



FACULTY OF MEDICINE, UNIVERSITY OF RUHUNA

Second Examination for Medical Degrees-January 2020

Biochemistry-Paper II

Answer All Five Questions.

Answer each question in a **separate** book.

7th January 2020

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

2.00 p.m- 5.00 p.m

Handover each book separately.

(Three hours)

1. 1.1 Biochemical investigation results of an obese 50 year-old woman with uncontrolled type I diabetes mellitus at a routine medical check-up are given below.

Serum total cholesterol	293	(mg/dL)	(<200)
Serum triglycerides	277	(mg/dL)	(< 50)
Fasting plasma glucose	276	(mg/dL)	(< 100)

- 1.1.1 Name the lipoproteins that are elevated in the blood of this patient. (10 marks)
- 1.1.2 Explain the biochemical rationale for the occurrence of hyperlipidaemia in this patient. (40 marks)
- 1.1.3 List three other causes that could lead to secondary hypertriglyceridaemia in a patient. (15 marks)
- 1.1.4 Briefly explain five dietary modifications and three lifestyle modifications that you would suggest to this patient. (20 marks)
- 1.2 List five factors to be taken into consideration before performing a lipid profile of a person. (15 marks)

2. Explain the following.

- 2.1 The biochemical significance of estimating serum urea and creatinine concentrations in acute renal failure. (30 marks)
- 2.2 Chemical mediators are involved in mediating type 1 hypersensitivity reaction. (30 marks)

- 2.3 Smoking increases the risk of developing lung disease in α 1-antitrypsin (AAT) deficiency. (20 marks)
- 2.4 A point mutation could lead to a 'no detectable effect' in a protein. (20 marks)
3. 3.1 A 45 year-old male patient from a poor socio-economic background is admitted to a surgical ward with jaundice. An ultrasound scan of the abdomen reveals that there is a complete obstruction of the common bile duct due to calculi. The patient also has iron deficiency anaemia and he is awaiting surgery.
- 3.1.1 Describe the possible causes for iron deficiency in this patient. (20 marks)
- 3.1.2 State the most appropriate biochemical test to confirm the iron status of this patient. (5 marks)
- 3.1.3 Explain the biochemical basis of the test mentioned in 3.1.2. (25 marks)
- 3.1.4 An intramuscular injection of a vitamin K is administered to this patient prior to surgery.
- 3.1.4.1 Explain the biochemical basis for the administration of vitamin K including its functions in the body. (30 marks)
- 3.2 Explain the 'chloride shift' in the transport of CO_2 . (20 marks)
4. Explain the biochemical basis of the following.
- 4.1 Construction of a complementary DNA (cDNA) library to produce human recombinant insulin. (30 marks)
- 4.2 Administration of allopurinol to a patient with gout. (20 marks)
- 4.3 Glycaemic index is important in the dietary management of a patient with type 2 diabetes mellitus. (30 marks)
- 4.4 A high energy and high protein diet is recommended for a person convalescing from a severe infection. (20 marks)

5. 5.1 A 65-year-old man diagnosed with a carcinoma of the head of the pancreas develops jaundice. His urine is positive for Fouchet's test and Hay's test.

5.1.1 What is the type of hyperbilirubinaemia this patient is likely to have? (10 marks)

5.1.2 Explain the biochemical basis of the following.

5.1.2.1 Development of jaundice in the above patient (20 marks)

5.1.2.2 Positive results for Fouchet's test (10 marks)

5.1.2.3 Positive results for Hay's test (10 marks)

5.2 A 56 year-old man is admitted to the emergency treatment unit with sudden onset, constricting central chest pain which is not relieved with routine analgesics. He is a diagnosed patient with hypercholesterolaemia and hypertension. His electrocardiogram shows ST segment elevations. His father died of a similar condition at the age of 39 years.

5.2.1 State the probable diagnosis. (10 marks)

5.2.2 Name the risk factors for the condition mentioned in 5.2.1. (10 marks)

5.2.3 State the most appropriate biomarker that you would select to perform on this patient to help in the diagnosis of 5.2.1. (5 marks)

5.2.4 Explain the biochemical basis for the selection of the biomarker mentioned in 5.2.3. (25 marks)
