

**WARNING: You must return this section with your answer book otherwise marks will be lost.**

Write Your  
Examination  
Number here

AN ROINN OIDEACHAIS  
LEAVING CERTIFICATE EXAMINATION, 1996

27538

**BIOLOGY — HIGHER LEVEL**

WEDNESDAY, 12 JUNE — AFTERNOON, 2.00 to 5.00

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 the following by placing a tick (✓) in the appropriate box.

(a) Deamination occurs in the

Liver

Kidney

Spleen

Stomach

(b) The sensory cells in the ear which detect sound are situated in the

Pinna

Cochlea

Eardrum

Ampullae

(c) Budding is a form of asexual reproduction used by

Bacteria

Yeast

*Rhizopus*

*Amoeba*

(d) Enlargement of the thyroid gland may result from a dietary deficiency of

Iron

Iodine

Magnesium

Sodium

(e) Flame cells are found in

Annelida

Arthropoda

Cordata

Platyhelminthes

2. Give a major function of each of the following.

(a) centriole.....

(b) mitochondrion.....

(c) cell membrane.....

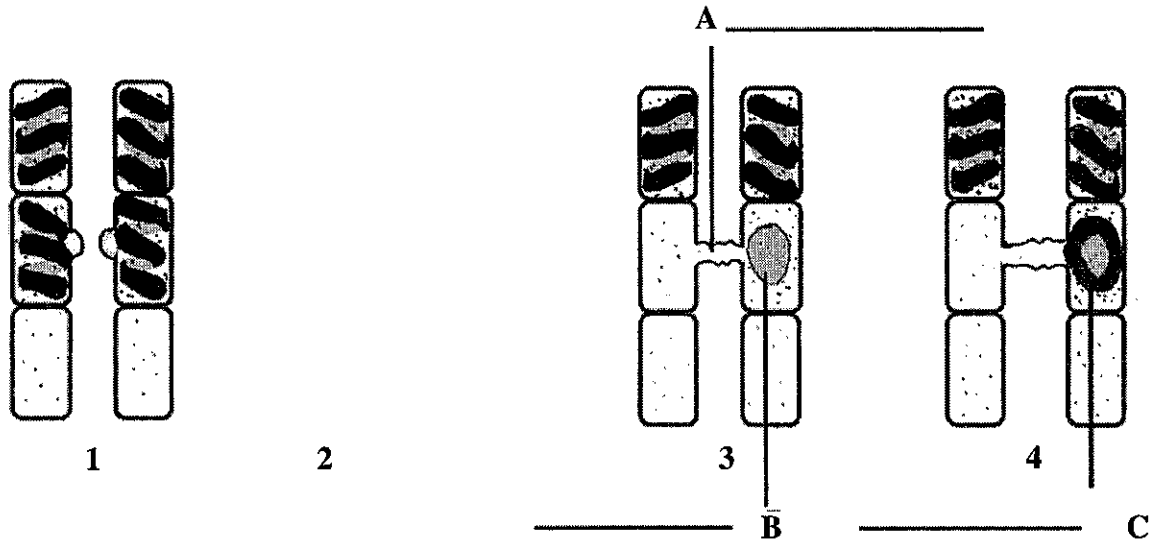
(d) leucoplast.....

(e) ribosome.....

(f) lysosome.....

(g) endoplasmic reticulum.....

3. The sequence of diagrams below shows some of the main stages of conjugation in *Spirogyra*.



(a) Complete the diagram sequence by drawing in stage 2.

(b) Name the parts labelled A, B and C.

(c) How does B develop into C?

.....

(d) The gametes in each of the filaments of *Spirogyra* are not visibly different from each other.

The term used to describe this is .....

(e) Under what environmental conditions is conjugation likely to commence in *Spirogyra*?

.....

(f) State one way in which structure C is of benefit to *Spirogyra*.

.....

(g) What is the typical habitat of *Spirogyra*?

.....

4. Vitamin A, amylase, protein, cellulose, glucose, starch, amino acid, vitamin C, sodium, vitamin D, calcium, magnesium, sucrose, pepsin, fat.

From the above list select an example to illustrate each of the following.

