin B<sub>6</sub> can be differentiated. **(20 Marks)**
- 7.2 Give the Benedict's test and its uses. **(25 Marks)**
- 7.3 Snake bite may cause haemolysis. Explain. **(25 Marks)**
- 7.4 Vitamin D deficiency is one of the main reasons for the development of atherosclerosis in vegetarians. Explain. **(30 Marks)**

8. Answer this question based on **Questions 5 and 6.**
- 8.1 Calculate the Body Mass Index of the male patient mentioned in **Question 5.**  
(15 Marks)
- 8.2 What would be the expected ideal weight for the height of this patient?  
(10 Marks)
- 8.3 Calculate a day's Total Energy Expenditure of this male patient. (20 Marks)
- 8.4 What would have been the dietary advice given by the dietician to reduce the body weight and optimize the lipid profile while maintaining zero nitrogen balance.  
(40 Marks)
- 8.5 Explain the expected nitrogen balance of the patient when he was investigated after two years. (15 Marks)
9. 9.1 Explain the biochemical basis for prescribing metformin to a patient with diabetes mellitus Type II. (25 Marks)
- 9.2 Explain why glutamate dehydrogenase is important for the
- 9.2.1 synthesis of non-essential amino acids. (35 Marks)
- 9.2.2 synthesis of urea. (20 Marks)
- 9.3 Explain how the proteins are catabolised with the help of ubiquitin/proteasome pathway. (20 Marks)
10. Explain the biochemical basis of the followings.
- 10.1 Cancer patients administered with methotrexate. (20 Marks)
- 10.2 von Gierke disease causes hyperuricemia, lactic acidosis and ketonemia.  
(30 Marks)
- 10.3 Glucose-6-phosphate dehydrogenase deficient patients are protected from *falciparum* malaria. (25 Marks)
- 10.4 Asthma patients treated with steroidal anti-inflammatory drug develop impaired glucose tolerance. (25 Marks)