UNIVERSITY OF JAFFNA, SRI LANKA
FACULTY OF MEDICINE
FIRST EXAMINATION FOR MEDICAL DEGREES –NOVEMBER 2015

BIOCHEMISTRY PAPER II

Date: 05.11.2015 **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. High intake of dietary fructose and sucrose has greater effect in raising blood triacylglycerol level than glucose.

   1.1 Explain why fructose is more readily converted to triacylglycerol than glucose. (60 Marks)

   1.2 Explain why fructose cannot be used as an alternative for glucose for diabetics. (40 Marks)

2. A 36 year old man has hypercholesterolemia. His daily diet contained about 600mg cholesterol. His plasma LDL cholesterol was 300mg dL^{-1} (Normal level is 190mg dL^{-1}). He was treated with cholesterol free diet for 3 months and no significant decrease in plasma cholesterol level was observed. Then he was treated with clofibrate & his plasma cholesterol level decreased to 200mg dL^{-1}.

   2.1 Give reasons for the elevated serum cholesterol level even after decreasing the dietary intake. (40 Marks)

   2.2 Explain the use of clofibrate in the treatment of hypercholesterolemic patients. (35 Marks)

   2.3 Explain the plasma HDL / LDL cholesterol ratio of the patient before and after clofibrate treatment. (25 Marks)

3. 3.1 3.1.1 Explain the biochemical defects observed in β-thalassemia and the consequences of the said defects in the patients. (40 Marks)

3.1.2 Why β- thalassaemia is more common than α- thalassemia. (20 Marks)

3.2 Explain how dietary non-heme iron is absorbed, transported and stored? (40 Marks)

4. 4.1 An alcoholic was admitted to hospital with fluid retention, drowsiness and confusion. On investigation the patient had hypoalbuminemia, icterus and elevated blood ammonia level.

4.1.1 Give the biochemical explanation for the observed hypoalbuminemia, icterus and elevated blood ammonia levels in this patient. (40 Marks)

4.1.2 Which fraction of the serum bilirubin is elevated in this patient? Give reasons. (25 Marks)

4.2 Diagrammatically show how the steroid drugs are metabolized. (35 Marks)

5. 5.1 A 35 year old male was losing weight and was diagnosed to have carcinoma of thyroid gland. Thyroxin level was 350nmol/l (normal 65-156 nmol/l). After total thyroidectomy and removal of invaded lymph nodes, the patient gained weight. The patient maintained a steady weight when treated with thyroid hormone a month after thyroidectomy.

5.1.1 Give the mechanism of action of thyroid hormone. (40 Marks)

5.1.2 Explain the observed changes in the body weight. (25 Marks)

5.2 A ten year old boy had elevated methionine and homocysteine concentration in both blood and urine and undetectable plasma cysteine. Treatment with pyridoxine improved this condition.

5.2.1 What is the probable enzyme defect? (10 Marks)

5.2.2 Explain the above observation and the basis for this treatment. (25 Marks)

PART B

6. 6.1 Explain diagrammatically the role of antioxidants in the protection of cell membrane. (35 Marks)

   6.2 Explain the biochemical basis of the following:

   6.2.1 Folic acid deficiency causes megaloblastic anaemia. (40 Marks)

   6.2.2 Vitamin C promotes wound healing. (25 Marks)

7. 7.1 Explain autoimmunity taking Myasthenia Gravis as an example. (40 Marks)

   7.2 Explain the biochemical basis for the use of Neostigmine on the above condition. (30 Marks)

   7.3 Explain how cholesterol biosynthesis is controlled at gene level. (30 Marks)

8. 8.1 What is "flow of genetic information" (20 Marks)

   8.2 Show how fidelity is maintained during the flow of genetic information. (45 Marks)

   8.3 Show how insulin controls protein synthesis at mRNA level. (35 Marks)

9. 9.1 9.1.1 List the causes of hyperuricemia. (25 Marks)

   9.1.2 Explain how Allopurinol administration is beneficial to this patient. (35 Marks)

   9.2 Give the nutritional values of breast milk. (40 Marks)

10. A 35-year old sedentary man weighing 80 kg with 160 cm height is seeking for nutritional advice.

    10.1 Comment on his body mass index and his weight. (25 Marks)

    10.2 Calculate his total energy requirement per day? (30 Marks)

    10.3 How would you give the nutritional advice to reduce his body weight to normal level? (45 Marks)