



Second Examination for Medical Degrees - March/April 2002
BIOCHEMISTRY - PAPER II

Thursday 25th March, 2002

2.00 pm to 5.00 pm
(3 hours)

Answer All Six Questions.

Marks allotted to each part of a question is shown within parenthesis.

1. An obese middle-aged man had an urge to eat most of the time and passed urine frequently. Investigation of a fasting blood sample revealed the following results.

Plasma Analyte	Results
(a) Glucose	14 mmol/L
(b) Total cholesterol	5 mmol/L
(c) Triglyceride	3.5 mmol/L
(d) Insulin	Normal

(Assume the average molecular weight of triglyceride as 900)

- 1.1 Comment on each of the values (a) to (d). (20 marks)
- 1.2 Critically evaluate the results and deduce the possible biochemical disorder. (60 marks)
- 1.3 Describe the dietary advice that should be offered to this person. (20 marks)
2. 2.1 Describe the role of G protein in signal transduction, using as an example the manner in which epinephrine acts. (40 marks)
- 2.2 State the mechanism of action of prostaglandins. (30 marks)
- 2.3 Describe the effect of aspirin on prostaglandin metabolism. (30 marks)
3. 3.1 List the steps involved in protein biosynthesis. (20 marks)
- 3.2 Explain the dual specificity of t RNA in protein metabolism. (20 marks)
- 3.3 Explain the effects of the following on protein metabolism.
- 3.3.1 Tetracycline
- 3.3.2 Puromycin
- 3.3.3 Diphtheria toxin (60 marks)
4. 4.1 4.1.1 Explain how a point mutation in HbA leads to sickling of red blood cells. (30 marks)
- 4.1.2 Describe the biochemical basis of a method used to detect homozygous and heterozygous states of HbS at DNA level. (30 marks)
- 4.2 Give reasons to justify the following:
- 4.2.1 Early feeding and exposure to morning sunlight minimizes neonatal jaundice. (20 marks)
- 4.2.2 A patient with muscular pain was found to have elevated levels of myoglobin and creatine phosphokinase enzyme. (20 marks)

5. Explain the biochemical basis of the following:

- 5.1 Blood homocysteine is found to be elevated in folate and vitamin B12 deficiency. (25 marks)
- 5.2 Urinary hydroxyproline excretion in a child ^{is} higher than that of an adult. (25 marks)
- 5.3 A diet rich in polyunsaturated fatty acids increases the demand for vitamin E. (25 marks)
- 5.4 Poor nutrition is the main cause of iron deficiency in children and adolescents. (25 marks)

6. A healthy adult male of 60 kg body weight and BMR of 25 Kcal/kg/day spends 8 hours sleeping, 8 hours in moderately active work (BMR multiplying factor 2.7) and rest of the period utilizing energy at a rate of 1.6×BMR.

Calculate

- 6.1 his total energy expenditure. (60 marks)
- 6.2 the approximate amount of energy he should ideally obtain from carbohydrate. (10 marks)
- 6.3 if the nitrogen excretion of the subject is 10g/day what would be the approximate protein intake, assuming he consumes a mixed diet with 85% digestibility. (30 marks)