

Write your Examination Number here

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AN ROINN OIDEACHAIS

LEAVING CERTIFICATE EXAMINATION, 1988

0035006

BIOLOGY—HIGHER LEVEL

WEDNESDAY, 15 JUNE—MORNING, 9.30 to 12.30

Answer six questions from Part I and four 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 the following by placing a tick (✓) in the appropriate box.
 - (i) The cellular organelle most closely associated with the translation of messenger RNA during protein synthesis is the
mitochondrion ribosome lysosome chloroplast
 - (ii) Clotting of blood requires
vitamin K vitamin C vitamin A vitamin E
 - (iii) The middle ear contains
lymph air water extra-cellular fluid
 - (iv) A positive Biuret test indicates the presence of
fat protein vitamin C carbohydrate
 - (v) The number of incisor teeth in the human is
2 4 6 8

2. On what day is ovulation likely to occur in a normal 28 day menstrual cycle in the human female?

.....

What is a Graafian follicle?

.....

State two functions of the hormone progesterone.

(i)

(ii)

What is the function of the seminal vesicles in the male?

.....

What is meant by implantation in relation to the fertilised egg?

.....

.....

3. In the space provided draw a diagram to show the structure of *Rhizopus*.

Label the following: rhizoids, sporangium, stolon.

Give one function for each of these parts.

Rhizoids:

.....

Sporangium:

.....

Stolon:

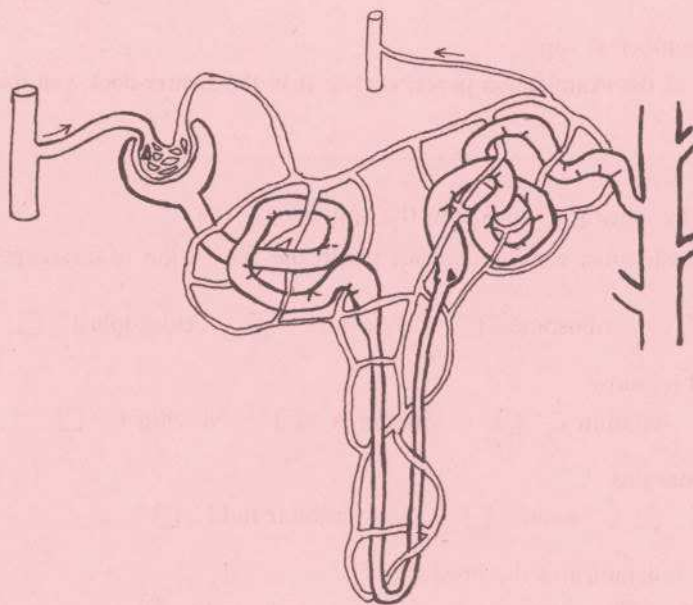
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Give two examples of micro-organisms used in industrial processes.

(i)

(ii)

4. On the diagram of the nephron label the following parts: glomerulus, loop of Henle, collecting duct, proximal convoluted tubule, afferent arteriole.



From what food material is urea produced?

Where in the body is urea produced?

Give a function of the kidney other than excretion

What effect would a very hot day (with no extra fluids taken) have on the volume and concentration of urine?

.....

5. (a) The apparatus shown in the diagram was set up to investigate gas exchange during aerobic respiration at a constant temperature.

State the function of the soda lime.

.....

What would you expect to observe in relation to the position of the marker drop during the experiment?

.....

.....

- Why was the apparatus kept at a constant temperature?

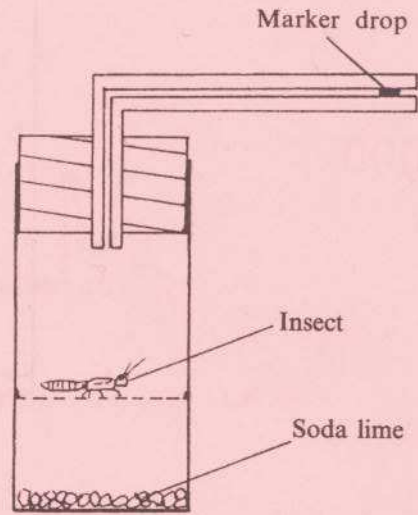
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What control should be used in this experiment?

.....

.....



- (b) State where each of the following occurs in the cell.

Glycolysis

Krebs cycle

What is the final chemical product of glycolysis?

