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LEAVING CERTIFICATE EXAMINATION, 1989

BIOLOGY — HIGHER LEVEL

WEDNESDAY, 14 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.

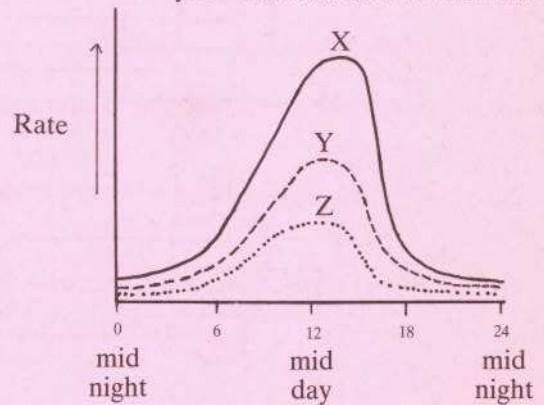
Write your examination number at top.

**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) Name a group of organisms that have compound eyes. ....
- (b) The mineral essential for blood clotting is .....
- (c) Food is moved through the intestine by waves of muscular contractions known as .....
- (d) Fascicular cambium is located in the .....
- (e) Cobalt chloride is used to test for .....
- (f) Name an organism which shows alternation of generations in its life cycle .....

2. The graphs show the rate of transpiration in a plant over successive days during which the plant was not watered.



(i) Explain the low rate of transpiration recorded at midnight on the three days shown (X, Y, Z).

.....  
 .....

(ii) Explain the drop in the rate from X to Y to Z.

.....  
 .....

(iii) What control would you set up for this experiment?

.....

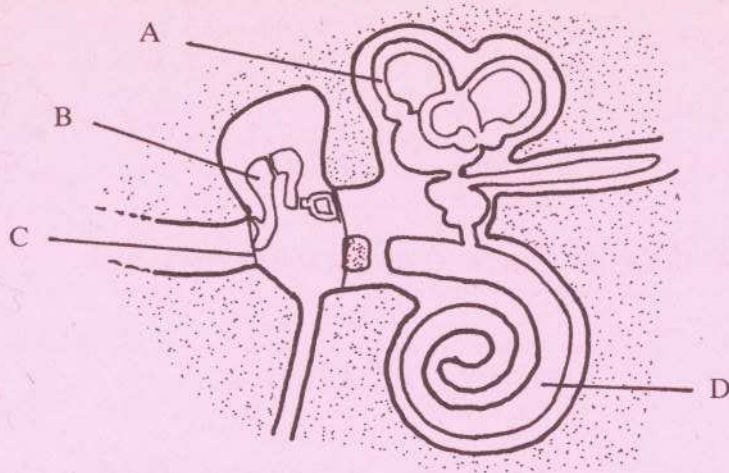
(iv) Name the apparatus you would use to measure the transpiration rate .....

(v) List three different environmental conditions which you would expect to cause a high rate of transpiration.

- (a) .....
- (b) .....
- (c) .....



3. The diagram shows the mammalian ear.



Draw the main trunk of the auditory nerve on the diagram.

Mark X on the diagram to show the location of the pinna.

Name the parts labelled.

A ..... B .....

C ..... D .....

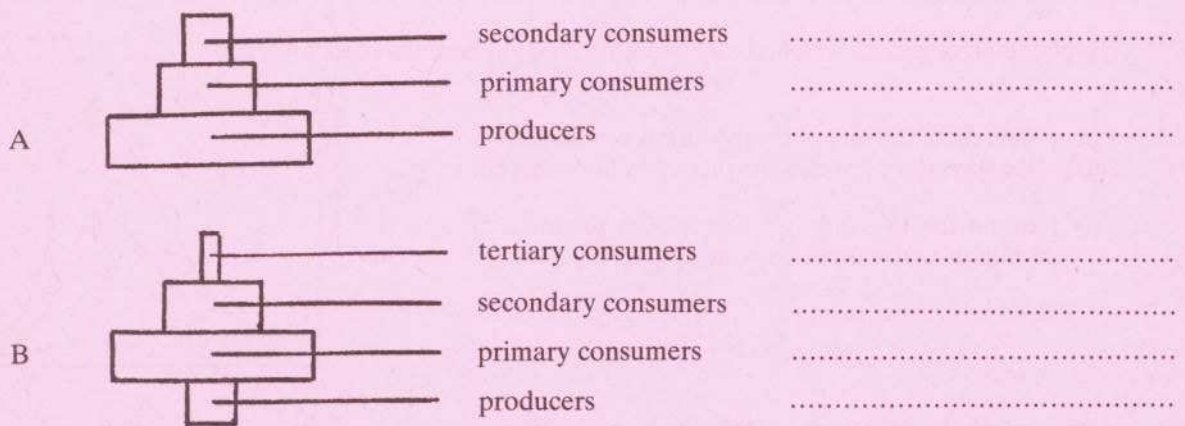
State the function of B.

