



UNIVERSITY OF JAFFNA, SRI LANKA  
FACULTY OF MEDICINE

FIRST EXAMINATION FOR MEDICAL DEGREES (1<sup>ST</sup>) - MARCH 2021

**BIOCHEMISTRY PAPER II**  
**(NEW CURRICULUM)**

16. 03.2021

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 <sub>1c</sub>	9.5%	

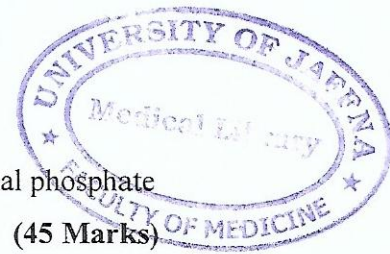
The patient was advised to take Fibrate (Fenofibrate), statin (Atorvastatin) and Metformin with life style modification.

- 1.1 What could be the probable condition of the above patient? (10 Marks)
- 1.2 List the hormones which could have been altered in the above patient. (20 Marks)
- 1.3 Explain the metabolic alterations which would have brought in the above said FBG level. (45 Marks)
- 1.4 What is meant by glycosylated haemoglobin? Explain the changes in the glycosylated haemoglobin level in the patient. (25 Marks)

2. Answer the questions based on the patient mentioned in Question 1.
- 2.1 Give reasons for the elevation in total cholesterol and triacylglycerol levels in the patient. **(35 Marks)**
- 2.2 Comment on his LDL to HDL ratio. **(15 Marks)**
- 2.3 Explain the basis of advising the patient to take
- 2.3.1 Fibrate (Fenofibrate) **(15 Marks)**
- 2.3.2 Statin (Atorvastatin) **(15 Marks)**
- 2.3.3 Metformin **(20 Marks)**
3. 3.1 A 50 year old lady teacher complains of hoarseness of voice and feeling of tiredness. She admitted that she had started putting on weight and feeling comfortable in warm weather. After initial examination by doctor she was referred to an endocrinologist. The laboratory report is given below:

	<b>Patient Value</b>	<b>Reference Range</b>
Cholesterol (mg/dL)	285	146-200
T <sub>3</sub> (ng/ml)	7.0	0.5-1.85
T <sub>4</sub> (ng/ml)	4.0	4.4- 10.8
TSH ( $\mu$ IU/ml)	7.2	0.4- 6.2

- 3.1.1 Explain the observed T<sub>4</sub>, T<sub>3</sub> and TSH levels and how they are interrelated to each other. **(35 Marks)**
- 3.1.2 Give reasons for the patient to have elevated cholesterol level, weight gain and cold intolerance. **(30 Marks)**
- 3.2 Troponin I is an important biomarker of myocardial infarction. Explain. **(35 Marks)**



4. 4.1 Metabolism of homocysteine involves folate, vitamin B<sub>12</sub>, pyridoxal phosphate and riboflavin. Explain. (45 Marks)
- 4.2 Lactulose is used in preventing and treating clinical portosystemic encephalopathy. Give reasons. (25 Marks)
- 4.3 Explain the different modes of action of eicosanoids. (30 Marks)
5. 5.1 Write short notes on
- 5.1.1 Osteogenesis imperfecta (20 Marks)
- 5.1.2 Elastin is a flexible protein. (25 Marks)
- 5.1.3 Separation of plasma proteins by electrophoresis. (30 Marks)
- 5.2 Neonatal respiratory distress syndrome is due to the absence / deficiency of surfactant synthesis. Explain. (25 Marks)
6. 6.1 The total serum bilirubin in a 45 year old patient was 4mg / 100 ml blood and urine urobilinogen was increased.
- 6.1.1 What could be the probable diagnosis? (05 Marks)
- 6.1.2 Which fraction of the bilirubin is elevated in this patient? (05 Marks)
- 6.1.3 List the probable causes for the elevation in the above said fraction of bilirubin in the above patient. (15 Marks)
- 6.1.4 Explain why the fraction of bilirubin said in Section 6.1.2 would be elevated under the conditions mentioned in Section 6.1.3. (25 Marks)
- 6.1.5 What further test would you perform with blood to confirm your diagnosis? Give the principle of the test. (20 Marks)
- 6.2 Describe the effects of uncouplers and ionophores on respiratory chain with examples. (30 Marks)



7. mRNA vaccine induces anti-SARS-CoV-2 immune responses.
- 7.1 Give the main steps involved in the synthesis of the specific protein from the above mentioned mRNA in a vaccinated man. **(20 Marks)**
- 7.2 Explain how the immune system responds to the specific protein mentioned in Section 7.1. **(70 Marks)**
- 7.3 Explain how adenosine deaminase gene defect causes severe combined immunodeficiency disease. **(10 Marks)**
8. 8.1 Give the biochemical basis for the development of megaloblastic macrocytic anaemia in folate deficiency. **(50 Marks)**
- 8.2 Vitamin D deficiency is highly prevalent in chronic kidney disease patients. Explain **(25 Marks)**
- 8.3 Hcpidin production is stimulated by iron overload. Explain. **(25 Marks)**
9. 9.1 9.1.1 List the genetic and modifiable risk factors of hyperuricaemia. **(35 Marks)**
- 9.1.2 Explain how allopurinol administration is beneficial to a gout patient. **(30 Marks)**
- 9.2 Explain the importance of breast milk for immunity and development of an infant. **(35 Marks)**
10. 10.1 A 45 year old male driver was diagnosed to have type 2 diabetes. His weight and height were 80 kg and 160 cm respectively. The dietary analysis indicated that, daily he was consuming on average 400, 60 and 60g carbohydrate, fat and mixed protein respectively. Comment on his calorie intake and nitrogen balance. **(50 Marks)**
- 10.2 A person with a dietary habit of consuming variety of low Glycemic Index foods and no sugar, but still has a Body Mass Index (BMI) of 25kg/m<sup>2</sup>. Explain how this is possible with reference to energy balance? **(50 Marks)**