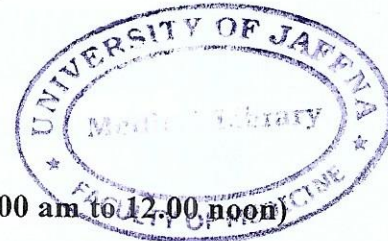




UNIVERSITY OF JAFFNA, SRI LANKA  
FIRST EXAMINATION FOR MEDICAL DEGREES (1<sup>ST</sup>) - APRIL 2024  
ACADEMIC YEAR 2021/2022

**BIOCHEMISTRY PAPER II**  
**(45<sup>TH</sup> BATCH)**



30.04.2024

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 A 45 year old labourer had collapsed while working and was admitted to the hospital. Analysis of his blood revealed 82 mmol/L alcohol (legal Limit for motor car drivers is 17.4mmol/L), 2.8 mmol/ L glucose (normal blood glucose is 3.3-8.4 mmol/L) and 2.8 mmol/L lactate (normal blood lactate 3.3-8.4 mmol/L).
  - 1.1.1 Explain, how ethanol is metabolized in a chronic alcoholic. (30 Marks)
  - 1.1.2 Give the biochemical basis of occurrence of hypoglycaemia in this patient. (30 Marks)
- 1.2 Diagrammatically show how insulin hormone is secreted by the pancreas when the blood glucose level is elevated. (40 Marks)
2. 2.1 Give the expected fasting and postprandial blood glucose and glycosylated haemoglobin levels of normal and, prediabetic & diabetes mellitus patients. (25 Marks)
- 2.2 Schematically show the electrophoretic plasma lipid profiles of a patient with hypercholesterolemia and normal individual. (20 Marks)
- 2.3 Explain how the prolonged elevation in LDL level can lead to coronary heart disease? (25 Marks)
- 2.4. 2.4.1 List the conditions which can lead to elevated ketogenesis. (05 Marks)
- 2.4.2 Explain how the above-mentioned conditions lead to increase in ketogenesis. (25 Marks)

3. 3.1 A 40-year-old female of 152cm height and 90kg of weight had presented with intolerance to fatty foods, pain in the right side of the abdomen, yellowish sclera, and passage of clay-coloured stools. Laboratory investigations were as follows:

		Patient	Normal Range
Serum	Total bilirubin ( $\mu\text{molL}^{-1}$ )	30.0	1.71-20.5
	Direct bilirubin ( $\mu\text{molL}^{-1}$ )	20.0	<5.1
	ALP (IUL <sup>-1</sup> )	800	44-147
	ALT (UL <sup>-1</sup> )	20	4-36
Urine	Colour	Deep Yellow	
	Bilirubin	++	
	Urobilinogen	Absent	
Stool	Stercobilinogen	Absent	

- 3.1.1 Name the probable cause for the above said observations? (05 Marks)
- 3.1.2 Diagrammatically show the steps involved in the metabolism of bilirubin in liver and its excretion. (20 Marks)
- 3.1.3 Explain the biochemical basis of the above laboratory findings. (35 Marks)
- 3.1.4 Give reasons for the fat intolerance. (10 Marks)
- 3.2 3.2.1 List the enzymes which are secreted by the pancreas. (10 Marks)
- 3.2.2 Feeding with triacylglycerols rich in medium chain fatty acid is useful in patients with pancreatic insufficiency. Explain. (20 Marks)
4. 4.1 4.1.1 Explain how the autocrine action of thromboxane leads to thrombosis. (30 Marks)
- 4.1.2 Give the biochemical basis of using aspirin to prevent thrombosis. (30 Marks)
- 4.1.3 Diagrammatically show the changes in serum proteins and enzymes after myocardial infarction. (20 Marks)
- 4.2 Explain how the structure of collagen suited for its function. (20 Marks)



5. 5.1 A 56-year-old lady presented to Endocrine Out Patient Clinic complaining neck swelling, tremor, loss of body weight and nervousness, and sleep disturbances. There was a strong family history of thyroid diseases. On physical examination, she was diagnosed to have goitre and fine tremor. Blood analysis revealed the following results.

