



UNIVERSITY OF ZAMBIA  
Second Examination for Medical Degrees - April 2006  
BIOCHEMISTRY PAPER II

Wednesday, 19<sup>th</sup> April, 2006

2.00 p.m. - 5.00 p.m.

Answer **All Six** Questions

(3 hours)

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

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1. An obese 45yr old woman with Type I diabetes mellitus was found to have a blood glucose concentration of 28 mmol/L. Blood was taken for further analysis and serum was grossly lipaemic. Following results were obtained.
  - I: Serum cholesterol 53 mmol/L (< 5)
  - II -Serum triglyceride 150 mmol/L (0.3 - 1.7)
  - III Sample of serum after standing overnight had a creamy supernatant layer although the bottom layer remained lipaemic.
  - 1.1 Comment on results I, II and III giving biochemical reasons. (60 marks)
  - 1.2 Explain the likely biochemical changes if the patient was given a regimen of insulin injections. (40 marks)
  
2. 2.1 Give the biochemical basis for the occurrence of hyperuricaemia in the following conditions.
  - 2.1.1 Glucose 6- phosphatase deficiency (25 marks)
  - 2.1.2 Hypoxanthine-Guanine phosphoribosyl transferase deficiency (25 marks)
  - 2.2 Serum transaminases (AST & ALT), alkaline phosphatase (ALP), and gamma glutamyl transferase ( $\gamma$  GT) were measured on a patient with suspected liver pathology.  
Explain the biochemical basis in performing the above investigations. (50 marks)
  
3. Describe the importance of the following enzymes.
  - 3.1 Phospholipase C in hormone action. (25 marks)
  - 3.2 Glutamine synthase in the metabolism of ammonia. (25 marks)
  - 3.3 Creatine kinase in energy metabolism. (25 marks)
  - 3.4 Glucokinase in the regulation of blood glucose concentration. (25 marks)

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4. Give biochemical explanations for the following.
- 4.1 Serum  $\alpha_1$  antitrypsin activity is less in smokers compared to non smokers. **(25 marks)**
  - 4.2 Inheritance of HbM causes methaemoglobinaemia. **(25 marks)**
  - 4.3 Hexose monophosphate pathway is important in the metabolism of the red blood cell. **(25 marks)**
  - 4.4 IgE mediates immediate hypersensitivity reaction. **(25 marks)**
5. Explain the following giving the biochemical basis.
- 5.1 cDNA method is useful in the determination of genes that are expressed in a given tissue. **(40 marks)**
  - 5.2 Vitamin B<sub>12</sub> is involved in cellular metabolism. **(30 marks)**
  - 5.3 Vitamins are involved in post translational modification of proteins. **(30 marks)**
6. A healthy adult female of 55 kg body weight and BMR of 25kcal/kg/hr, spends 8 hrs sleeping, 8hrs in moderate activity ( 2.7 BMR), 4 hrs in discretionary activity ( 3 BMR), and rest of the period utilizing energy at the rate of 1.4 BMR.
- Calculate
- 6.1 her daily energy expenditure. **(25 marks)**
  - 6.2 the amount of carbohydrate , fat and protein that should be included in her daily diet. **(25 marks)**
  - 6.3 her total energy and protein requirement if she becomes pregnant. **(25 marks)**
  - 6.4 the additional protein requirement if she secretes 600 ml of milk during lactation. **(25 marks)**

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