

Write your Examination Number here

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AN ROINN OIDEACHAIS

LEAVING CERTIFICATE EXAMINATION, 1980

BIOLOGY—HIGHER LEVEL

TUESDAY, 17 JUNE—MORNING, 9.30 to 12.30

Answer six questions from Part I and four questions from Part II.

You should not spend more than 45 minutes on Part I, leaving about 135 minutes for Part II.

PART I (120 marks)

Answer six questions. Each question carries 20 marks.

Write your answers in the spaces provided. Keep your answers short.

Write your examination number at top.

Be sure to return this Part of the examination paper; enclose it in the answer-book you use for answering Part II.

1. Answer five of the following.

- (a) Deamination of proteins takes place in the.....
- (b) Waves of muscular contraction along the alimentary canal are called
- (c) Proteins always contain the elements carbon, hydrogen, oxygen and
- (d) The vitamin required for blood clotting is
- (e) Mammalian muscles are attached to bones by
- (f) A fertilized ovum is called a.....

2. (i) In the diagram of the heart (shown below) name the parts A, B and C.

A.....

B.....

C.....

(ii) Place an X on the diagram to indicate the position of a semi-lunar valve.

(iii) What is the function of semi-lunar valves?

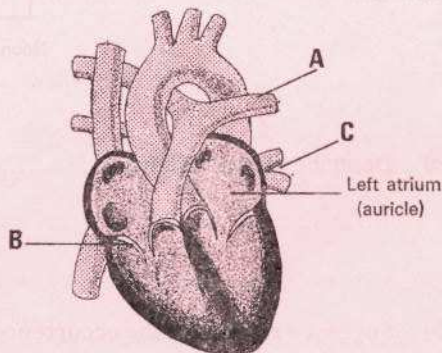
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(iv) What type of muscle do you find in the wall of the heart?

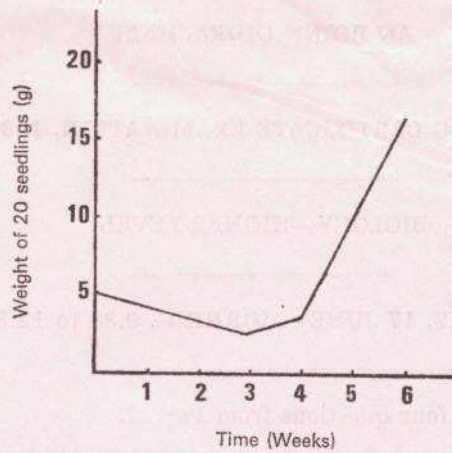
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(v) Why are the walls of the ventricles more muscular than the walls of the atria (auricles)?

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3. Two hundred pea seeds were planted in a greenhouse. Each week twenty seedlings were removed and using a standard procedure were weighed. The results obtained are shown in the graph.



(i) What was the standard procedure used before weighing?

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(ii) Why were twenty seedlings weighed each week instead of single seeds?

.....

(iii) What process occurring in the seedlings in the first three weeks would account for the loss in weight?

.....

(iv) What process occurred in the seedlings after the first four weeks?

.....

(v) List three factors necessary for germination.

(a)..... (b).....

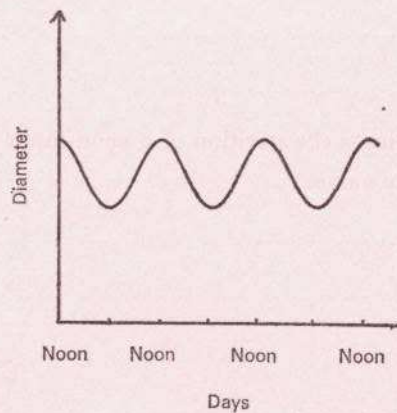
(c).....

4. (i) What is meant by the term guttation?

.....

.....

(ii) The graph below shows the daily variation in the diameter of a Monterey Pine tree.



(a) Describe the variations

.....

.....

(b) Suggest a reason for the occurrence of these variations

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.....

5. The diagram shows the reproductive system of the earthworm.

(a) To what phylum does the earthworm belong?

.....

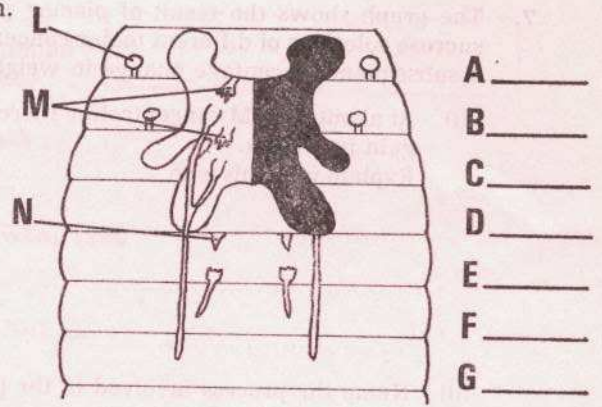
(b) Give two reasons for classifying the earthworm in this phylum.

