

PRIMARY EXAMINATION

BIOCHEMISTRY

Tuesday, 5 December 2000

Time allowed: Two hours

INSTRUCTIONS TO CANDIDATES

Question 1 in Section A is compulsory.

Answer **three** of the questions in Section B, including one from questions 5 & 6.

Use diagrams and formulae wherever possible.

Maximum marks: 75.

Please answer each of your four questions in a **separate** book.

Section A (15 marks)

This question is compulsory.

1. Write short explanatory answers to **THREE** of the following questions:

- (a) Describe the structure and properties of collagen, the main protein found in dentine.
- (b) Describe the mechanisms that the human body uses to maintain the plasma glucose levels during a fast of 48 hours.
- (c) Discuss the role of cholecalciferol (vitamin D) in the body. What would be the effect on the dentition if there was a deficiency of this vitamin from birth to the age of eight?
- (d) Saliva has a vital role in preserving the integrity of enamel. Discuss.
- (e) Dietary guidelines are a set of nutrition recommendations that help individuals to select diets which may reduce the risk of chronic disease. Is there any justification for vitamin or mineral supplements ? Discuss.

Section B (60 marks)

Answer THREE of the following FIVE questions.

All questions are of equal value

This MUST include at least one from questions 5 and 6

2. Describe the structure of haemoglobin and discuss the mechanisms which allow oxyhaemoglobin to release oxygen in the tissues in response to varying physiological needs.
3. Answer any five (5) of the following six (6) questions.
 - (a) What are the two main differences between normal and transformed cells which may be exploited in cancer chemotherapy using inhibitors of nucleotide biosynthesis?
 - (b) Discuss with an example how proto-oncogenes are converted into oncogenes.
 - (c) Describe the primary site of action of the anti-cancer drug, methotrexate.
 - (d) Which reactions in the purine and pyrimidine pathways are the secondary sites of inhibition induced by methotrexate that disrupt nucleotide synthesis?
 - (e) Which of the four dNTPs may be depleted in cells treated with methotrexate ?
 - (f) How might an imbalance in the cellular levels of the four dNTPs affect DNA synthesis resulting in cell death?
4. Explain why lipoproteins are necessary for lipid transport. How is the metabolism of lipoproteins affected by the composition of dietary triglyceride?
5. Discuss RNA, including some mention of the ways in which it differs from DNA, the enzymes that synthesize RNA, and the different types of RNA and their particular biological roles.
6. You are given a sample of human tissue that you believe may contain Hepatitis B. Explain the molecular biological techniques you might use to test for the presence of viral DNA and protein. Assume that you know the entire DNA sequence of the virus and list any other reagents you may require.

End of Paper