.....

In anaerobic respiration what happens to this final product of glycolysis

(i) in active muscle?

(ii) in plants?

6. The diagrams show an insect and part of a dissected earthworm. Name the parts labelled.

A

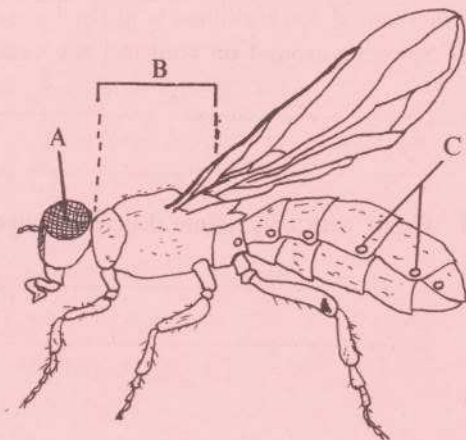
B

C

D

E

F



State the function of C.

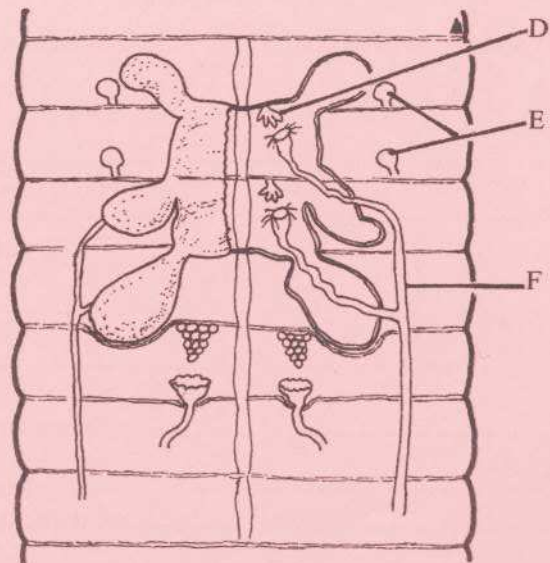
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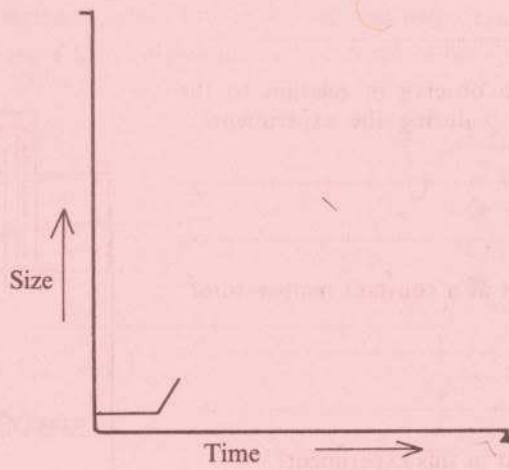
Why is there no need for an earthworm to undergo ecdysis?

.....

.....



Complete the graph to show the growth of an insect which grows by incomplete metamorphosis e.g. cockroach.



7. Give a biological explanation for each of the following:

(a) Draining land to control liverfluke.

.....
.....

(b) Taking bread soda (sodium hydrogen carbonate) to relieve heartburn or indigestion.

.....
.....

(c) Preventing silage effluent entering rivers.

.....
.....

(d) Spinning around on your feet can cause dizziness.

.....
.....

(e) Plants with magnesium deficiency have yellow leaves.

.....
.....

