UNIVERSITY OF JAFFNA, SRI LANKA

FIRST EXAMINATION FOR MEDICAL DEGREES - APRIL 2025

ACADEMIC YEAR 2022/2023

BIOCHEMISTRY PAPER II

(42ND BATCH)

22.04.2025 **Time: 3 Hours**

Answer all 10 questions.

Marks allotted to each part are indicated in brackets.

Answer Each Question on Separate Answer Book.

1. A 42 year old man was referred to a clinic for assessment and the laboratory findings of the patients on fasting blood sample are given below:

Parameter	Patient	Reference
Total cholesterol level (mg/dL)	336	146 – 200
Total Triacylglycerol (mg/dL)	324	30 - 150
Fasting Blood glucose level (mg/dL)	256	
HbA_{1C}	9.5%	

The patient was advised to consume Fibrate (Fenofibrate), statin (Atorvastatin) and Sulphonylurea with lifestyle modification.

1.1 What could be the probable clinical condition of the patient? **(10 Marks)**

1.2 List the hormones which are altered in the above patient. **(20 Marks)**

1.3 Explain the metabolic alterations that would have been brought about by the changes in the hormonal levels. **(55 Marks)**

1.4 Explain why the glycosylated haemoglobin level is altered in this patient. **(15 Marks)**

2. Answer the questions based on the patient mentioned in Question 1.

2.1 Comment on the nitrogen balance of the patient with reasons. **(35 Marks)**

2.2 Comment on his LDL to HDL ratio. **(15 Marks)**

2.3 Explain the basis of advising the patient to consume

2.3.1 Fibrate (Fenofibrate) **(15 Marks)**

2.3.2 Statin (Atorvastatin) **(15 Marks)**

2.3.3 Sulphonylurea **(20 Marks)**

3. **3.1** Explain the biochemical basis of

3.1.1 developing coma due to elevated blood ammonia level. **(40 Marks)**

3.1.2 homocystinuria Type I. **(20 Marks)**

3.2 Explain how the cyanide poisoning affects the respiratory chain. **(15 Marks)**

3.3 Diagrammatically show how the serum proteins and enzymes are altered due to myocardial infarction. **(25 Marks)**

4. **4.1** Total serum bilirubin level of a 45-year-old male was 4mg dL^{-1}. Blood and the urine contained bilirubin with decreased urobilinogen level.

4.1.1 What could be the probable diagnosis? **(05 Marks)**

4.1.2 Which fraction of the serum bilirubin is elevated in this patient? **(05 Marks)**

4.1.3 List the probable causes for the elevation in the said fraction of bilirubin in the patient. **(15 Marks)**

4.1.4 Explain the biochemical basis of the elevated bilirubin fraction said in **Section 4.1.2**. **(35 Marks)**

4.1.5 What further test should be performed with blood to confirm the diagnosis? Give the principle of the test. **(20 Marks)**

4.2 Write short notes on cyclooxygenase -1 and cyclooxygenase-2 inhibitors. **(20 Marks)**

5. **5.1** Explain the role of bile in the digestion and absorption of fat. **(20 Marks)**

5.2 List the functions of glycosaminoglycans. **(15 Marks)**

5.3 Diagrammatically show the glucose reabsorption mechanisms in the kidney. **(15 Marks)**

5.4 Explain how antibodies and memory cells are formed during immune response against an infection. **(30 Marks)**

5.5 Explain with a diagram, how iron is absorbed into the intestinal epithelial cells. **(20 Marks)**

6. **6.1** A 4-year-old girl presented to endocrine OPD with the complaints of neck swelling, tremor, and nervousness, protrusion of both eyes and sleep disturbances. There was a strong family history of thyroid diseases. On physical examination, she had a goitre, exophthalmos and fine tremor of hands.

Hormonal analysis revealed

Parameter	**Patient**	**Normal**
FT_3 (pmol/L)	48.95	3.5-7.7
FT_4 (pmol/L)	100	12-22
TSH (pmol/L)	0.005	0.27-4.2
Thyroid-stimulating Ig (IU/L)	2.42	< 1.75

Oral administration of propylthiouracil showed improvements of clinical symptoms.

6.1.1 What would be the probable defect in this child? **(10 Marks)**

6.1.2 Explain the changes in blood hormonal levels. **(25 Marks)**

6.1.3 Diagrammatically show how the thyroid hormone is synthesized in a normal individual. **(35 Marks)**

6.2 Glucose 6 phosphatase deficiency can lead to hyperuricemia. Explain. **(30 Marks)**

7. **7.1** Discuss the basis of developing microcytic and macrocytic anaemia after partial gastrectomy. **(50 Marks)**

7.2 Explain the biochemical functions of the following.

7.2.1 Vitamin K. **(25 Marks)**

7.2.2 Thiamine. **(25 Marks)**

8. **8.1** Write short notes on

8.1.1 Osteogenesis imperfecta **(20 Marks)**

8.1.2 Elastin is a flexible protein. **(25 Marks)**

8.1.3 Separation of plasma proteins by electrophoresis. **(30 Marks)**

8.2 Explain the biochemical basis of neonatal respiratory distress syndrome. **(25 Marks)**

9. **9.1** List the advantages of feeding an infant with colostrum. **(30 Marks)**

9.2 **9.2.1** Explain the supplementary action of proteins. **(15 Marks)**

9.2.2 Suggest three examples each for diets that could be consumed by the vegetarians and non-vegetarians to meet the supplementary action of proteins **(20 Marks)**

9.3 Write short notes on

9.3.1 Lipoprotein lipase. **(20 Marks)**

9.3.2 Lecithin Cholesterol Acyl Transferase. **(15 Marks)**

10. A 40year old male security guard is having 65kg body weight and 1.8m height.

10.1 Calculate the Basic Metabolic Rate (BMR) of the Security Guard. **(25 Marks)**

10.2 What is his physical activity level? Explain. **(10 Marks)**

10.3 Calculate his Total Energy Expenditure (TEE) per day. **(15 Marks)**

10.4 To maintain zero energy balance by the above male security guard,

10.4.1 What proportion of energy should be obtained from carbohydrates, proteins and lipids? **(15 Marks)**

10.4.2 Give the menu for a day to obtain the above nutrients considering the 'Healthy eating plate concept'. **(35 Marks)**