

Biology – (Theory)

Dec. 2022 – 2 hours



Name Index Number

Candidate's Signature Date

Instructions to candidates

- Write your name and index number in the spaces provided above.
- Sign and write the date of examination in the spaces provided above.
- This paper consists of **two** sections; **A** and **B**.
- Answer **all** the questions in section **A** in the spaces provided.
- In section **B** answer question **6 (compulsory)** and either question **7** or **8** in the space provided after question **8**.
- This paper consists of 12 printed pages.**
- Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**
- Candidates should answer the questions in English.**

For Examiner's Use Only

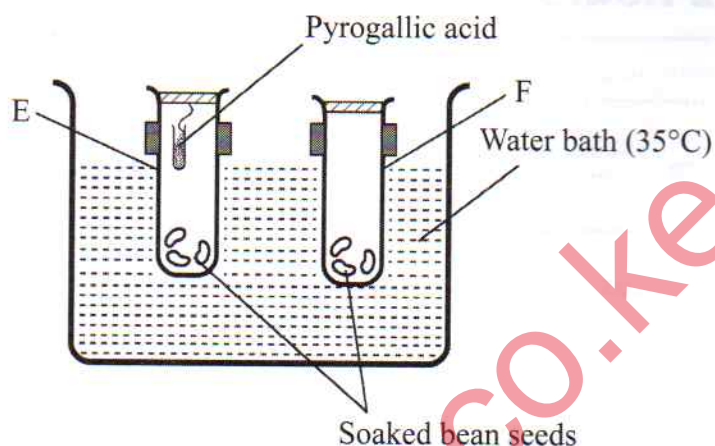
Section	Question	Maximum Score	Candidate's Score
A	1	8	
	2	8	
	3	8	
	4	8	
	5	8	
B	6	20	
		20	
Total Score		80	



SECTION A (40 marks)

Answer **all** the questions in this section in the spaces provided.

1. The set-up below was used to investigate a certain factor necessary for seed germination.



- (a) (i) Identify the factor under investigation. (1 mark)

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- (ii) Give a reason for your answer in 1(a)(i) (1 mark)

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- (b) Explain why it was necessary to:

- (i) maintain the water bath at 35°C (1 mark)

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- (ii) use soaked bean seeds (1 mark)

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- (c) (i) Explain the expected observations at the end of the experiment in test tubes **E** and **F**. (2 marks)

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- (ii) Explain what is likely to happen if set-up **F** was maintained for 7 days. (2 marks)

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2. A fresh water lake surrounded by agricultural farms has the following organisms:

- Fish
- Hippopotamus
- Reeds
- Algae

- (a) State the roles of each of the following organisms in the lake ecosystem:

- (i) hippopotamus (2 marks)

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- (ii) algae (2 marks)

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- (b) Explain the likely positive and negative effects of the surrounding agricultural farms on the lake ecosystem.

- (i) Positive effects (2 marks)

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(ii) Negative effects

(2 marks)

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3. (a) Two tall garden pea plants were crossed and of the resulting offspring, 750 were tall and 250 were short. Using letter **T** to represent the dominant gene, determine the genotypic ratio of the off-spring. (5 marks)

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- (b) Besides height in the garden pea plants, state **two** other contrasting seed traits that Mendel focused on in his genetic studies. (2 marks)

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- (c) State how the genetic knowledge has been used to improve pea plant farming. (1 mark)

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4. (a) Explain how each of the following factors affect uptake of mineral ions in plants:

(i) temperature (3 marks)

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(ii) glucose concentration in root hair cell sap (3 marks)

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(b) State **two** characteristics of the root hairs that increase their surface area for absorption of mineral ions. (2 marks)

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5. (a) State **two** main functions of the ear ossicles. (2 marks)

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(b) Explain how each of the following parts of the ear are structurally adapted to their functions:

(i) tympanic membrane (1 mark)

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.....

(ii) cochlea (1 mark)

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- (c) State the function of the eustachian tube in the mammalian ear. (1 mark)

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- (d) State the importance of each of the following in the mammalian ear:

- (i) wax (1 mark)

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- (ii) endolymph and perilymph (2 marks)

