

Write your
Examination
Number here

AN ROINN OIDEACHAIS

LEAVING CERTIFICATE EXAMINATION. 1987

BIOLOGY—HIGHER LEVEL

WEDNESDAY, 17 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 the following by placing a tick (✓) in the appropriate box.

(i) The products of photosynthesis are translocated mainly through the
collenchyma xylem phloem cambium

(ii) The fittest individual in terms of evolution is best described as the one who
is the strongest physically
lives the longest
is resistant to disease
has the most grandchildren

(iii) Which of the following is the most suitable material to use when preparing microscope slides to show mitosis?
leaf anther root tip unthickened stem

(iv) Animals in which the canine teeth are well developed are likely to have a diet consisting mainly of
insects vegetation meat decaying matter

(v) Which of the following contains the rods and cones?
lens retina cornea vitreous humour

2. (a) In a series of laboratory tests the following results were obtained. State what each result indicates.

Test	Result	Indicates
Fehling's	orange
Litmus	red → blue
Cobalt chloride	blue → pink
Iodine	no colour change
Lime water	milky

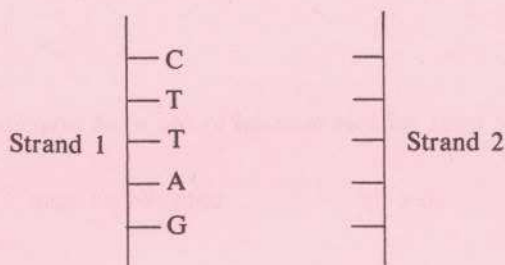
(b) State the purpose for which you would use the following in biological experiments.

- Universal indicator
- Clinostat
- Tullgren (or Baermann) funnel
- Biuret test
- Capture-recapture technique

3. Complete the table below in relation to the mammalian diet.

Substance	one source	one function	one effect of a deficiency
Vitamin A			
Vitamin D			
Iodine			
Roughage			
Calcium			

4. The four bases present in DNA are Adenine (A), Guanine (G), Cytosine (C) and Thymine (T). The diagram shows the two strands of a DNA molecule. Use the letters A, G, C and T to indicate the arrangement of the bases on the complementary strand of the molecule.



Name the other components of the complete DNA molecule.

.....

What is the significance of the replication of the DNA molecule?

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Examination of the DNA content of body cells and sperm cells of animals has shown that body cells contain approximately twice as much DNA as do the sperm cells. State the reason for the difference.

.....

5. (a) State the phylum to which the organism shown in photograph W belongs and give your reason(s) based on the photograph.

Phylum

Reason(s)

- (b) State the group to which the non-green organism shown in photograph X belongs.

.....

What part of the organism is shown in the photograph and state its function.

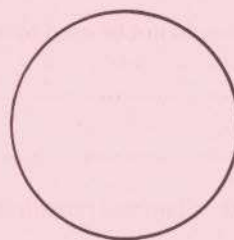
Part shown

Function

Complete the partial diagrams below to indicate what you would expect to see.



Vertical section through part shown



Undersurface view of part shown

The organism is growing on an old cow dung in a field.
Comment briefly on the role of the organism in that habitat.

.....
.....

6. The table refers to the approximate composition of air breathed in to the lungs and breathed out again by a mammal.

Name of gas	Air breathed in	Air breathed out
Oxygen	20.7%	
	78%	
Water Vapour		6.2%
		3.8%

Insert on the table the names of the other two gases involved.

Place the following percentages in the appropriate column on the table: 75.5%, 0.03%, 1.3%, 14.6%.

Name the structures which enlarge the surface area of the lungs

State the reason why a large surface area is necessary

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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.

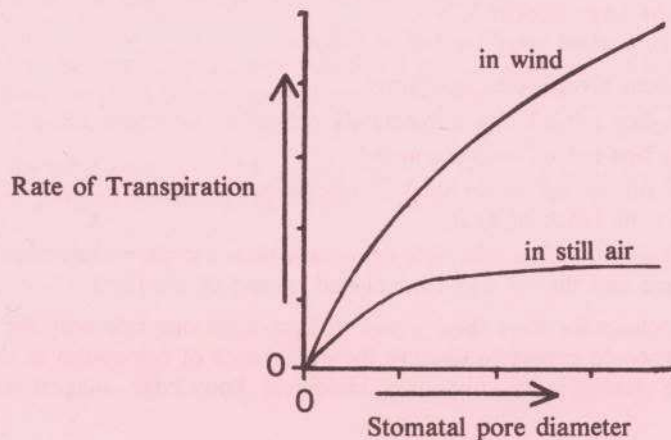
PART II (280 marks)

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

Answer four questions. Each question carries 70 marks.

8. Give a labelled diagram to show apparatus *set up* to measure the rate of transpiration in a leafy shoot. (12)

The graphs show the variations in the rate of transpiration in a plant plotted against stomatal pore diameter in windy conditions and in still air.



