UNIVERSITY OF JAFFNA, SRI LANKA

FACULTY OF MEDICINE

FIRST EXAMINATION FOR MEDICAL DEGREES –JULY 2015

BIOCHEMISTRY PAPER II

Date: 28.07.2015 **Time: 3 Hours**

Answer all TEN questions.

Answer Part A and Part B in separate Answer Books

Marks allotted to each part are given in brackets.

PART A

1. A modified oral glucose tolerance test of a 45 year old patient gave a fasting blood glucose level of 210 mg/dL and 2 hours level of 245 mg/dL.

1.1 Explain the observed blood glucose levels. **(20 Marks)**

1.2 List the pathways which are the causes for the increased blood glucose level. **(06 Marks)**

1.3 Schematically give one of the above mentioned pathways indicating the rate limiting steps and how they are overcome to increase the blood glucose level. **(34 Marks)**

1.4 Give the principle of a specific method to measure the glucose in blood. **(20 Marks)**

1.5. Comment on the use of glycated haemoglobin (HbA_{1C}) in assessing the diabetic state. **(20 Marks)**

2. **2.1** Explain the regulation of de novo biosynthesis of fatty acids. **(30 Marks)**

2.2 Biochemically explain how ketoacidosis occurs during prolonged starvation. **(70 Marks)**

3. **3.1** Laboratory findings of a 30 year old male was as follows:

	Patient	Normal range
Alanine transaminase (Units L^{-1})	294.0	5.0 -30.0
Aspartate transaminase (Units L^{-1})	268.0	10.0- 30.0
Serum alkaline Phosphatase (Units L^{-1})	284.0	40.0-125.0
Serum Bilirubin (mg mL^{-1})	9.6	0.2 - 1.0

3.1.1 What could be the probable problem in this patient? **(10 Marks)**

3.1.2 Which fraction/s of the bilirubin would have been elevated in this patient. Explain with reasons. **(25 Marks)**

3.1.3 Give reasons for the elevation of the above said enzymes. **(15 Marks)**

3.2 A 55 year old man who had been consuming alcohol for 20 years, was admitted to the hospital with increased respiratory rate and responding only to painful stimuli and exhibits mild respiratory alkalosis. With relevant medical investigation, he was intravenously administrated with α-ketoglutarate.

3.2.1 Diagrammatically show the oxidation of alcohol. **(10 Marks)**

3.2.2 Explain the biochemical basis of the reasons for above signs. **(15 Marks)**

3.2.3 Explain reasons for the administration of α-ketoglutarate. **(25 Marks)**

4. A 60 year old male had severe chest pain and was admitted to the hospital immediately after the pain. His ECG was abnormal and he was diagnosed to have had myocardial infarction.

4.1. Diagrammatically show the serum enzymes pattern of this patient. **(20 Marks)**

4.2 Explain his probable lipid profile showing the electrophoretic pattern by comparing with that of normal person? **(45 Marks)**

4.3 Explain the nitrogen balance of the above patient before and after the infarction. **(15 Marks)**

4.4 Give the dietary advice to the above patient. **(20 Marks)**

5. **5.1** A 25 year old man who had heat intolerance with sweating, heart palpitation for the past four months. He has lost weight in spite of good appetite. He has been sleeping poorly and on examination it was observed that his heart rate was increased and hand tremor was observed as he extended his arm in front of his chest. His thyroid gland was enlarged three times of the normal size.

5.1.1 What could be the probable defect in this patient **(10 Marks)**

5.1.2 Analysis of which biochemical parameter/s would be useful to confirm the condition. **(20 Marks)**

5.1.3 Give the biochemical basis for the increased appetite and loss of weight. **(30 Marks)**

5.2 Give the biochemical functions of prostaglandins. **(40 Marks)**

PART B

6. **6.1** Patient with chronic kidney disease develops bone mineral disorder. Explain. **(50 Marks)**

6.2 Vitamin K injection reduces the prothrombin time. Explain. **(30 Marks)**

6.3 Biochemical function of vitamin B_{12} in the mitochondria. **(20 Marks)**

7. **7.1** **7.1.1** Draw the structure of IgG. **(10 Marks)**

7.1.2 Discuss how the structure of IgG facilitates its function. **(40 Marks)**

7.2 List the functions of plasma proteins. **(25 Marks)**

7.3 Explain the steps involved in digestion and absorption of sesame oil in alimentary canal. **(25 Marks)**

8. **8.1** Show how cholesterol biosynthesis is controlled at gene level? **(50 Marks)**

8.2 **8.2.1** What are free radicals? **(15 Marks)**

8.2.2 Show how the following enzymes function as protective enzymes.

8.2.2.1 Superoxide dismutase. **(10 Marks)**

8.2.2.2 Catalase. **(10 Marks)**

8.2.2.3 Glutathione peroxidase. **(15 Marks)**

9. **9.1** **9.1.1** Give the purine salvage pathways. **(15 Marks)**

9.1.2 Give the importance of purine salvage pathways. **(20 Marks)**

9.2 Explain how would you estimate the glycaemic index of rice. **(30 Marks)**

9.3 Explain the measures considered to evaluate the quality of a protein. **(35 Marks)**

10. A 45 year old sedentary male admitted to the hospital was diagnosed as type 2 diabetic patient. His weight and height were 80 kg and 160 cm respectively. Based on the dietary analysis, he was consuming 2500kcal per day and was on nitrogen equilibrium.

10.1 Comment on his calorie and protein consumption per day. **(30 Marks)**

10.2 How would you advise him for the weight reduction program. **(30 Marks)**

10.3 Prepare the day menu with amount at his normal weight. **(40 Marks)**