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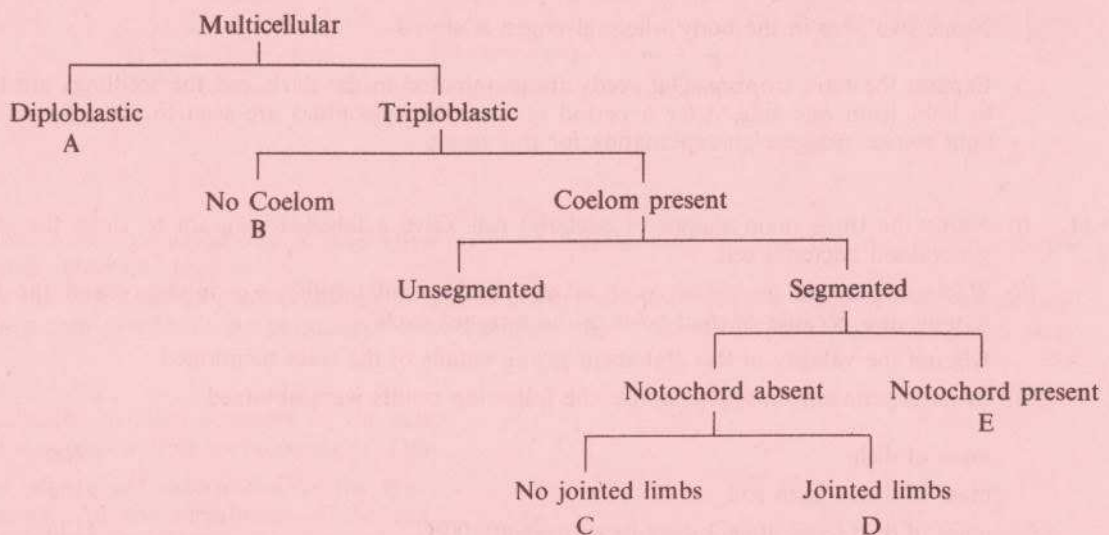
Part I is on a separate sheet which provides spaces for your answers. The completed sheet should be enclosed in your answer-book.

PART II (280 marks)

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

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

8. (a) *Amoeba* and *Spirogyra* are two 'simple' organisms.
- Name the phylum to which each organism belongs.
 - One of the major differences between these two organisms is their mode of nutrition. State the type of nutrition in each case and outline how *Amoeba* obtains its food.
 - Apart from the difference mentioned above state the reason why one can be classified as an animal and the other as a plant.
 - Why are they known as 'simple' organisms?
 - Outline how the contractile vacuole in *Amoeba* works and state why it is necessary. Explain why *Spirogyra* does not need a contractile vacuole.
- (45)
- (b) Distinguish between diploblastic and triploblastic. Name the animal phyla A, B, C, D, E on the chart below.



(25)

9. Define the term enzyme and write brief explanatory notes on each of the following: active site of enzyme, co-enzyme, denatured enzyme. (28)

Catalase is an enzyme that catalyses the breakdown of hydrogen peroxide resulting in the release of oxygen gas. The table shows the results of an experiment in which catalase was added to hydrogen peroxide at different pH values and the time taken to collect 10cm³ of the gas produced was recorded.

pH of solution	4	5	6	7	8
Time (minutes)	18	10	8	13.5	16

Draw a graph to show these results.

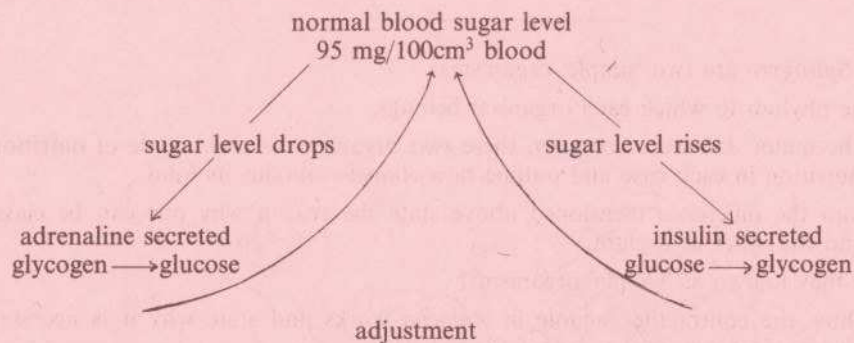
Describe the effect of pH on the activity of the enzyme.

State the factors that should be kept constant during the experiment and say how you would keep each one constant.

What test would you carry out to demonstrate that the gas released in this experiment was oxygen. (42)

10. (a) Explain each of the following terms: hormone, endocrine gland. Name and give the location of the mammalian endocrine glands that secrete (i) adrenaline, (ii) insulin. (18)

(b) The diagram shows, in part, how variations in blood sugar level are continuously monitored and adjusted by the body in order to prevent large variations that could damage or kill living cells.



From the diagram suggest what would happen if a person was deficient in insulin.

State how you would expect the level of blood sugar to be affected by each of the following: (i) digestion of carbohydrate, (ii) running.

