FACULTY OF MEDICINE, UNIVERSITY OF RUHUNA

Second Examination for Medical Degrees - August 2022

Biochemistry-Paper II

Answer **All Five** Questions.
Answer each question in a **separate** book.
Marks allocated to each part of a question are shown within parenthesis.
Handover each book separately.

2nd August 2022
2.00 p.m - 5.00 p.m
(Three hours)

1.

1.1 A 48-year-old female with a body mass index of 30 kg/m^2 was admitted to a hospital with intermittent, constricting, severe right-sided abdominal pain. She was icteric and complained of passing dark coloured urine. An ultrasound scan of the abdomen showed an obstruction to the common bile duct.

1.1.1 State the type of hyperbilirubinaemia that the patient has developed. (10 marks)

1.1.2 State the most probable cause for the obstruction of the common bile duct. (10 marks)

1.1.3 Explain the biochemical basis for the icterus and passing dark coloured urine. (30 marks)

1.2 Explain the biochemical basis of the following.

1.2.1 Glycated haemoglobin (HbA_{1C}) percentage is used in monitoring glycaemic control of a patient with diabetes mellitus. (25 marks)

1.2.2 Cardiac troponin I is used in the diagnosis of acute myocardial infarction. (25 marks)

2.

2.1. 2.1.1 List **five (05)** factors that determine the plasma lipid levels of an individual. (10 marks)

2.1.2 What are the basic components of a lipid profile? (10 marks)

2.1.3 Name **three (03)** types of drugs with different modes of action which are used in the treatment of hypercholesterolaemia and state their specific mechanisms. (15 marks)

2.2 Explain the biochemical basis of the following.

2.2.1 Occurrence of hypercholesterolaemia in a patient with hypothyroidism. (20 marks)

2.2.2 Development of carpopedal spasms in a patient with hypoparathyroidism. (20 marks)

2.2.3 Development of haemolysis in glucose 6-phosphate dehydrogenase deficiency. (25 marks)

Cont.

3. Explain the biochemical basis of the following.

3.1 Development of cataract in galactosaemia. (25 marks)

3.2 Smoking increases the risk of developing emphysema in α_1-antiproteinase (AAP) deficiency. (25 marks)

3.3 Use of methotrexate in chemotherapy. (25 marks)

3.4 Use of 3'- Azido - 3'- deoxythymidine (AZT) in the treatment of HIV infection. (25 marks)

4. A 38-years-old female presented with generalized bone pain and muscle weakness over the past two years. She had restricted the consumption of fish and dairy products and had avoided the exposure to sun light for eight years due to an allergic condition of the skin.

4.1 4.1.1 State the most likely clinical condition of this patient. (10 marks)

4.1.2 What is the vitamin deficiency which causes the condition mentioned in 4.1.1? (10 marks)

4.1.3 Briefly explain the underlying mechanism for the development of the condition mentioned in 4.1.1 in this patient. (20 marks)

4.2 Briefly describe the mechanisms which are important in maintaining body iron levels. (35 marks)

4.3 Severe Combined Immune Deficiency (SCID) is a genetic disorders treated successfully with gene therapy.

4.3.1 Name the main enzyme deficiency in the purine degradation pathway that leads to SCID. (05 marks)

4.3.2 Briefly explain the molecular basis of gene therapy. (20 marks)

5.

5.1 State **two (02)** goals in the dietary management of an obese patient with type 2 diabetes mellitus. (10 marks)

5.2 Briefly explain the dietary considerations with examples of suitable food items in planning a diet for the patient mentioned in 5.1. (30 marks)

5.4 Explain the main considerations in planning a diet for a child with a severe ongoing infection. (30 marks)

5.5 Briefly describe the main methods of assessing the nutritional status of an individual. (30 marks)

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