- (i) State the effect of the closure of the stomata on transpiration in (a) wind and (b) in still air. (12)
- (ii) In still air conditions a thin layer of air exists on each surface of the leaf in which there is little or no movement of the air and the concentration of water vapour builds up to a level higher than in the general surroundings.
Relate this high concentration of water vapour to the differences between transpiration in wind and in still air. (12)
- (iii) Give a simple labelled diagram of a stoma (a) in the open position, (b) in the closed position, as seen looking down on the surface of the leaf. (8)
- (iv) It is usually found that transpiration from the lower surfaces of leaves is greater than from the upper surfaces.
(a) Suggest two reasons for this based on leaf structure.
(b) State briefly how you would compare the rate of transpiration from the upper and lower leaf surfaces using the apparatus you have drawn above. (26)
9. State the habitat you have studied and, giving an example in each case from that habitat, explain each of the following: food niche, food web, trophic level, pyramid of numbers. (20)
Outline the flow of energy through a habitat and explain how it differs from the cycle of materials. (30)
Suggest ecological explanations for the following.
'Biologists have repeatedly observed that, on major motorways, the verges and the central green strip are often richer in the numbers and variety of plants and animals living there than the adjacent agricultural land. It has also been found that the spraying of the roadside verges and hedgerows with herbicides can have major effects on the plant and animal communities living there.' (20)
10. The photographs Y and Z show a potato and a winter twig from a tree.
- (i) Make simple outline drawings of each of the specimens Y and Z and label the main features visible on each specimen. (20)
(Note: your drawings must be of the specimens shown in the photographs.)
- (ii) State briefly how the two specimens are related structurally giving evidence for this relationship from the photographs and from internal structure. (16)
- (iii) Explain the term perennation and state briefly how the potato and the twig shown are adapted for this function. (16)
- (iv) Give a simple labelled plan diagram of the layout of the main tissues that you would expect to see in a transverse section through an internode region of the winter twig. (18)

11. Distinguish between the saprophytic and parasitic modes of nutrition.
Give a labelled diagram of the adult *Fasciola hepatica* to show the reproductive system. (28)
Suggest how each of the following are advantageous to *Fasciola*:
- the production of up to 20,000 eggs per day and the use of asexual reproduction in the life cycle;
 - eggs hatch only following exposure to light;
 - adults are hermaphrodite;
 - suckers and spines are present on body surface. (24)
- A knowledge of the life cycle of parasites facilitates effective control measures. State *two* methods of controlling *Fasciola* infections based on the life cycle. (18)
12. Give the meaning of alternation of generations.
Describe with the aid of clearly labelled diagrams the life cycle of *either* the moss *or* the fern. (40)
Outline the problem posed by life on dry land for plant reproduction and briefly explain how the flowering plant *and* the moss *or* fern have overcome these problems. (30)
13. (a) Give a simple labelled outline drawing of the mammalian central nervous system naming five parts. Distinguish between the central nervous system and the peripheral nervous system. (24)
- (b) State the meaning of the term tropism.
In an experiment oat coleoptiles were treated as follows.
- Batch 1: no treatment given. Acts as control.
Batch 2: coleoptile tips cut off and immediately replaced on the cut surface.
Batch 3: coleoptile tips cut off and discarded.
Batch 4: coleoptile tips cut off, a thin block of agar placed on the cut surface and the coleoptile tip then placed on the block of agar.
Batch 5: coleoptile tips cut off, a thin piece of mica (which is impermeable) was placed on top of the cut surface and the tip was then placed on top of the mica.
- All five batches of coleoptiles were then grown in light from one side only for a period of time.
Give the results you would expect to observe for *each* batch of coleoptiles at the end of the growing period. Using these results and your own biological knowledge suggest explanations for your observations. (30)
- (c) If 2.5 cm of the tip region of the winter twig shown in photograph Z was cut off state what you would expect to observe when growth resumed in spring. Briefly suggest an explanation for the observation you would expect to make. (16)
14. The table below summarises some of the results obtained by Gregor Mendel in his investigation of the inheritance of certain traits of pea plants.

Trait	Original cross	F ₁ progeny	F ₂ progeny
Seed form	Round × wrinkled	Round	5474 round : 1850 wrinkled
Seed colour	Yellow × green	Yellow	6022 yellow : 2001 green
Flower position	Axial × terminal	Axial	651 axial : 207 terminal
Pod form	Inflated × constricted	Inflated	882 inflated : 299 constricted
Pod colour	Green × yellow	Green	428 green : 152 yellow
Stem length	Tall × dwarf	Tall	787 tall : 277 dwarf

