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AN ROINN OIDEACHAIS

LEAVING CERTIFICATE EXAMINATION, 1973

BIOLOGY — HIGHER LEVEL

MONDAY, 18 JUNE—AFTERNOON, 2 to 4.45

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 120 minutes for Part II.

PART I (120 marks)

Answer any six of the questions (1-7). Each question carries 20 marks. Write your answers in the spaces provided below. Keep your answers short. Write your examination number at top.

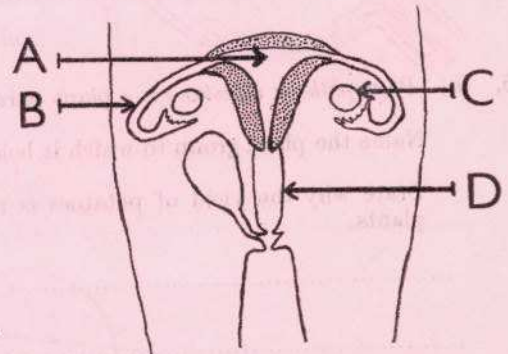
Be sure to return the examination paper: enclose it in the answer-book you use for answering Part II.

- 1. (a) Name a vitamin required for bone growth. ....
- (b) In what form are proteins absorbed following digestion? ....
- (c) Where are companion cells to be found in a plant? ....
- (d) What is a spontaneous inheritable change in the structure of a gene called? ....
- (e) Name one major tissue produced by the chordate embryonic ectoderm. ....

2. When may fertilization be considered to be completed? .....

Name the parts A, B, C and D.

- A.....
- B.....
- C.....
- D.....



Female reproductive organs (human)

Mark X on the region where sperm is liberated by the male. Mark Y on the region where fertilization normally takes place. Mark Z on the area where implantation of the embryo occurs.

3. An experiment on germination is shown in the diagram.

What hypothesis is being tested?

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The surfaces of the seeds and the inside of the flask were sterilised before the experiment. Suggest a reason for this.

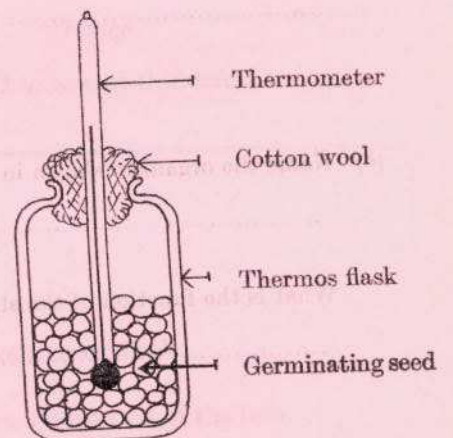
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What control would you use in this experiment?

.....

What event in the process of germination corresponds to digestion in animals?

.....



4. (a) Name the tissue shown in vertical section.

.....

Give two reasons for your answer.

(i) .....

(ii) .....



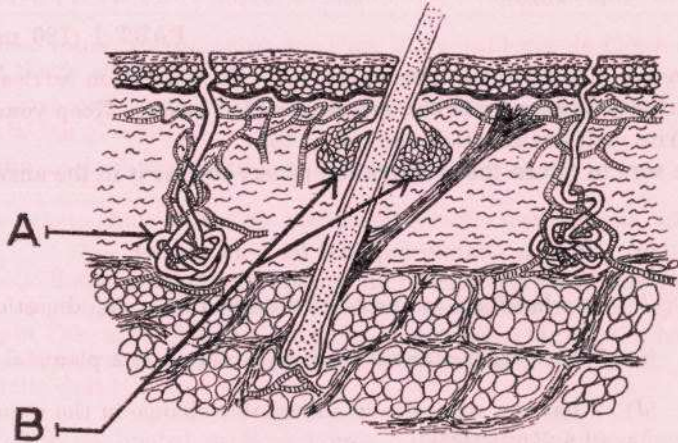
(b) Name the mammalian tissue shown in vertical section.

.....

Name the parts labelled A, B.

A.....

B.....



Give one function for each of the structures labelled.