.....  
 .....

What would be the likely effect of serious damage to A?

.....  
 .....

4. The diagrams A and B represent two pyramids of numbers. Give organisms from simple food chains or webs to illustrate each.



Why are there usually fewer than five steps in a pyramid of numbers?

.....  
 .....

Some environmental pollutants, for example some insecticides, accumulate in the tissues of organisms which have ingested them and may be excreted very slowly. Referring to the second pyramid of numbers above, which trophic level would eventually be likely to have the highest concentration?

.....

5. When a sample of urine was tested in the laboratory the following results were obtained.

Test 1 result: Blue litmus paper turned red.

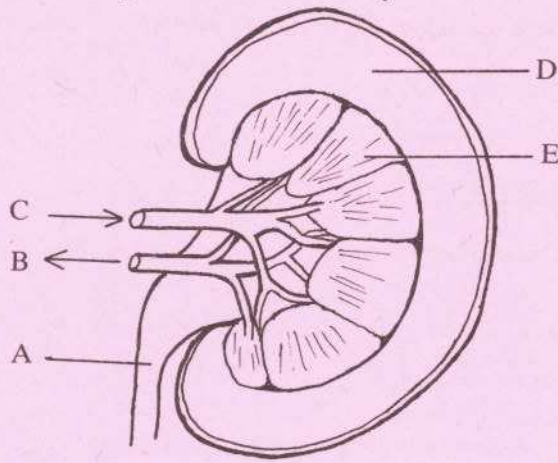
Test 2 result: A brick-red precipitate formed when the urine was boiled with Fehling's solutions A and B (or with Benedict's reagent).

What does each of these results indicate?

Test 1 .....

Test 2 .....

The diagram shows a section through a mammalian kidney.



Name the parts labelled. A ..... B .....

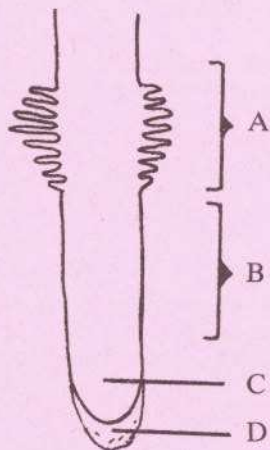
To what organ does A connect the kidney? .....

Use the letters on the diagram to identify each of the following regions:

- (i) Where most filtration takes place: .....
- (ii) Through which the urine is collected: .....

6. (i) The diagram represents part of a young root.

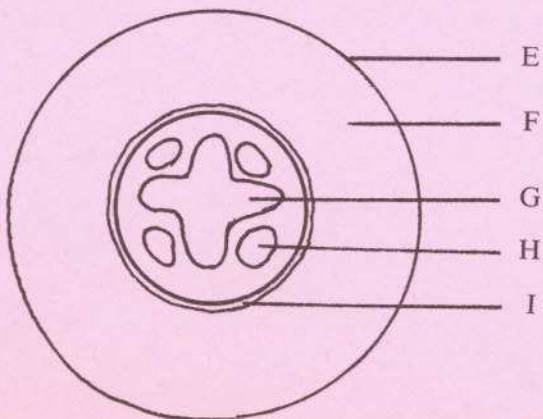
Name the regions of the root labelled A, B, C and D.



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

In which region would you expect to observe a bending response to a tropism? .....

(ii) On the transverse section of a root shown below name the tissues labelled E, F, G, H and I.



- E .....
- F .....
- G .....
- H .....
- I .....



7. (a) List three ways in which water is important to all living organisms.

(i) .....

(ii) .....

(iii) .....

(b) Give one characteristic deficiency symptom in humans for each of the following.

Iron .....

Vitamin D .....