Name two sites in the body where glycogen is stored. (24)

- (c) Explain the term tropism. Oat seeds are germinated in the dark and the seedlings are then exposed to light from one side. After a period of time the coleoptiles are seen to have grown towards the light source. Suggest an explanation for this result. (28)

11. (i) Name the three main shapes of bacterial cell. Give a labelled diagram to show the structure of a generalised bacterial cell. (25)

(ii) 'Bacteria play an important part in maintaining soil fertility, e.g. in decay and the formation of humus, and because of their roles in the nitrogen cycle'.

Discuss the validity of this statement giving details of the roles mentioned. (27)

- (iii) In an experiment on a soil sample the following results were obtained.

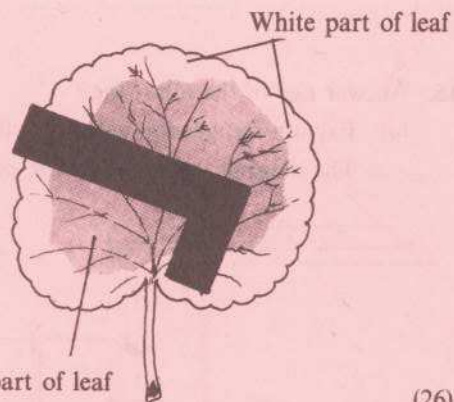
mass of dish	45g
mass of dish + fresh soil	210g
mass of dish + soil after 3 days in an oven at 100°C	112g
mass of dish + soil after being heated strongly over a Bunsen burner for	
(i) 10 minutes	88g
(ii) 20 minutes	80g
(iii) 30 minutes	80g

From these results calculate

- (i) the percentage (%) water in the original fresh soil sample;
(ii) the percentage humus in the original fresh soil sample.

Why was heating over the Bunsen burner continued until two readings were of the same value? (18)

12. A potted plant with variegated leaves was left in darkness for 48 hours. Then one leaf, still attached to the plant, had tin foil attached to it (the foil was an L-shape as shown). After 8 hours exposure to sunlight the leaf was removed from the plant and tested for starch.



- (i) Outline the *four* main steps in the correct order, that you would take to test the leaf for starch. Give a reason for each step.

Why was the plant kept in darkness before the experiment was started?

(26)

- (ii) Copy the diagram of the leaf and state the colours of the different areas *after* the starch test was completed.

What conclusions can you draw from this experiment? Why was it unnecessary to test another leaf as a control after the period of exposure to light?

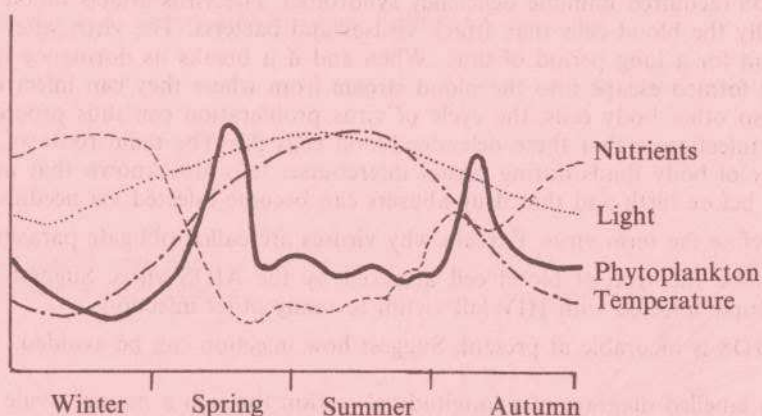
From where did the carbon atoms in the starch formed in the leaf come? (24)

- (iii) Not all of the sugar formed in the leaf during photosynthesis is converted into starch. State one other possible fate of sugar molecules formed during the process.

Outline the importance of photosynthesis (a) to a green plant and (b) to all living organisms. (20)

13. (i) Define each of the following ecological terms: colonization, succession, competition and climax. Outline how colonization and competition play an important part in succession. (40)

- (ii) The diagram shows the seasonal variation in the amount of phytoplankton observed in freshwater lakes and the seasonal variation in the environmental factors light, temperature, and nutrients, during a year.



[after Odum: Fundamentals of Ecology]

Outline how the variations in the environmental factors might cause the fluctuations in the phytoplankton numbers.