(a) A vitamin manufactured in human skin .....

(b) A product of the action of trypsin .....

(c) A structural carbohydrate .....

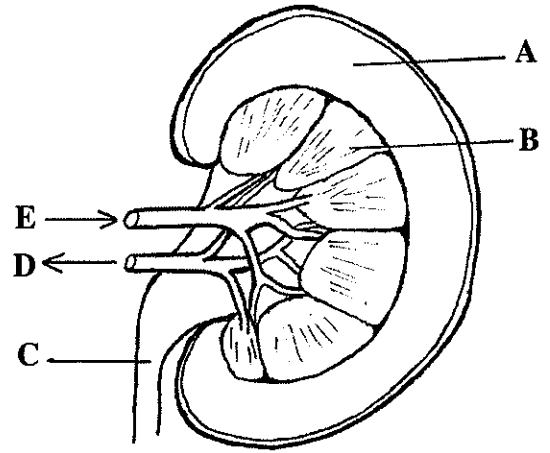
(d) A mineral involved in tooth structure .....

(e) A substrate for lipase .....

(f) A reducing sugar .....

(g) An enzyme that breaks down carbohydrate .....

5. The diagram shows a human kidney in vertical section.



(a) Name the parts labelled A, B, C.

A .....

B .....

C .....

(b) Place an X on the diagram where you would expect to find a Bowman's capsule.

(c) To which major blood vessel does E connect ? .....

(d) Part C joins the kidney to the .....

(e) Name a solid found in solution in C, D and E. ....

(f) State a function of the kidney other than excretion. ....

(g) State the location of the kidneys in the human body.

.....

6. Complete the following table.

Hormone	Site of Secretion	Function
	islets of Langerhans	
adrenaline	adrenal medulla	
F.S.H.		
oxytocin		

7. For each of the following distinguish clearly between the members of the pair of terms by writing a brief explanatory note on each term.

(a) Ecdysis and metamorphosis

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

(b) Lenticel and spiracle

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

(c) Hypha and mycelium

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

(d) Cerebellum and cerebrum

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

(e) Prothrombin and thrombin

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

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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.

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## PART II (280 marks)

Write your answers to this part in your answer book.

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

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8. Give an appropriately illustrated account of the liver fluke, *Fasciola hepatica*, making use of the following headings: external structure, life cycle. (45)

Give *three* features which are adaptations to the parasitic mode of life and state briefly the value of those features to the organism.

Name *two* effective measures used in controlling the parasite. (25)

9. (a) (i) Mendel formulated the Law of Segregation and the Law of Independent Assortment. State the meaning of each of these laws.

When does independent assortment *not* occur?

- (ii) Distinguish clearly between the products of mitosis and meiosis. (34)

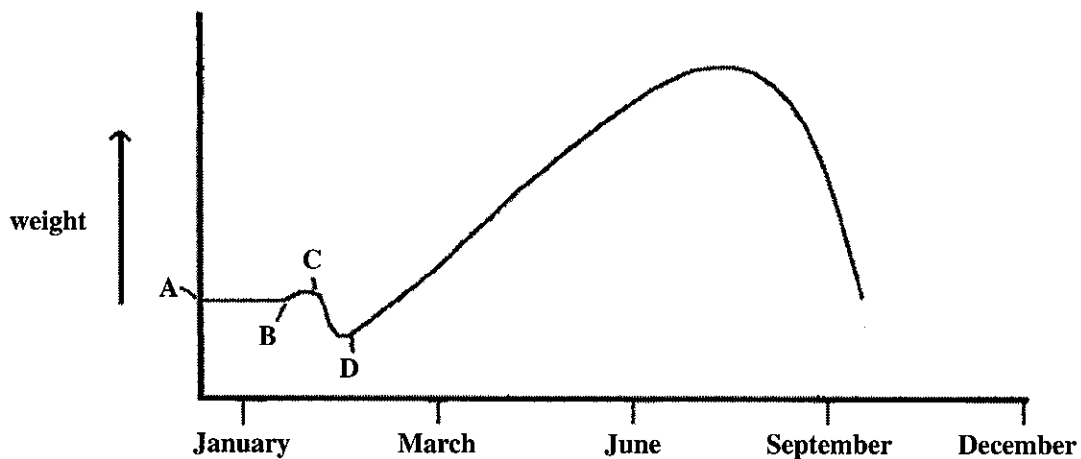
- (b) (i) Name the four bases present in DNA.