(c) Name the metallic element in each of the following substances.

chlorophyll .....

haemoglobin .....

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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)

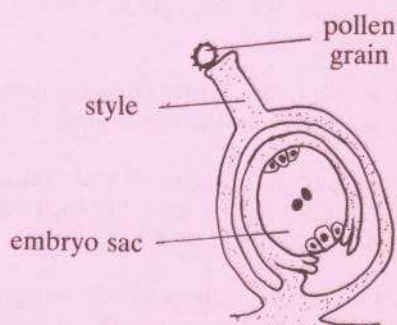
Write your answers to this part in your answer-book.

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

8. (a) Explain the terms (i) gamete, (ii) fertilization.

Name the process shown in the diagram with reference to the pollen grain and describe the events that next occur leading to the completion of fertilization.

Comment briefly on the statement: "A pollen grain is a gametophyte and not a gamete". (42)



- (b) Outline with the aid of simple labelled diagrams the development of the human fertilised egg up to the formation of the blastocyst. How does the blastocyst obtain its nutrition? (28)

9. Give details of how you would dissect an earthworm to show the reproductive region. (24)

Draw a large diagram to show the main structures in the reproductive segments and label the following: the seminal vesicles, the spermathecae, ovary, sperm duct. (21)

What are the main effects of earthworms on the soil? Outline an experiment to demonstrate some of these effects. (25)

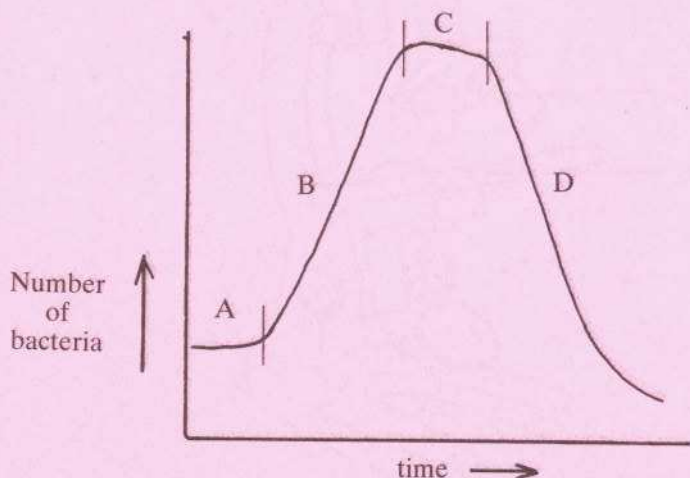
10. (a) Name three different types of food material rich in protein. Outline a laboratory test for the presence of protein in food.

Describe the digestion of protein and absorption of the products in the mammalian intestine. (37)

- (b) Describe fully an experiment to demonstrate that the rate of enzyme action varies with substrate concentration. (33)

11. (a) (i) Describe, giving full details of the practical procedures involved, how you would demonstrate the presence of bacteria and fungi in the air. (24)

(ii) The graph shows the growth of bacteria in a culture on a nutrient medium.



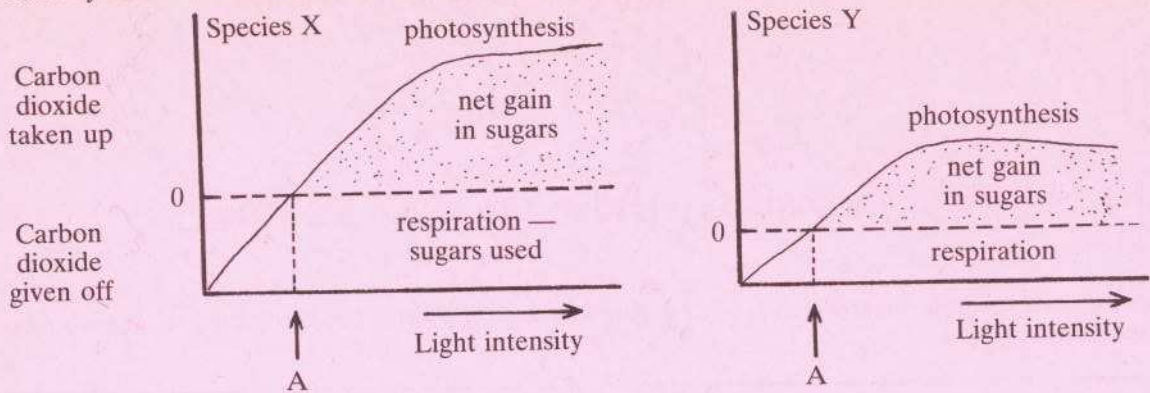
Outline the change in numbers of bacteria in each of the stages of growth, A, B, C and D, of the culture as shown on the graph. Suggest an explanation for the change in each case. (28)

