UNIVERSITY OF JAFFNA, SRI LANKA

FACULTY OF ALLIED HEALTH SCIENCES

FIRST YEAR SECOND SEMESTER EXAMINATION IN BScHons (MLS)-2023

MLSBM 1262 BIOCHEMISTRY FOR MEDICAL LABORATORY SCIENCES II

(16^{th}, 17^{th} & 18^{th} Batches)

PAPER-II

Date: 23.06.2025 **Time: 2 Hours**

Answer all the six questions.

Answer each part in separate answer books.

PART A

1. 1.1 1.1.1 List the pathways which help to maintain the blood glucose level under fasting state along with the respective organs where the pathways are taking place. **(15 Marks)**

   1.1.2 Diagrammatically show how the insulin and glucagon helps to maintain the blood glucose level under fasting state with the organs where they involve with. **(45 Marks)**

   1.2 1.2.1 List the tests that could be performed to confirm that a person is diabetic. **(15 Marks)**

   1.2.2 List the expected ranges of the results of the tests mentioned in **Question 1.2.1** to confirm that a person is non-diabetic. **(25 Marks)**

2. 2.1 2.1.1 List the ingredients that should be added to collect the blood specimen to estimate the glucose. **(15 Marks)**

   2.1.2 Give the biochemical basis of using the ingredients mentioned in **Question 2.1.1.** **(25 Marks)**

   2.2 List the enzymes that catalyse the irreversible steps of glycolytic pathway and name the enzymes which help to overcome these respective irreversible steps in gluconeogenic pathway. **(20 Marks)**

   2.3 Write short notes on

   2.3.1 Galactosemia **(25 Marks)**

   2.3.2 Lactose intolerance **(15 Marks)**

PART B

3. 3.1 List three organs that are involved with cholesterol synthesis. **(10 Marks)**

   3.2 Briefly explain the regulation of cholesterol synthesis,

   3.2.1 by hormones and covalent modification. **(20 Marks)**

   3.2.2 at the nuclear level. **(15 Marks)**

   3.2.3 by feedback inhibition. **(10 Marks)**

   3.3 3.3.1 List two lipoproteins that mainly carry cholesterol. **(10 Marks)**

   3.3.2 Diagrammatically show how the cholesterol is transported from liver to extrahepatic tissues. **(35 Marks)**

4. 4.1 4.1.1 List three conditions that would lead to elevated blood urea level. **(10 Marks)**

   4.1.2 Name the reactions/ pathways that are involved in the detoxification of ammonia. **(10 Marks)**

   4.1.3 Briefly explain the biochemical basis of neurological consequences of ammonia toxicity. **(25 Marks)**

   4.2 4.2.1 List the genetic disorders that are associated with the defects in aromatic amino acids metabolism. **(15 Marks)**

   4.2.2 A 9-months-old child was brought to the clinic with generalised hypopigmentation, including pale skin, white hair and light - coloured irises. The parents reported that the child frequently squints with rapid involuntary eye movements (dancing eyes) and has sensitivity to sunlight. Laboratory investigations show normal plasma homocysteine and methionine levels.

   4.2.2.1 What is the most likely diagnosis and the typical enzyme deficiency? **(15 Marks)**

   4.2.2.2 Give the biochemical basis for the hypopigmentation observed with the metabolic pathway. **(25 Marks)**

5. 5.1 5.1.1 List two enzymes that can provide NADPH for fatty acid synthesis.

(10 Marks)

5.1.2 List the cells where the fatty acid synthesis is actively taking place.

(10 Marks)

5.1.3 List the hormones which would enhance the fatty acid synthesis.

(10 Marks)

5.1.3 Diagrammatically show the initiation step of fatty acid synthesis.

(30 Marks)

5.2 Explain the post-translational modification of proteins taking insulin as an example.

(40 Marks)

PART C

6. 6.1 What is meant by

6.1.1 *de novo* biosynthesis of purines. (10 Marks)

6.1.2 purine salvage pathway. (10 Marks)

6.2 List the organs where the *de novo* biosynthesis and salvage pathways of purine biosynthesis are taking place. (15 Marks)

6.3 6.3.1 Name three disease conditions that occurs due to increased purine biosynthesis. (15 Marks)

6.3.2 Explain how the increase in purine biosynthesis would have led to the disease conditions mentioned in **Question 6.3.1**. (30 Marks)

6.3 Explain with a diagram how the increase in purine biosynthesis would lead to gout.

(20 Marks)