INSTRUCTIONS TO CANDIDATES:

- Write your name and index number in the spaces provided.
- Answer all the questions in Section A in the spaces provided.
- In section B answer questions 6 (compulsory) and either question 7 or 8 in the spaces provided.

For Examiner’s Use Only:

<table>
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<th>SECTION</th>
<th>QUESTIONS</th>
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<th>CANDIDATES SCORE</th>
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This paper consists of 7 printed pages. Candidates should check to ascertain that all papers are printed as indicated and that no questions are missing.

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SECTION A (40 MARKS)
Answer all the questions in this section in the spaces provided.

1. The diagram below represents a simple respiratory pathway in cells

- Glucose → Process X → Substance A → Oxygen Present → Process Y → Substances B + 150kJ → Plants → Ethanol + CO₂ + 210kJ → Animals

a) Name the process marked X and Y. (2mks)
X: .......................................................... Y: ..........................................................

b) State two differences between process X and Y. (2mks)
........................................................................................................................................
........................................................................................................................................

c) State the name of substance B and condition under which it is formed. (2mks)
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d) Explain how body size affects the rate of respiration in animals. (2mks)
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2. The flow chart below represents a part of the nitrogen cycle

- Atmospheric Nitrogen → C → B → Plants → D → Animals

- Ammonium compounds → F → A

a) Name the groups of organism responsible for processes A and B. (2mks)
A: ..........................................................
B: ..........................................................

b) Name the process C and D. (2mks)
C: ..........................................................
D: ..........................................................
3. The diagram below represents the structure of a nephron. Study it and answer the questions that follow.

a) (i) State the physiological process by which solutes are selectively re-absorbed back into blood at the part labelled B. (1mk)

(ii) How is the part labeled B adapted to carry out the physiological process named in 3 (a) (i) above. (1mk)

b) In which part of the kidney is the part labelled A abundantly found. (1mk)

c) On the diagram above, indicate the direction of flow of blood using arrows at the part labelled C. (1mk)

d) Give the name of a symbiotic micro-organism present in leguminous plants that carries out process C. (1mk)

e) Name the chemical compound synthesized by plants using nitrogen. (1mk)

f) State the effect of process F. (1mk)

c) Name the chemical compound X. (1mk)

d) Give the name of a symbiotic micro-organism present in leguminous plants that carries out process C. (1mk)

e) Name the chemical compound synthesized by plants using nitrogen. (1mk)

f) State the effect of process F. (1mk)
4. Study the diagram below and answer the questions which follow.

![Diagram of the female reproductive system]

a) Name the parts labelled

A…………………………………………………..
B…………………………………………………..
D…………………………………………………..

b) State the functions of part B. (3mks)

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5(a) A man marries a woman with blood group B and the couple has three children. The man disputes parentage of the second born child, who is blood group O. His dispute is incorrect given that he belongs to blood group A. Explain without using neither a genetic cross nor a punnet square. (2mks)

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b) Haemophilia is a sex linked trait in humans caused by a recessive gene located in the X chromosome. A man with normal blood clotting marries a woman who also has normal blood clotting in the event of a cut. On getting offsprings, one of their sons turned out to be a haemophiliac. By the use of letter H for normal blood clotting, illustrate the outcome of the haemophiliac son using a genetic cross. (4mks)

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5(c) Other than haemophilia state two sex linked traits in human. (2mks)

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SECTION B (40MARKS)

Answer questions 6 (compulsory) and either questions 7 or 8 in the spaces provided

6. The data below shows the rate of photosynthesis at different temperature in attached leaves of three East African plants, (Crotolaria, Gynandropsis and Amaranthus species) respectively which were grown outside with the same illumination while water and carbon (IV) oxide are not limiting factors in this experiment.

Rate of photosynthesis was expressed in terms of carbon (IV) oxide uptake in mg/mm²/hr at various temperatures as tabulated below.

<table>
<thead>
<tr>
<th>Temperature °C</th>
<th>Rate of photosynthesis (mg/mm²/hr)</th>
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<tbody>
<tr>
<td></td>
<td>Gynandropsis sp</td>
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<tr>
<td>5</td>
<td>-</td>
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<tr>
<td>10</td>
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</table>

a) Represent the results graphically (rate of photosynthesis against temperature)
b) Using the graph in (a) above indicate optimum temperature for the Gynandropsis and Amaranthus species.
   Gynandropsis ......................................................... (2mks)
   Amaranthus ..........................................................

c) Give a reason why Gynandropsis and Amaranthus could not function photosynthetically at 5°C. (1mk)

   .................................................................

d) What are the possible ecological habitats for the following plants. (2mks)
   (i) Amaranthus ..........................................................
   (ii) Crotolaria ..........................................................

   .................................................................

e) At what temperature was the amount of carbon (IV) oxide around the leaf of Gynandropsis highest? (1mk)

   .................................................................

f) What raw material is required in the light stage of photosynthesis. (1mk)

   .................................................................

g) Name the parts of chloroplasts in which the following stages of photosynthesis take place. (2mks)
   (i) Light stage ..........................................................
   (ii) Dark stage ..........................................................

   .................................................................

h) State one structural similarity and difference between chloroplast and mitochondria. (2mks)
   Similarity ..........................................................
   Difference ..........................................................

   .................................................................

i) What is the compensation point of photosynthesis? (1mk)

   .................................................................

7 (a) Explain why plants lack elaborate excretory organs like those found in animals. (3mks)

   .................................................................

(b) Name five methods of excretion in plants. (5mks)

   .................................................................
(c) State any six excretory products in plants and give economic uses. (12mks)

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8. Discuss the evidence of organic evolution. (20mks)

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