Name the type of substance which is combined with DNA to form chromosomes.

- (ii) Outline the procedure you would follow to show the presence of DNA in cell nuclei. (36)

10. (i) Give a large labelled outline diagram to show the contents of the thoracic cavity of a mammal. (21)
- (ii) Give a labelled diagram of an alveolus from a lung together with its blood supply.  
Outline how inhalation and exhalation occur during normal breathing (diagrams not required). (28)
- (iii) Describe an experiment which you would carry out to determine the relationship between exercise level and the rate of breathing and comment briefly on the results you would expect. (21)
11. (a) (i) Distinguish between annual and perennial plants and give a named example of each type.
- (ii) Give a simple labelled diagram to show the internal structure of a named seed.
- (iii) State three ways in which seeds are dispersed and, in each case, name a plant which employs the method.  
Outline how seed dispersal is of benefit to the plant. (35)

(b) The diagram shows the growth curve of an annual plant from germination to death.



The wet weight (freshweight) indicated at A is that of a seed from the plant some time after seed dispersal has taken place.

- (i) What term is used to describe the period of the plant's life cycle between A and B as shown on the graph?  
State the importance of this period.
- (ii) Name the stage of the life cycle which begins at B.  
Account for  
— the increase in wet weight between B and C;  
— the decrease in wet weight between C and D.
- (iii) Wet weight increases rapidly from D.  
Name the major biochemical process mainly responsible for this increase.  
Name the cell layer(s) and the cell organelles, in which this process occurs.
- (iv) Copy the graph into your answer book and mark X where you think flowering is likely to begin and Y where seed dispersal is likely to take place. (35)

12. (a) Read the following extract and then answer the questions below.

'Antibiotics work by killing bacteria and so stopping the spread of infectious diseases. Penicillin kills bacteria by stopping them from building proper cell walls. Other antibiotics work in different ways. For example, streptomycin stops the bacteria from making proteins and so kills them. Penicillin was the first antibiotic discovered and has been used for many years. Unfortunately some types of bacteria that were once easily killed by it have now become resistant to it. This means that the bacteria have mutated so that the penicillin can no longer kill them. In some respects this is a naturally occurring form of genetic engineering, and this kind of selection forms the basis of what Charles Darwin long ago called 'survival of the fittest.'

(From: 'Biotechnology in Focus.' Hobsons Publishing, 1988.)

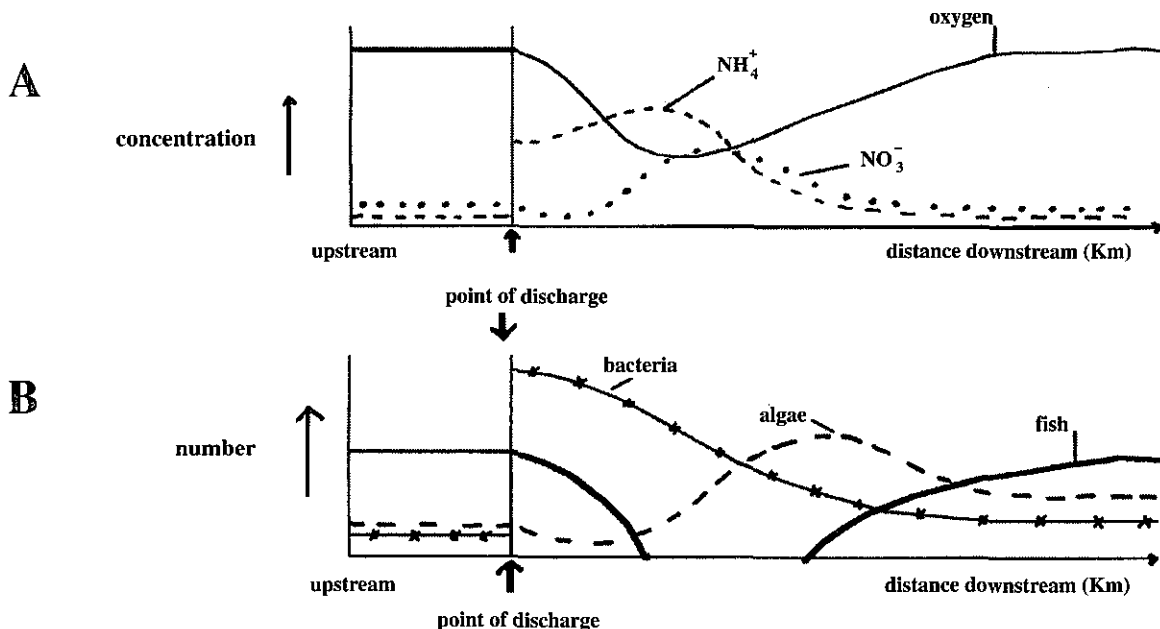
- (i) Name a group of organisms from which antibiotics are extracted.
- (ii) State two ways by which antibiotics kill bacteria.
- (iii) Give the meaning of 'mutated' and 'survival of the fittest'.
- (iv) Name a group of disease-causing micro-organisms which are not killed by antibiotics. (30)