.....

.....

(c) Number the segments A to G in the diagram.

(d) Label L, M and N.



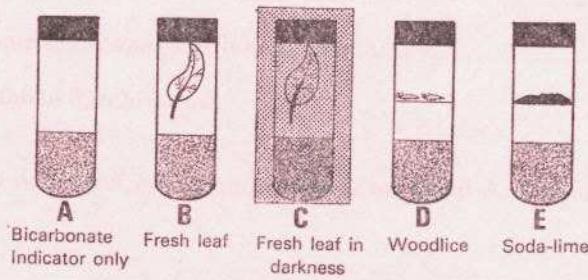
L M

N

(e) Give three reasons for earthworms being so important in agriculture.

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.....
.....

6. In an experiment to investigate gaseous exchange in organisms the following tubes were set up.



All of the tubes contained equal amounts of bicarbonate indicator. Tubes A, B, D and E were kept in light while tube C was in darkness. The indicator is yellow when neutral, green in alkaline solution and orange in acid.

(i) What colour would you expect in each tube after a few hours?

A B C

D E

(ii) What is the purpose of the soda-lime?

.....

(iii) What tube(s) have the highest pH at the end of the experiment?

.....

(iv) Explain what is happening in tube C.

.....

.....

(v) To what phylum does the woodlouse belong?

.....

7. The graph shows the result of placing plant tissues in sucrose solutions of different molar concentrations, with a subsequent percentage change in weight.

(i) At about 0.32 M concentration there was no loss or gain in weight. Explain why this is so.

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

(ii) Name the process involved in the gain or loss of weight by the tissues.

.....

(iii) What is the term used to describe the condition of the cells in 0.6 M conc. of sucrose solution?

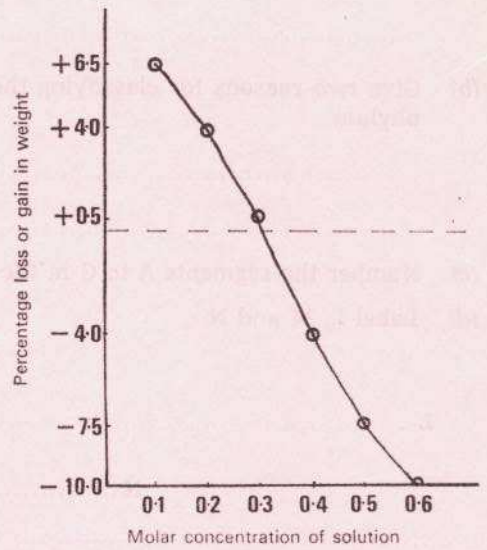
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(iv) Draw a labelled outline diagram of a cell in this condition.

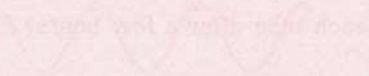
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(v) How would you restore these cells to normal?

.....



All of the experimental tubes showed a number of plasmolysed cells. The cells in the 0.1 M and 0.2 M were turgid and showed a yellowish color. The cells in the 0.3 M were turgid and showed a yellowish color. The cells in the 0.4 M were turgid and showed a yellowish color. The cells in the 0.5 M were turgid and showed a yellowish color. The cells in the 0.6 M were turgid and showed a yellowish color.



What color would you expect to see in each tube? (i) 0.1 M (ii) 0.2 M (iii) 0.3 M (iv) 0.4 M (v) 0.5 M (vi) 0.6 M

What is the purpose of the experiment? (i) To study the effect of sucrose concentration on the weight of plant tissues. (ii) To study the effect of sucrose concentration on the color of plant tissues. (iii) To study the effect of sucrose concentration on the turgidity of plant tissues.

What is the independent variable? Molar concentration of sucrose solution. What is the dependent variable? Percentage loss or gain in weight of plant tissues.

What is the control? The 0.3 M sucrose solution. Why is it a control? It is the concentration where there is no change in weight.

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Part I is on a separate sheet which provides spaces for your answers. The completed sheet should be enclosed in your answer-book.

PART II (280 marks)

Write your answers to this part in your answer-book.

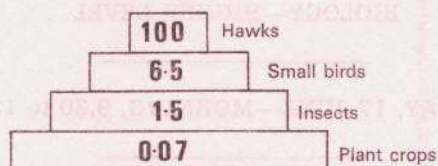
Answer four questions. Each question carries 70 marks.

