Write your Examination Number here

AN ROINN OIDEACHAIS

LEAVING CERTIFICATE EXAMINATION, 1978

BIOLOGY—HIGHER LEVEL

WEDNESDAY, 14 JUNE—MORNING, 9.30 to 12.15

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 **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. Give a location for five of the following.

(a) Spleen .....
(b) Glomerulus .....
(c) Ampulla .....
(d) Fascicular cambium .....
(e) Corpus luteum .....
(f) Epiglottis .....

2. Uterus, Sebaceous gland, Optic nerve, Vaccine, Geotropism, Translocation, Transpiration, Antibiotic, Moss, *Fucus*, Brain, Insulin, Ureter, Sweat gland, Fenestra ovalis, Quadrat, Oestrogen, Mesophyll, Lichen.

Select and write in Column 2 in each case the term from the above list that most appropriately matches the term in Column 1. Use each term once only. The first one is completed as an example for you. There will be terms left unused.

Column 1	*Column* 2
Cerebellum	Brain
Potometer	.....
Clinostat	.....
Antibody	.....
Islets of Langerhans	.....
Eye	.....
Symbiosis	.....
Holdfast	.....
Hair follicle	.....
Rhizoids	.....
Kidney	.....

3. State the functions of the lymph nodes.

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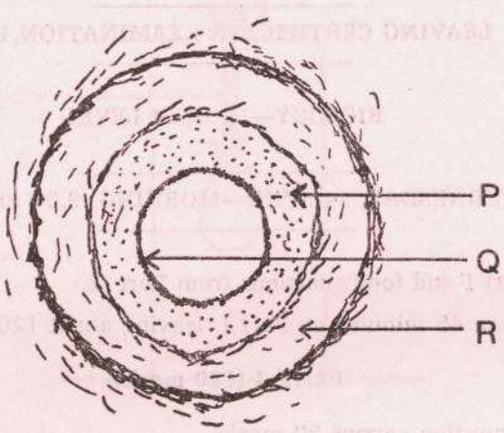
The diagram shows an artery in transverse section.



Name the parts P, Q, R.

P .....

Q .....

R .....

In the space below draw a diagram to show a length of vein in longitudinal section.

List two structural differences between arteries and veins.

.....

.....

4. *(a)* Give a laboratory use for each of the following:

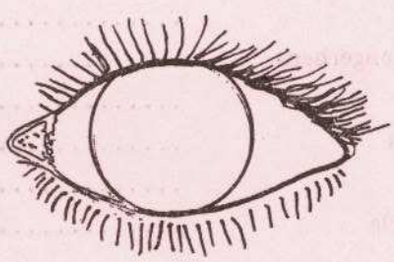
Chromatography: .....

Fehling's solution (A and B): .....

Tullgren funnel: .....

respirometer: .....

(b) Draw the pupil in the diagram of the human eye as it would appear in an eye adapted to bright light.



What alters the size of the pupil?

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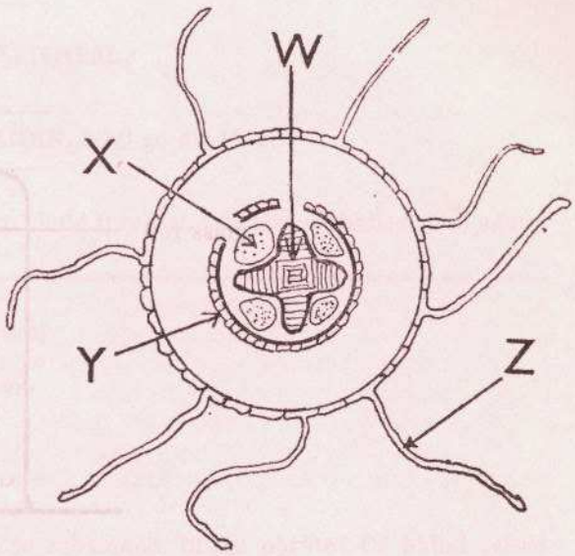
5. The diagram shows a section through a young dicotyledonous root.



Give two structures shown in the diagram that indicate that the section is of a root.

.....

.....

Name the parts labelled W, X, Y.

W .....

X .....

Y .....

State how each of the following enters the root at Z.

Water .....

Minerals .....

6. Distinguish between the members of each of the following pairs:

(a) hydrophyte and hydrosere: .....

.....

(b) pollination and fertilization: .....

.....

(c) autotroph and heterotroph: .....

.....

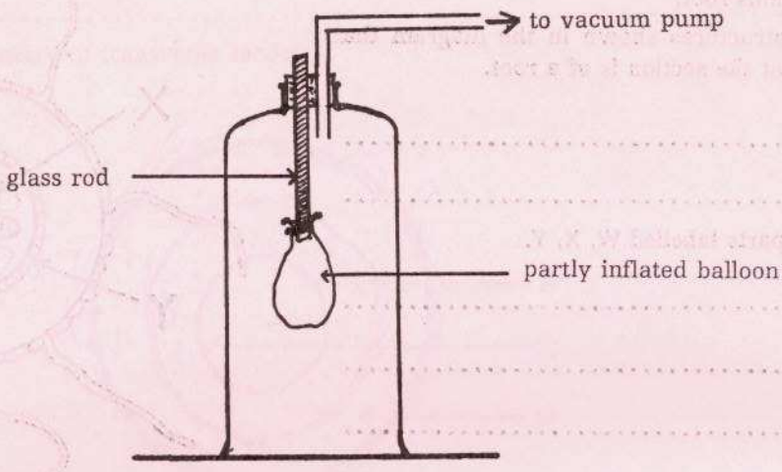
(d) exocrine gland and endocrine gland: .....