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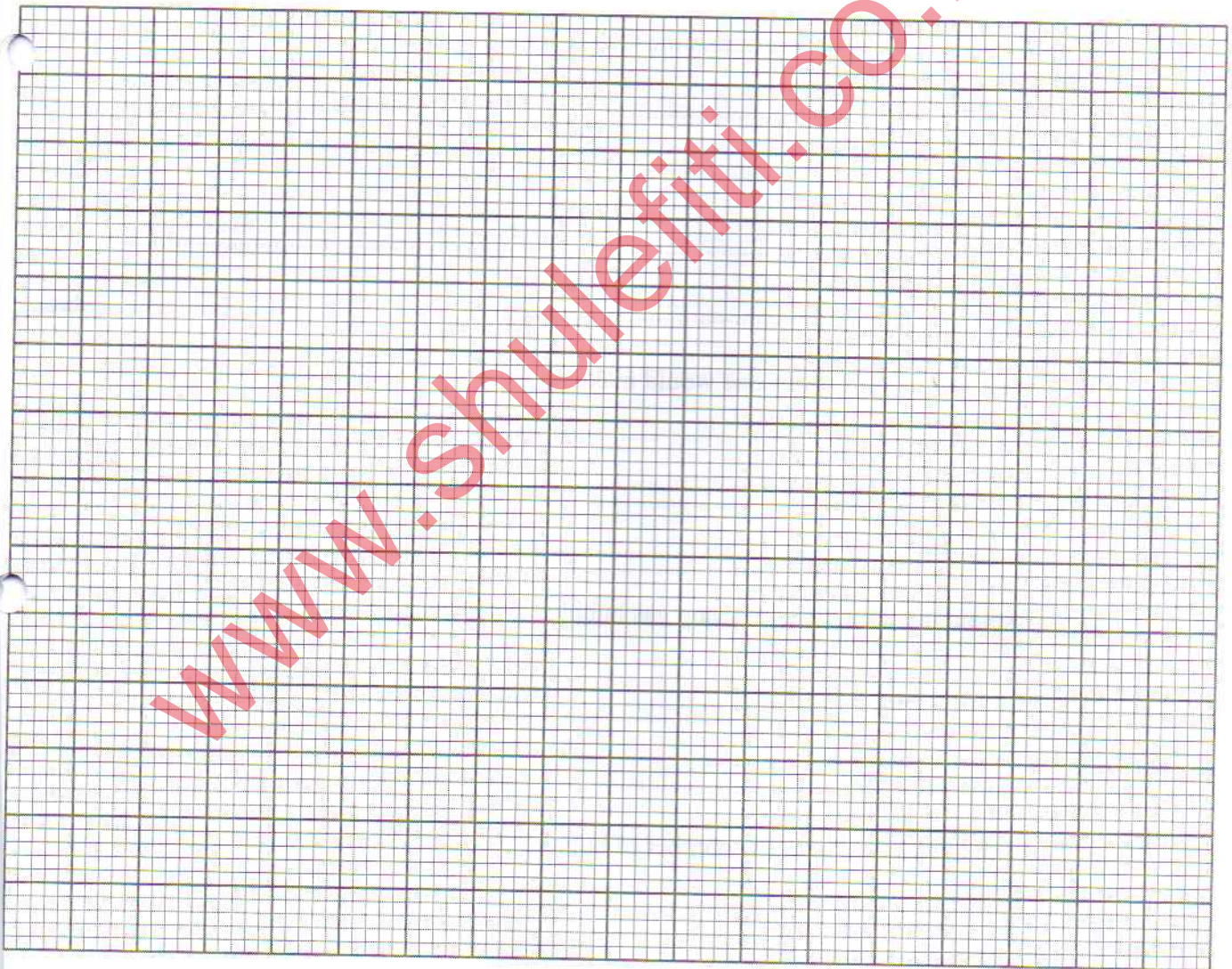
SECTION B (40 marks)

Answer question 6 (compulsory) and either question 7 or 8 in the space provided after question 8.

6. A shoot of an aquatic plant was exposed to different light intensities and the rate of photosynthesis estimated by counting the number of bubbles of a gas leaving the shoot per minute. The results were tabulated as shown below.

No. of bubbles per minute	0	9	16	22	28	31	32	32	32
Light intensity (arbitrary units)	0	1	2	3	4	5	6	7	8

- (a) On the grid below, draw the graph of the number of bubbles produced per minute against light intensity. (6 marks)



- (b) State how the identity of the gas produced can be determined in the laboratory. (1 mark)

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- (c) Name the apparatus used for measuring light intensity. (1 mark)
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- (d) Why was it necessary to get the shoot from an aquatic plant? (1 mark)
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- (e) Account for the number of bubbles produced between the following units of light intensities. (3 marks)
- (i) 0–6
-
-
- (ii) 6–8 (3 marks)
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- (f) State **two** modifications one would make on the experimental set up to increase the rate of gas bubble production. (2 marks)
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- (g) Explain the limitations of using gas bubbles to determine the rate of photosynthesis. (2 marks)
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- (h) With a reason, predict the number of bubbles that would have been produced at 15 units of light intensity. (1 mark)
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7. (a) Describe how plants eliminate waste products. (8 marks)
- (b) Describe the structure and function of the mammalian nephron. (12 marks)
8. (a) Describe **five** tropic responses in plants and their survival values. (15 marks)
- (b) Describe how the mammalian heart beat is controlled. (5 marks)

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