8. (i) Compare and contrast, with the aid of diagrams, the vegetative structures and life cycles of *Spirogyra* and *Fucus vesiculosus*.
 (ii) Describe, with the aid of diagrams, reproduction in *Fucus vesiculosus*.
 (iii) Explain how *Fucus vesiculosus* is adapted to its environment.
9. (i) Sketch the arrangement of the chromosomes of a plant cell with a diploid number of six (a) at early anaphase of mitosis and (b) at early anaphase of a first meiotic division.
 (ii) Outline the significance of the differences between the above stages.
 (iii) In the snapdragon plant the narrow leaf character is recessive to broad leaf. A scientist had three broad leaved plants X, Y and Z. He crossed X and Y and got 32 broad leaved plants. Crossing X and Z yielded 9 narrow leaved plants and 28 broad leaved plants. When he crossed Y and Z he got 27 broad leaved plants.
 Explain, giving reasons, the genotypes and phenotypes you would expect when the plants X, Y and Z are crossed with narrow leaved plants.
10. (i) Distinguish between excretion and egestion in mammals, name the organs involved and state what the waste products are.
 (ii) Describe, with the aid of diagrams, how excretion takes place in the mammal.
 (iii) The following table shows the composition of plasma, glomerular filtrate and urine of the human, in respect of certain components. Comment fully on these compositions.

Component	Plasma g/100cm ³	Glomerular filtrate g/100cm ³	Urine g/100cm ³
Urea	0.03	0.03	2.00
Uric Acid	0.004	0.004	0.05
Glucose	0.10	0.10	0.00
Amino Acids	0.05	0.05	0.00
Salts	0.72	0.72	1.50
Proteins	8.00	0.00	0.00

11. (i) Describe an experiment to show the effects of antibiotics on bacteria.
 (ii) Show how knowledge of the life cycle and physiology of a named plant parasite and its host can lead to the development of effective methods of controlling the parasite.

12. (a) List the constituents of a fertile soil and outline their importance to plant life.
- (b) What is meant by edaphic factors in ecology?
From a named habitat that you have studied give examples to show (i) how an edaphic factor affects the distribution of a plant species; (ii) how plants may affect the distribution of animals and (iii) how animals may affect the distribution of plants.
- (c)



In the pyramid of numbers above the figures show (in parts per million) the D.D.T. present at each trophic level.

- (i) At which of the trophic levels would D.D.T. be most effective in fulfilling the purpose for which it was intended?
- (ii) What conclusions can you draw from the data?
13. The effect of temperature on the rates (a) of apparent photosynthesis (net CO_2 uptake in light) and (b) respiration (CO_2 produced in the dark) was determined. The results expressed as milligrams of CO_2 taken up and released, per gram dry weight of leaf per hour are given below.

Temperature	$^{\circ}\text{C}$	7	10	15	19	22	28	31
Uptake (apparent photosynthesis)	$\text{mgCO}_2/\text{g/h}$	1.3	2.3	2.8	3.1	2.8	2.5	1.8
Release (respiration)	$\text{mgCO}_2/\text{g/h}$	0.3	0.6	0.7	1.2	1.8	2.1	2.7

- (i) Calculate the rates of true photosynthesis at each temperature, assuming that the rate of respiration in light is equal to rate of respiration in dark.
- (ii) Plot on a graph the results for apparent photosynthesis, true photosynthesis and respiration.
- (iii) Explain the relationship between true photosynthesis and temperature.
14. (a) Discuss the storage of energy in living cells.
- (b) An experiment was carried out to investigate the effect of varying the concentration of substrate in the enzymatic hydrolysis of ATP. The concentration of enzyme (ATP'ase) was kept constant at each substrate concentration investigated.
The table below shows the results obtained.

Conc. of substrate A.T.P. (millimoles/ dm^3)	Rate of hydrolysis (micromoles/ dm^3/s)
0.01	0.06
0.02	0.09
0.04	0.15
0.08	0.18
0.17	0.19
0.25	0.19

- (i) Plot these results on a graph.
- (ii) What is the relationship between substrate concentration and rate of reaction?
- (iii) Suggest a hypothesis to explain this relationship.
- (iv) Would the relationship be similar for every enzyme controlled reaction?
- (v) List the other factors that affect the rate of enzyme controlled reactions.
15. (i) What is meant by the term geotropism?
Explain how this process occurs physiologically.
- (ii) Give a brief description of the following sensory functions in Man, relating each to the structure of the organ involved.
- (a) Detection of angular inclination of the head.
- (b) Detection of sound waves by the inner ear.
- (iii) Describe an experiment to illustrate binocular vision in humans.