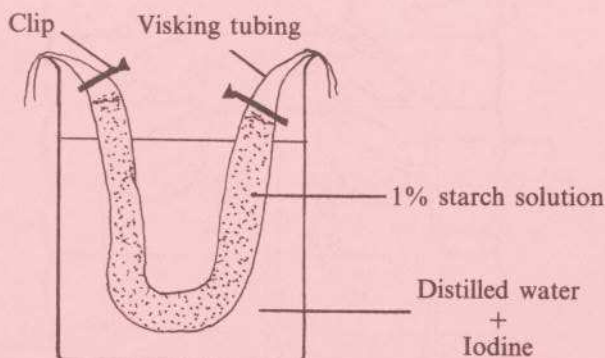
Copy the graph of the phytoplankton into your answerbook and draw a graph (on the same axes) to show how you think the population of zooplankton that feed on the phytoplankton should vary. (30)

14. (i) Describe the detailed structure of the cell membrane and outline its functions. (26)

- (ii) Blood groups are determined by the type of antigen on the membrane of the red blood corpuscles. Name the four blood groups and state which antigen is present on the membrane of the red blood corpuscles of each group.

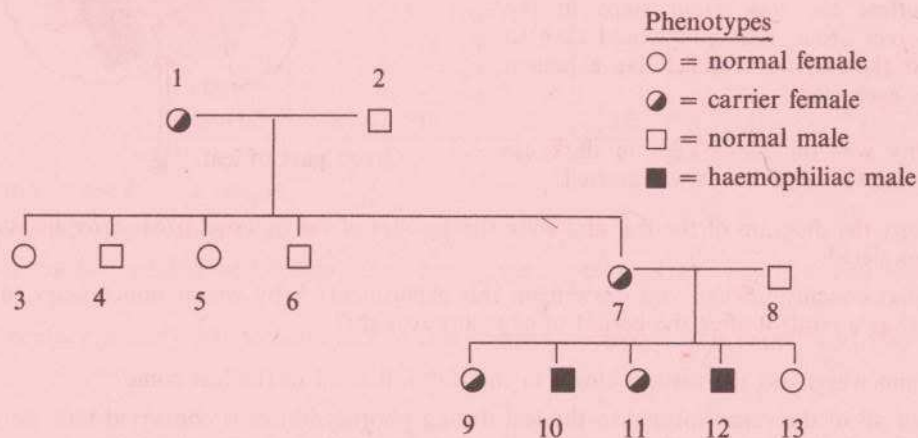
In relation to blood donations what is meant by universal donor and universal recipient? Refer in your explanation to antigen/antibody reactions. (24)

- (iii) Some visking tubing (semi-permeable) containing 1% starch solution was set up as shown in a solution of distilled water and iodine. It was left for 15 minutes. State any changes you would expect to see and give reasons for your answer. (20)



- (a) Explain the genetic terms: (i) allele, (ii) sex linkage, (iii) heterozygous.

The diagram below show the pedigree for the incidence of haemophilia in a family.



Give the genotypes of persons 7 and 8. Could this couple have a normal male child? Explain your answer.

If person 10 married a normal female and had only male children what proportion of these (if any) would be haemophiliac? Explain your answer.

- (b) Give two methods of defence the body may use against disease-causing organisms which manage to invade the tissues.

A virus called human immuno-deficiency virus (HIV) is believed to be the cause of a disease known as AIDS (acquired immune deficiency syndrome). The virus attacks blood cells which themselves are normally the blood cells that attack viruses and bacteria. The virus, after invading the cells, may lie dormant for a long period of time. When and if it breaks its dormancy it is replicated and the new viruses formed escape into the blood stream from where they can infect more of the same cell type and also other body cells, the cycle of virus proliferation can thus proceed. The most serious effect of the infection is that these defender blood cells die. The main route of initial infection is through transfer of body fluids during sexual intercourse. It is also known that mothers can pass it to their babies before birth and that drug-abusers can become infected via needles used.

- (i) Define the term virus. Explain why viruses are called obligate parasites.
- (ii) Name the type of blood cell attacked by the AIDS virus. Suggest an explanation as to why people infected with HIV fall victim to many other infections.
- (iii) AIDS is incurable at present. Suggest how infection can be avoided.

- (c) Give a labelled diagram of a longitudinal section through a mature ovule of a flowering plant. Outline what happens in the flower during fertilization.

- (d) Give a labelled diagram of a reflex arc and outline how it functions e.g. if you accidentally pricked your finger with a pin. Relate the following to the transmission of the nerve impulse: synapse, acetylcholine