.....

(e) saprophyte and parasite: .....

.....

7. The apparatus shown in the diagram may be used to demonstrate how the lungs respond to the pressure changes brought about by the breathing movements.



Which muscles do mammals use for breathing? .....

.....

What will happen to the balloon when air is withdrawn from the bell jar? .....

.....

Which phase of breathing corresponds to the change in the balloon? .....

In which phase of breathing is nervous control unnecessary? .....

State the reason .....

.....

What is meant by tidal volume? .....

.....

.....

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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.

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8. In what form is the reserve carbohydrate stored (i) in the mammal, (ii) in the potato? State where a carbohydrate reserve is to be found (i) in the human body, (ii) in a non-endospermous seed.

In an experiment to study the changes in the fat and carbohydrate content of the endosperm and the embryo of germinating seeds the following results were obtained.

TIME (days)	Content in grams per seed			
	ENDOSPERM		EMBRYO	
	Fat	Carbohydrate	Fat	Carbohydrate
0	0·26	0·02	0	0
4	0·24	0·06	0	0·01
6	0·10	0·14	0	0·06
8	0·04	0·10	0	0·14
11	0·01	0·01	0	0·17

On the graph paper provided draw graphs using the same axes to show the changes in fat and carbohydrate content with time. Put time on the horizontal axis.
Comment on the relationship, if any, between the changes in content of the following and suggest an explanation:

(i) the endosperm fat and carbohydrate;

(ii) the endosperm carbohydrate and embryo carbohydrate.

9. Describe, with the aid of labelled diagrams, meiosis in a cell with two pairs of homologous chromosomes.

'The products of meiosis are always gametes.' Comment briefly on the validity of this statement.

Given that the allele **A** is dominant over **a** and the allele **B** is dominant over **b**, draw simple chromosome diagrams to illustrate each of the following cases.

(i) The genes are not linked and the organism is heterozygous for both genes.

(ii) The genes are linked, **A** to **B** and **a** to **b**, and the organism is heterozygous for both genes.

(iii) The genes are not linked and the organism is heterozygous for **A** and homozygous for **B**.

Give the genotypes of the gametes that the organisms in (ii) and (iii) can produce.

10. Draw a large diagram of a photosynthetic cell of a plant as seen using the electron microscope. Name an organelle where the following occur: (i) protein synthesis, (ii) Krebs cycle, (iii) selective absorption, (iv) carbohydrate manufacture. Indicate each organelle on the diagram.

The organelle involved in Krebs cycle is present in low numbers in the cells of some tissues and present in large numbers in the cells of other tissues in the same organism. Suggest an explanation for this. Name one site in the human body and one site in the flowering plant where you would expect to find large numbers of the organelle.

11. *(a)* To which group (phylum) does each of the following belong: (i) *Fasciola hepatica,* (ii) moss *or* fern, (iii) insect, (iv) *Lumbricus terrestris*. Give the features on which you base your classification of (i) and (iv).

(b) *Fasciola hepatica* is a triploblastic organism. Explain this statement with the aid of a simple labelled diagram. Comment briefly on the significance of the development of the triploblastic state.

(c) Show by means of a labelled diagram the external features of a named insect. Give an illustrated account of its life cycle referring to ecdysis and metamorphosis.

12. *(a)* Explain the biological principles involved in the prevention of food decay by each of the following: canning, drying, freezing, salting.

Outline how you would prepare agar petri-dishes and inoculate them with a fungus.

(b) Read this extract and answer the questions below.

'Most aphids (green-flies) that transmit virus in temperate regions are host alternating species and the trees and shrubs on which these aphids normally overwinter do not usually harbour viruses of agricultural crops. However, outbreaks of virus disease in agricultural crops are associated with mild winters and springs. The reason for this is that not all the individuals of some host alternating species return to their primary host in the autumn; some remain on their herbaceous hosts all through the year, without entering an egg stage during the winter. In mild winters the survival rate of these free living forms is high, and in spring they multiply early and migrate. The herbaceous plants on which these aphids overwinter are often infected with virus'.

(Dixon, A.F.G., 1973. 'Biology of Aphids'. Edward Arnold, London.)

Explain 'host alternating species'. Give an example other than aphids.

Suggest the likely consequences for each of the following and explain your answers.

(i) a mild winter followed by a warm spring;

(ii) a mild winter followed by a very cold spring.

13. *(a)* Describe with the aid of a labelled diagram, the structure of a motor neuron in relation to its function. Explain the terms (i) threshold, (ii) all or nothing, (iii) acetylcholine, in relation to nerve impulses.

(b) What is a tropism? Comment on the biological importance of tropisms.

Describe an experiment to test the hypothesis that the use of rooting powders promotes the faster rooting of cuttings.

14. *(a)* Describe the methods you used in obtaining information on the distribution of plants and animals in the habitat you have studied.

(b) Give an account of the difference between the transfer of energy and the cycling of nutrient materials such as carbon and nitrogen in ecosystems.

15. Answer *two* of the following.

(a) Describe an experiment to show the relationship between light intensity and the rate of photosynthesis. Indicate the result you would expect in the form of a graph.

(b) State the function of the pacemaker in the heart. You are provided with live Daphnia in water and a chemical solution. Describe how you would investigate the effect of the chemical on the heartbeat of Daphnia.

(c) You are provided with a solution of an enzyme. Describe how you would show that the rate of reaction is affected by pH. How would you expect the pH optima of two enzymes, one working in the stomach and the other in the small intestine, to differ?

(d) Write a short essay on:

Our inland waterways – their pollution and the steps necessary to prevent it.