(b) Describe fully the laboratory procedures you would carry out in each of following:

- (i) to isolate a pure culture of bacteria;
- (ii) to test which one of a number of different antibiotics is the most effective against the bacteria you isolated. (40)

13. The diagrams show some of the changes observed downstream from a point where a large amount of untreated sewage was released into a river. (Data after Hynes, "The Biology of Polluted Waters", Liverpool University Press 1978.)

Diagram A shows the chemical changes and diagram B the changes in some of the living organisms in the same part of the river.



Make use of the data in the diagrams to answer the following.

- (i) Suggest an explanation for the drop in the amount of dissolved oxygen in the water. (10)
- (ii) Explain
  - the changes in the number of fish;
  - the changes in the number of algae. (40)
- (iii) State *two* possible ways by which the amount of the dissolved oxygen in the water is increased again. (12)
- (iv) What basis is there for saying that an aspect of the nitrogen cycle is shown by the data? (8)

14. (a) In the case of each of the following give an explanation for the experimental procedure given.

- (i) In investigating the mineral requirements of plants the flasks containing the nutrient solutions are covered with black paper or tin foil.
- (ii) When investigating heat production by germinating seeds the vacuum bottle and the seeds used are rinsed in alcohol and then dried.
- (iii) Using an atmometer in conjunction with a potometer.
- (iv) When the water plant *Elodea* (Canadian pondweed) is used to determine the relationship between light intensity and the rate of photosynthesis a little sodium hydrogen carbonate is added to the water.
- (v) When testing leaves for starch they are placed in hot alcohol for a period.
- (vi) In an experiment to investigate the conditions needed for germination one of the experimental flasks contains a small quantity of alkaline pyrogallol.
- (vii) Carrying out Fehling's (or Benedict's) test on a solution. (42)

(b) In relation to the human eye outline experiments to demonstrate

- (i) binocular vision.
- (ii) the blind spot. (28)

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

(a) Give a large labelled outline diagram of a transverse section through a young dicotyledonous root. Indicate on the diagram the tissue in which water ascends to the leaves and the tissue in which soluble foods pass down to the root.

Give *two* differences between the section you have drawn and a transverse section through the stem of the same plant?

Name and draw *one* example each of the water-transporting *and* the food-transporting cell types.

(b) Write explanatory notes on any *three* of the following: pyruvic acid, active transport, oxidative phosphorylation, acetylcholine, synapse, axon.

(c) Name the group of organisms to which *Fucus* belongs .

How is *Fucus* adapted to life (i) at low tide, (ii) at high tide.

Give an illustrated account of sexual reproduction in *Fucus*.

(d) Give outline diagrams of a human sperm and a mature Graafian follicle.

State what happens to a Graafian follicle at ovulation. What changes take place in the Graafian follicle after ovulation (i) in a normal menstrual cycle, (ii) when fertilization and implantation take place?