



UNIVERSITY OF JAFFNA, SRI LANKA
FIRST EXAMINATION FOR MEDICAL DEGREES (2ND) - JUNE 2023
ACADEMIC YEAR 2020/2021

BIOCHEMISTRY PAPER II

13.06.2023

Duration: 3 Hours (9.00 am to 12.00 noon)

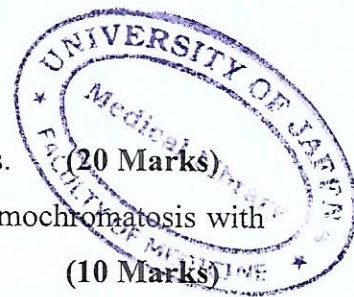
Answer all 10 questions.

Marks allotted to each part are indicated in brackets.

Answer Each Question on Separate Answer Books.

1. 1.1 Give the reference ranges of blood glucose levels under the following conditions:
 - 1.1.1 Fasting (10 Marks)
 - 1.1.2 Prediabetes (10 Marks)
 - 1.1.3 Diabetes (10 Marks)
 - 1.2 Diagrammatically show how insulin secretion by the pancreas is effected when the blood glucose level is elevated. (35 Marks)
 - 1.3 List the tissues which are not sensitive to
 - 1.3.1 Insulin (20 Marks)
 - 1.3.2 Glucagon (15 Marks)
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2. 2.1 Diagrammatically show how liver detoxifies ammonia. (40 Marks)
 - 2.2 Cysteine is a non-essential amino acid for adults. Explain. (30 Marks)
 - 2.3 Explain the steps in preparing a patient and performing Oral Glucose Tolerance Test (OGTT). (30 Marks)

3. 3.1 3.1.1 List the hormones which increase lipolysis. (20 Marks)
- 3.1.2 Diagrammatically show how these hormones elevate lipolysis. (30 Marks)
- 3.2 3.2.1 List the conditions which would lead to ketosis. (15 Marks)
- 3.2.2 Explain why the concentration of β -hydroxy butyric acid concentration is higher than that of acetoacetic acid in a ketosis patient. (35 Marks)
4. 4.1 Explain the biochemical basis of the occurrence of β -thalassemia. (35 Marks)
- 4.2 Explain the changes in serum and urine bilirubin levels in a patient with β -thalassemia. (30 Marks)
- 4.3 Explain the tests that would be useful to confirm the condition with urine and blood. (35 Marks)
5. 5.1 Body fluids have different buffer systems.
- 5.1.1 List the different buffer systems in the blood. (10 Marks)
- 5.1.2 Among the different buffer systems in blood, explain how the best buffer system acts. (20 Marks)
- 5.2 Explain how the structure of collagen is suited for its function. (20 Marks)
- 5.3 Explain how the structure of phospholipids is suited to form plasma membrane. (20 Marks)
- 5.4 5.4.1 List different classes of immunoglobulin with their function. (20 Marks)
- 5.4.2 What is self-tolerance in immune response? (10 Marks)
6. 6.1 Explain the biochemical basis of Lesch Nyhan Syndrome. (35 Marks)
- 6.2 Explain the biochemical basis of occurrence of pernicious anaemia. (35 Marks)
- 6.3 Explain how the vitamin B₁₂ deficiency can lead to folate trap. (30 Marks)



7. 7.1. A 26-year-old male was diagnosed to have haemochromatosis.
- 7.1.1 Give the conditions which can lead to haemochromatosis. (20 Marks)
- 7.1.2 Give the biochemical basis of treating a patient with hemochromatosis with deferoxamine. (10 Marks)
- 7.2 7.2.1 Diagrammatically show and label the different parts of tRNA. (20 Marks)
- 7.2.2 Explain how the structure of tRNA is suited for its function. (20 Marks)
- 7.3 Explain the biochemical basis of human ABO blood grouping. (30 Marks)
8. A 35-year-old strict vegetarian woman from Nuwara Eliya district had the plasma T_4 level of 32 nmol/L (normal 65-130 nmol/L). She usually consumed upcountry vegetables like sweet potatoes, cabbage, cauliflower and radish. 'Proper intake' of iodized salt has improved her plasma T_4 level. A survey carried out in that area revealed that many of the people had low plasma T_4 level.
- 8.1 Mention the probable endocrine condition of the woman? Explain with the reason why this woman and many others living in this area have low plasma T_4 level. (20 Marks)
- 8.2 Give the 'Proper intake' method of iodized salt. (15 Marks)
- 8.3 Explain the expected TSH level before the 'Proper intake' of iodized salt. (20 Marks)
- 8.4 Explain with the help of a labelled diagram, how the intake of iodized salt improved her condition. (35 Marks)
- 8.5 Explain how the T_4 is converted to T_3 in the target tissues. (10 Marks)
9. 9.1 Explain which Lactate Dehydrogenase Isoenzyme levels are altered in myocardial infarction, muscular dystrophy, and megaloblastic anaemia. (30 Marks)
- 9.2 Explain how hydrocortisone acts as anti-inflammatory drug. (30 Marks)
- 9.3 Write short notes on glycerol phosphate shuttle. (20 Marks)
- 9.4 Explain how the ATP production is self-regulated in mitochondria. (20 Marks)

10. Dietary Approach to Stop Hypertension (DASH) eating plan is beneficial to hypertensive patients.

10.1 How a DASH diet which contains 2000 kcal/day could be prepared for a Sri Lankan man with hypertension. **(45 Marks)**

10.2 Explain the advantages of consuming DASH diet when compared with a normal diet for a person with hypertension? **(25 Marks)**

10.3 Calculate the amount of protein that should be included in a healthy diet plate for an adult weighing 70 kg to maintain nitrogen equilibrium. **(15 Marks)**

10.4 List the factors that should be considered while selecting proteins for a balanced diet? **(15 Marks)**