

Paper Reference(s)

7040/01

London Examinations GCE

Biology

Ordinary Level

Paper 1

Monday 14 January 2002 – Morning

Time: 2 hours

Materials required for examination

Answer book (AB12)

Items included with question papers

Nil

Instructions to Candidates

Answer BOTH questions from Section A and any THREE questions from Section B.

In the boxes on the answer book, write the name of the examining body (London Examinations), your centre number, candidate number, the subject title (Biology), the paper reference (7040/01), your surname, other names and signature.

Answer your questions in the answer book. Make sure your answers to parts of questions are clearly numbered. Use supplementary answer sheets if necessary.

Information for Candidates

The total mark for this paper is 100. The mark allocation is indicated at the end of each question. Marks for parts of questions are shown in round brackets: e.g. (2).

This paper has seven questions. Pages 7 and 8 are blank.

Advice to Candidates

Write your answers neatly and in good English.

Show all the steps in your calculations, giving your answers at each stage.

Turn over

7. (a) Explain what is meant by the term **enzyme**. Describe the importance of enzymes to living organisms. (5)
- (b) Describe an experiment to show that the action of amylase is affected by temperature. (9)
- (c) How are enzymes used in each of the following?
- (i) The utilisation of a food source by a mould fungus (3)
- (ii) The production of human insulin from bacteria by genetic engineering (4)
- (iii) The seed of a leguminous plant during germination (4)

(Total 25 marks)

TOTAL FOR SECTION B: 75 MARKS

END

SECTION A

Answer BOTH questions

1. Read the passage below. Use the information in the passage and your own knowledge to answer the questions which follow.

For some eighty years scientists have been experimenting to see if they can increase the growth rate of crop plants by increasing the concentration of carbon dioxide in the atmosphere around them. Obviously this only works in enclosed areas from which the gas cannot escape, and where the concentration of carbon dioxide can be easily controlled.

The addition of extra carbon dioxide to glasshouse crops is now widespread. Normally, respiration of microorganisms in the soil in glasshouses produces carbon dioxide at a rate of about 2 to 3 kg per hectare per hour. If manure is added to the soil, there is an increase in the rate of production of carbon dioxide, to about 20 to 30 kg per hectare per hour. When the light in the glasshouse is intense, photosynthesis takes place rapidly and the crop plants use up carbon dioxide rapidly.

Another source of carbon dioxide is the burning of fuels containing carbon. Unfortunately, these fuels may produce small quantities of the gas sulphur dioxide. When carbon dioxide is produced in this way heat is produced at the same time. This is useful in cold weather but in the summer the glasshouse would get too hot. To prevent overheating, the propane burners can be put outside the glasshouses and the gases from them can be piped into the glasshouse in plastic pipes.

- (a) Explain how adding manure to the soil in a glasshouse leads to an increase in carbon dioxide production. (Lines 8 and 9) (2)
- (b) How would dim light conditions affect the concentration of carbon dioxide in a glasshouse? (2)
- (c) (i) Burning fossil fuels may release sulphur dioxide into the glasshouse. What effect would this have on the atmosphere in the glasshouse and on the growth of the crops? (Line 13) (2)
- (ii) What effect would increasing the temperature have on the growth of the glasshouse crop? Explain your answer. (2)
- (d) Suggest a simple test that the grower could use to estimate the level of carbon dioxide in the glasshouse. (2)

(Total 10 marks)

2. In a human kidney nephron, blood is filtered as it passes through the glomerulus and the filtrate enters the Bowman's capsule. Substances in the filtrate may then be reabsorbed or excreted in the urine.

The table below gives information about some of these substances.

Substance	Volume or mass filtered	Volume or mass excreted	Percentage reabsorbed
Water	180 dm ³	1.8 dm ³	99%
Sodium	630 g	3.2 g	99.5%
Glucose	180 g	0 g	100%
Urea	54 g	?	44%

Data from Vander et al. (1994)

- (a) (i) Calculate the **mass** of sodium that is reabsorbed. (1)
- (ii) Calculate the **mass** of urea excreted. Show your working. (3)
- (b) (i) Where in the body is urea produced? (1)
- (ii) Name **one** substance which is broken down to produce urea. (1)
- (c) Why is it important that the glucose is reabsorbed back into the blood stream? (1)
- (d) The kidney is an organ that carries out **excretion** and **osmoregulation**. Explain what is meant by these two terms. (2)
- (e) People with kidney failure may use a kidney machine for several hours each week. This provides a way of removing waste products from the person's blood. Between treatments with a kidney machine such people are advised to avoid certain types of food in their diet.
- Name **two** types of food that they should avoid and explain why these foods may be harmful to people with kidney failure. (4)
- (f) Name **one** organ, other than the kidney, that carries out excretion in the body and give **one** of its excretory products. (2)

(Total 15 marks)

TOTAL FOR SECTION A: 25 MARKS

SECTION B

Answer any **THREE** questions

3. (a) List **four** characteristics common to insects. (4)
- (b) (i) Give **four** ways in which insect-pollinated flowers differ from wind-pollinated flowers. (4)
- (ii) State **one** advantage and **one** disadvantage of insect-pollination compared with wind-pollination. (2)
- (c) (i) Draw a large labelled diagram of a leguminous flower. (7)
- (ii) Describe how this flower is pollinated. (2)
- (iii) Describe the changes that take place in this flower after pollination until the formation of the seed. (Details of germination are **not** required). (4)
- (d) Suggest and explain **one** reason why a commercial flower grower would want all his flowers to be self-pollinated rather than cross-pollinated. (2)

(Total 25 marks)

4. (a) List the elements present in each of the following:
protein; carbohydrate; lipid (fat). (3)
- (b) A student wants to test a piece of meat for the presence of protein. Describe the test she should perform giving the method and the result she should expect. (3)
- (c) Describe what would happen to a piece of meat from when it is first eaten to when its constituent molecules are absorbed into the bloodstream. Your answer should include a description of the following. (4)
- (i) Mechanical digestion (4)
- (ii) Chemical digestion (10)
- (d) What is the function of cellulose in the human diet? (2)
- (e) Describe how single-cell protein (SCP) is produced. (3)

(Total 25 marks)

5. (a) Give a biological explanation for each of the following.
- (i) A cut stem of a leafy shoot is placed in a beaker of water containing a red dye. Thirty minutes later the leaves start to turn red. (2)
 - (ii) Excess fertiliser placed in the soil may cause a herbaceous plant to wilt. (2)
 - (iii) A dried fruit, such as an apricot, swells if placed in pure water for several hours. (3)
- (b) (i) Draw a labelled diagram of the apparatus you would use to measure the rate of water loss from a leafy shoot. (3)
- (ii) Describe how you would use this apparatus to determine the effect of increasing wind speed on the rate of water loss from a leafy shoot. (7)
- (iii) Give **two** environmental factors, other than wind speed, that can cause an increase in the rate of water loss from a leafy shoot. (2)
- (c) Describe the effects on the environment of deforestation. (6)

(Total 25 marks)

6. (a) (i) Give a balanced equation for **aerobic** respiration. (3)
- (ii) List **two** ways in which anaerobic respiration differs from aerobic respiration. (2)
- (b) Describe the mechanism by which carbon dioxide in the blood capillaries around the alveoli passes into the alveoli and is exhaled. (10)
- (c) (i) Name **two** processes that occur in the leaf of a flowering plant which involve gas exchange. (2)
- (ii) Describe how the structure of a leaf is adapted for its functions. (8)

(Total 25 marks)