Parameter	Patient	Normal
FT <sub>4</sub> (ng/dL)	6.60	0.7 - 1.8
TSH (mIU/L)	0.005	0.10 - 5.00
Thyroid-Stimulating Immunoglobulins (IU/L)	9.25	< 0.55

- 5.1.1 What could be the probable condition of this lady? (05 Marks)
- 5.1.2 Explain the observed thyroid profile. (25 Marks)
- 5.1.3 List the functions of thyroid hormones in the body. (20 Marks)
- 5.1.4 Explain how the thyroid hormone is transported in the blood (10 Marks)
- 5.2 5.2.1 Explain 'hemochromatosis'? (15 Marks)
- 5.2.2 List the biochemical tests to be carried out for the diagnosis of hemochromatosis. (10 Marks)
- 5.3 Explain how hydrogen ions are buffered by urinary buffer system. (15 Marks)
6. 6.1 6.1.1 Explain the characteristics of competitive inhibition? (20 Marks)
- 6.1.2 Neostigmine is used in the treatment of the patients with Myasthenia gravis. Explain. (20 Marks)
- 6.2 6.2.1 Diagrammatically show the basic structure of Immunoglobulin G (IgG). (20 Marks)
- 6.2.2 Explain autoimmune diseases with examples. (20 Marks)
- 6.2.3 Give the serum electrophoretic pattern of an autoimmune disease patient comparing that with of a normal person. (20 Marks)
7. 7.1 7.1.1 Explain how ammonia is produced in the body. (20 Marks)
- 7.1.2 Explain how the ammonia is detoxified in the body. (35 Marks)
- 7.2 Explain the applications of uncouplers with an example. (20 Marks)
- 7.3 Give the biochemical basis of treating hyperuricaemia patients with Allopurinol. (25 Marks)

8. 8.1 8.1.1 Phospholipids are amphipathic substance. Explain with examples. (20 Marks)
- 8.1.2 Liposomes are clinically used as carriers of drugs. Explain. (10 Marks)
- 8.2 List the components required and explain their role in transcription. (30 Marks)
- 8.3 Explain the properties of glycosaminoglycan with two examples. (20 Marks)
- 8.4 List the ingredients of Oral Rehydration Solution and explain the basis of their use in a diarrhoea patient. (20 Marks)
9. A 40-year-old female teacher of 140 cm weighted 125 kg had consulted a doctor. She wanted to reduce her weight to the optimum Body Mass Index (BMI).
- 9.1 Calculate her Basal Metabolic Rate. (15 Marks)
- 9.2 What is her current BMI? (15 Marks)
- 9.3 What should be her ideal BMI? (05 Marks)
- 9.4 What should be her expected body weight to reach the ideal BMI? (15 Marks)
- 9.5 What is the maximum weight that an individual can lose per week? (05 Marks)
- 9.6 Recommend with justification the cheap dietary sources which could be included in her diet to correct her obesity. (30 Marks)
- 9.7 What should be her total energy requirement after she reaches her expected BMI? (15 Marks)
10. 10.1 A 75-year-old non-diabetic woman visited her doctor due to numbness and tingling in her arm. She was consuming normal healthy diet without nutrient supplementation. Laboratory results indicated elevated serum methylmalonic acid and due to her aging HCl production was reduced by the gastric mucosa (atrophic gastritis). On investigation, she was diagnosed to have megaloblastic anaemia.
- 10.1.1 Give reasons for the woman to have the above said problem, even though she has consumed normal healthy diet. (20 Marks)
- 10.1.2 Give the biochemical basis for the elevated methylmalonic acid, megaloblastic anaemia, and numbness. (30 Marks)
- 10.1.3 Give the dietary nutrient deficiency which would lead to megaloblastic anaemia. (10 Marks)
- 10.1.4 Give five dietary sources which are rich in the nutrient mentioned in Section 10.1.3. (15 Marks)
- 10.2 Give the advantages of exclusive breastfeeding. (25 Marks)