- (b) Give a short account of the beneficial and harmful effects of micro-organisms. (18)



12. (i) Describe an experiment to show that carbon dioxide is necessary for photosynthesis. (30)

(ii) The graphs show the relationship between light intensity and the production and utilisation of carbohydrates in two different species of plants. The scales used in the two graphs are the same.



What term is used to describe the level of light intensity at the points marked A? Briefly explain the meaning of this term.

State with reasons which of the two species you would expect to find in a shaded habitat e.g. growing under the trees in a woodland.

Suggest why the rate of photosynthesis levels off after a certain light intensity is reached. (40)

13. (a) Explain the terms (i) succession, (ii) climax as used in ecology. Comment briefly on the role of succession in the development of the climax community in an ecosystem. (25)

(b) Design an experiment to examine the effect of a selective weed killer (supplied to you in liquid form together with a watering can) on the dicotyledonous weeds growing in a grass lawn, giving details of any techniques you would use. (24)

(c) Outline the nitrogen cycle and give one reason why the application of excessive nitrogenous fertilizers to farmland can cause the pollution of adjacent streams and lakes. (21)

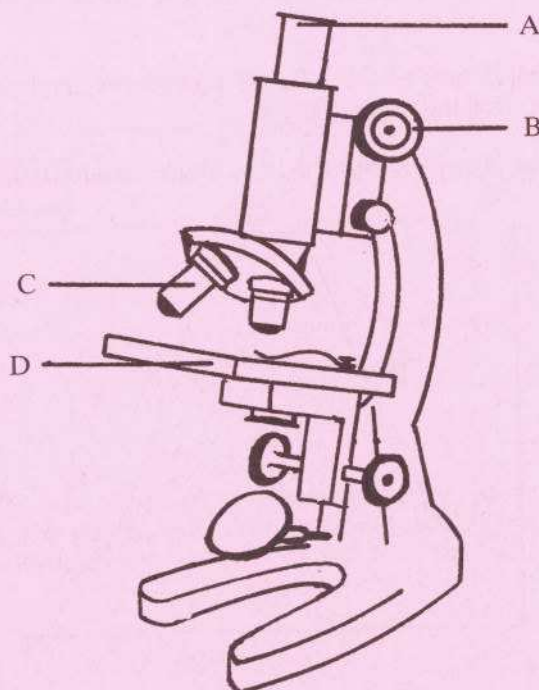
14. (a) Explain each of the following (i) allele, (ii) genotype, (iii) chiasma, (iv) incomplete dominance.

Give a large drawing of a cell nucleus with two pairs of chromosomes, each pair of homologous chromosomes to be visibly distinguishable from the other pair. Indicate on the chromosomes the alleles A/a and R/r so that the nucleus is heterozygous for both genes and the genes are not linked. (35)

(b) Explain what is meant by evolution and list three sources of evidence for evolution. Outline how the theory of evolution is supported by an example from any *one* of the sources of evidence you mention. (35)

15. Answer *two* of the following. (35, 35)

(a) Name the parts labelled on the outline diagram of a microscope.



You are given some sections of plant tissue in a dish of water. Outline how you would prepare a temporary microscope slide of the sections for examination with the microscope.

Give the correct procedure for examination of the sections under the high power.

(b) Name three methods of vegetative reproduction.

Describe with the aid of a diagram how a named flowering plant reproduces vegetatively.

State the genetic relationship between the parent plant and the vegetatively produced offspring and give the advantages to the species of this method of reproduction.

(c) Describe with the aid of a labelled diagram the external structure and outline the life cycle of one of the following: *Fucus* or *Fasciola hepatica*.

(d) Define (i) diffusion, (ii) osmosis, (iii) active transport.

Describe how you would carry out an experiment to demonstrate plasmolysis in a plant tissue such as onion epidermis.

Why do red blood cells burst and plant cells not burst when placed in distilled water?