A.....

B.....

5. (a) *Phytophthora infestans* is a plant parasite.

Name the plant group to which it belongs. ....

State why the yield of potatoes is reduced by the presence of the parasite in the aerial parts of the plants.

.....

.....

Explain why farmers are advised not to harvest potatoes until the aerial parts are dead.

.....

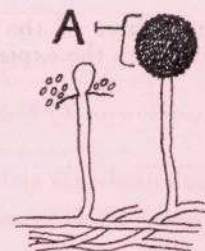
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(b) Name the organism shown in the diagram.

.....

What is the function of the structure marked A?

.....



6. Feulgen solution is used to test for the presence of DNA in tissues. It stains DNA a bright purple colour. After some young roots had been left in Feulgen solution one region in each root was found to be much more densely stained than the remainder.

- (i) Indicate on the diagram of a root the region you would expect to be most densely stained.
- (ii) Give a reason for your choice of region.

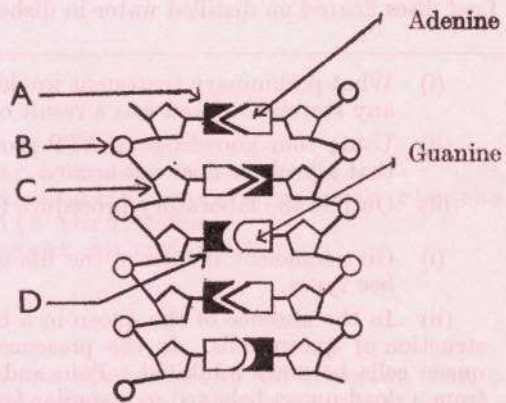


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 .....

The diagram below represents a portion of the DNA molecule.

Name the parts labelled A, B, C, D.

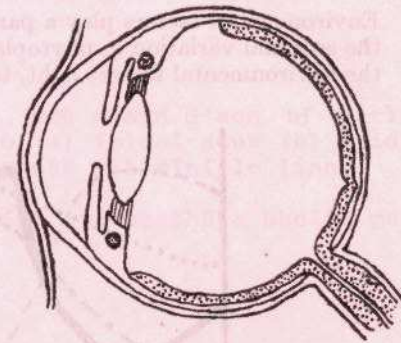
- A.....
- B.....
- C.....
- D.....



7. Insert the letters X and Y in the diagram of the eye to show the ciliary muscle (X) and the suspensory ligament (Y).

State the function of the ciliary muscle.

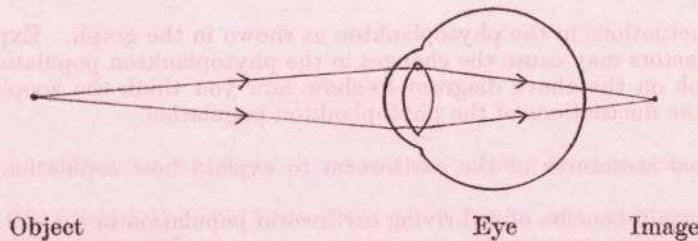
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If the eye is first focused on a near object how is the shape of the lens affected if it is then focused on a more distant object?

.....  
 .....

What defect of eyesight is represented in the diagram below? .....



Draw on the diagram, in the appropriate place, the type of lens used to correct this defect.

**PART II (280 marks)**

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

Answer any **four** questions. Each question carries 70 marks.

