EXAMINATIONS COUNCIL OF ZAMBIA
Joint Examination for the School Certificate and General Certificate of Education Ordinary Level

BIOLOGY

PAPER 2 Theory

Monday 7 NOVEMBER 2011 1 hour 45 minutes

Additional materials:
Answer Booklet

TIME: 1 hour 45 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the spaces at the top of this page and on the Answer Booklet used.

There are ten questions in this paper.

Section A
Answer all questions.
Write your answers in the spaces provided on the question paper.

Section B
Answer any three questions.
Write your answers in the Answer Booklet provided.

At the end of the examination:
1. fasten the Answer Booklet used securely to the question paper,
2. enter the numbers of the Section B questions you have answered in the grid on the bottom right side corner.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.
You are advised to spend no longer than one hour on Section A and no longer than 45 minutes on Section B.
Cell phones are not allowed in the examination room.

FOR EXAMINER’S USE

<table>
<thead>
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<tr>
<td>Total</td>
<td></td>
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This question paper consists of 8 printed pages.
Section A  [44 marks]

Answer all the questions in the spaces provided on the question paper.

1  *Figure 1.1* shows a plant cell which has been put in a concentrated salt solution.

![Figure 1.1](image)

(a) Identify the parts labelled A and B.

A  ..........................................................................................................................  
B  ..........................................................................................................................  [2]

(b) (i) What happened for the cell to reach this state?

..........................................................................................................................  [2]

(ii) State the term given to the cell in this condition.

..........................................................................................................................  [1]

(iii) How can this condition can be reversed?

..........................................................................................................................  [1]

(c) Give one reason why the structure labelled C remained in its natural state.

..........................................................................................................................  [1]

(d) Give two differences between a plant cell and an animal cell.

Difference 1 ..................................................................................................................  
Difference 2 ..................................................................................................................  [2]

[Total 9]
Figure 2.1 shows an experiment to investigate the movement of coloured solution in a plant.

![Diagram of a seedling with oil and coloured solution](image)

**Figure 2.1**

(a) Name the process by which

(i) water in the solution was absorbed by the plant.

(ii) coloured solute in the solution was absorbed by the plant.

(b) Why was oil put on top of the coloured solution?

(c) **Figure 2.2** shows the cross section of the stem obtained from **Figure 2.1** at the end of the experiment.

![Cross section diagram](image)
(i) Using the letter X, label the part on the figure which was stained by the dye. [1]

(ii) Identify the part you have labelled X on the Figure 2.2. [1]

(iii) Name two substances transported by part X and give one function for each.
Name: .................................................................
Function: ..............................................................
Name: .................................................................
Function: .............................................................. [4]

[Total 9]

3 Figure 3.1 shows part of the respiratory system of an insect.

![Figure 3.1]

(a) Identify the parts labelled D and E.
Part D .................................................................
Part E ................................................................. [2]

(b) Explain how oxygen from the atmosphere is able to reach the tissue labelled E.
.................................................................................................................................
.................................................................................................................................
................................................................................................................................. [2]

(c) Explain how the energy released from respiration in an insect is used.
.................................................................................................................................
.................................................................................................................................
................................................................................................................................. [3]
(d) State **two** ways in which the respiratory system shown differs from that of a fish.

............................................................................................................................................ [2]

[Total 9]
4 **Figure 4.1** shows the urinary system and its blood supply.

![Figure 4.1](image)

(a) **On Figure 4.1** label structures F, G and H. [3]

(b) State two processes that are involved in urine formation.

1. ........................................................................................................... [2]

2. ........................................................................................................... [2]

(c) **Table 4.1** shows the relative quantities of several substances in the blood in the renal artery and renal vein.

<table>
<thead>
<tr>
<th>Substance</th>
<th>Relative quantities in blood in renal artery (arbitrary units)</th>
<th>Relative quantities in blood in renal vein (arbitrary units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucose</td>
<td>10.0</td>
<td>9.5</td>
</tr>
<tr>
<td>Oxygen</td>
<td>100.0</td>
<td>40.0</td>
</tr>
<tr>
<td>Sodium salts</td>
<td>32.0</td>
<td>27.0</td>
</tr>
<tr>
<td>Urea</td>
<td>6.0</td>
<td>2.5</td>
</tr>
<tr>
<td>Water</td>
<td>180.0</td>
<td>175.0</td>
</tr>
</tbody>
</table>

Explain what happens in the kidney to bring about the changes in the relative quantities of

- glucose .............................................................................................................................
- oxygen ..............................................................................................................................

Biology/509/02/22011
In an experiment to demonstrate the inheritance of coat colour in cattle, a roan bull was repeatedly crossed with a roan cow and produced roan, white and red calves.

(a) Which coat colour is as a result of co-dominance?

(b) Determine the genotypes of the three coat colours, given that $C^R$ is gene for red colour and $C^W$ is gene for white colour.

(c) Show using a genetic diagram the possible offspring which could be produced when a red bull was crossed with a roan cow.
Section B [36 marks]
Answer any three questions.

All answers should be in sentence form in paragraphs.

6 (a) (i) Define the term growth. [1]
(ii) Describe the process of growth in plants from a seed to a seedling. [5]
(b) Outline the life cycle of a housefly. [6] [Total: 12]

7 (a) What is meant by the term hormone? [2]
(b) Describe the function of auxins in plants. [4]
(c) Relate the effects of auxins in geotropism. [6] [Total: 12]

8 (a) Describe the structure of a synovial joint and explain the functions of its parts. [6]
(b) Differentiate the following:
   (i) tendon and ligament,
   (ii) ball-and-socket joint and hinge joint. [6] [Total: 12]

9 (a) Explain the term immunity to disease. [2]
(b) Distinguish between active immunity and passive immunity, giving one example in each case. [5]
(c) Discuss how immunity to disease is reduced. [5] [Total: 12]

10 (a) Describe how nitrogen is cycled within the ecosystem. [6]
(b) Describe the importance of each of the physical components of soil. [6] [Total 12]
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