**When you have finished be sure to enclose the whole examination paper in your answer-book.**

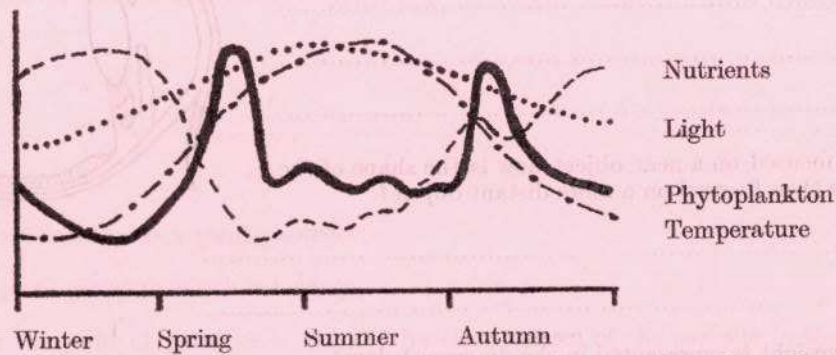
- 8. Outline, with the aid of diagrams, the life cycle of the moss and contrast it with that of the fern. State, with reasons, which of these plants is better adapted for life on land.
- 9. In the flour beetle, *Tribolium castaneum*, black eye (P) is dominant over pearl eye (p) and brown body (S) is dominant over sooty body (s). The genes governing these characters are located on different chromosomes. A black eyed brown bodied beetle, heterozygous for both genes, was crossed with a beetle with pearl eyes and sooty body. Describe the genetic constitution of the gametes formed and the genotypes and phenotypes of the progeny produced in this cross. Point out how this cross demonstrates the independent assortment of non-allelic genes. What types of progeny might be expected if the genes are linked?

10. The synthesis of starch from glucose requires ATP. In an experiment on the synthesis of starch by tobacco leaves 1 cm discs were cut from leaves. Some discs were exposed to bright light and some were kept in darkness for a period of 24 hours under different conditions A, B, C as described below. At the end of this period the discs were tested for the presence of starch and the following results obtained.

	Light	Dark
A. Leaf discs floated on glucose solution in dishes open to air.	starch present	starch present
B. Leaf discs sealed in glucose solution. (Leaf air spaces filled with glucose solution i.e. anaerobic conditions.)	starch present	starch absent
C. Leaf discs floated on distilled water in dishes open to air.	starch present	starch present

- (i) What preliminary treatment would you give the tobacco plant before this experiment to ensure that any starch observed was a result of the experimental conditions only?
  - (ii) Using your knowledge of ATP production explain the results obtained in this experiment. (Assume that glycolysis does not occur.)
  - (iii) Outline the laboratory procedure for testing leaves for starch.
11. (i) Give sufficient details of the life cycle of the bee to explain the production of worker and queen bee types.
- (ii) In the absence of the queen in a bee colony, worker bees develop their ovaries and begin the construction of queen cells. In the presence of their queen the ovaries shrink and the construction of the queen cells becomes inhibited. Pain and Chauvin showed that workers exposed to an alcoholic extract from a dead queen behaved in a similar fashion as in the presence of a live queen.
- What do the above observations suggest to you?

12. Environmental factors play a part in determining the size of populations in ecosystems. The graphs show the seasonal variation in phytoplankton that is observed in fresh water lakes and the seasonal variations in the environmental factors light, temperature and nutrients.



[after Odum: Fundamentals of Ecology]

Describe the fluctuations in the phytoplankton as shown in the graph. Explain how the variations in the environmental factors may cause the changes in the phytoplankton population.

Draw in a graph on the above diagram to show how you think the zooplankton population should vary in relation to the fluctuations of the phytoplankton population.

13. Describe the external structures of the earthworm to explain how copulation and cocoon formation is achieved.
- Summarize the main benefits of a thriving earthworm population in the soil.
- Outline one laboratory experiment you could carry out to show some of the effects of earthworms.
14. In an experiment some human red blood cells were placed in each of the following:—  
distilled water, 1% salt solution, 3% salt solution. The table shows the results.

distilled water	1% salt	3% salt
cells burst	cells normal	cells shrivelled

- (i) What do these results suggest about the salt concentration of the blood plasma in the body of man?
  - (ii) Explain, with reference to the experimental results above, what is meant by semipermeable membrane, osmosis and plasmolysis.
  - (iii) The red blood cells of a camel can tolerate salt concentrations up to at least 8% without damage. What benefit is this to the camel?
  - (iv) Why do blood cells burst and plant cells not burst when placed in distilled water?
15. Compare the composition and functions of blood and lymph in the mammal.
- Describe briefly the clotting mechanism of blood.
- Outline the part played by the blood system in the control of body temperature.