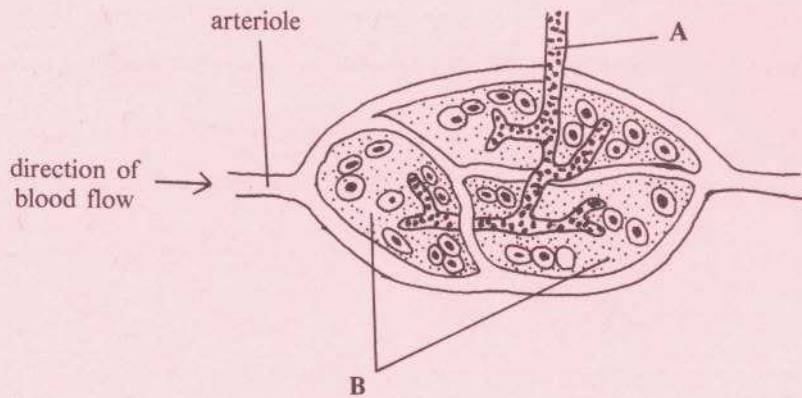
- (a) Use suitable symbols to illustrate the genotypes of the following pea plants.
- Heterozygous in respect of pod form.
 - Homozygous recessive in respect of flower position.
 - Homozygous in respect of round seed.
 - Heterozygous in respect of stem length.
 - Green seed. (25)
- (b) State the phenotypes which would result from the genotypes given in (a) (i), (ii), and (iv). (15)
- (c) Use suitable symbols to illustrate the genotype(s) of the gametes produced by plants given in (a) (i) and (iii). (10)
- (d) Deduce the genotypes and phenotypes of the offspring that may result from a cross between the following pea plants:
heterozygous green pod, dwarf stem × yellow pod, heterozygous tall stem. (20)

15. Answer *two* of the following:

(35, 35)

- (a) List seven components of human blood and give a function for each one. Indicate where the cellular components of blood are formed.

The diagram shows the relationship between the blood capillaries and the lymphatics in the body tissues.



Name **A** and **B** and describe briefly how the system operates.

- (b) What is understood by the terms anaerobic and aerobic respiration? Where do these processes occur in a cell? State how the yield of energy of the two processes differs and suggest a reason for the difference. Describe an experiment to demonstrate anaerobic respiration in the laboratory.
- (c) Draw and fully label a diagram of a human embryo (7–9 months) in the womb. State one function for each of the parts which you labelled. State the importance of mother's milk to the infant in the days immediately after its birth.
- (d) Outline how the structure of the alimentary canal of a mammal is adapted for carrying out its functions.

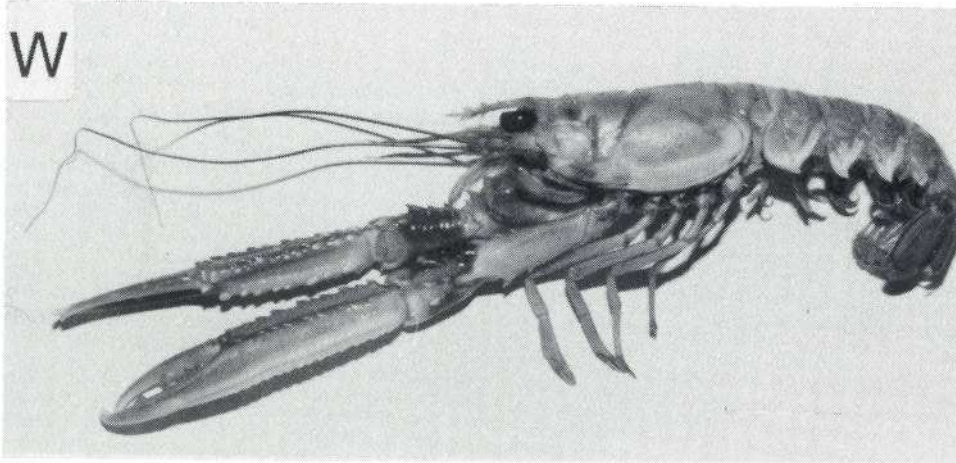
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Photographs for questions 5, 10, 13(c)
Griangraif le haghaidh na cheisteanna 5, 10, 13(c)

Ceist 5

Question 5



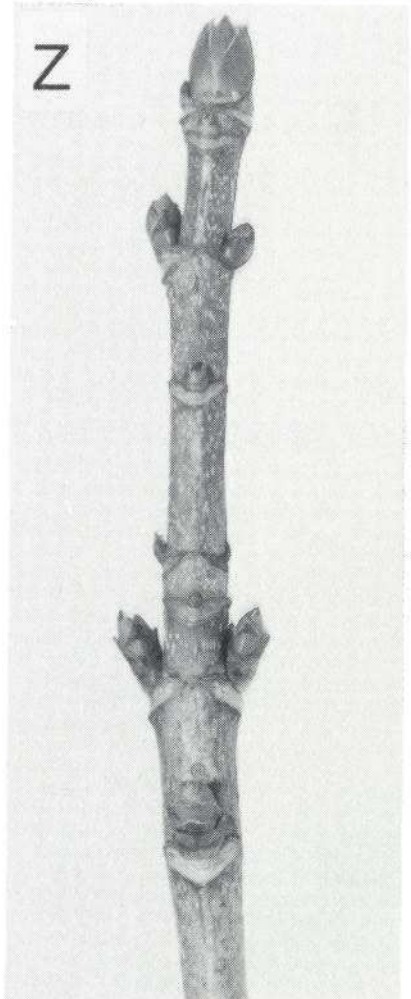
Ceist 5

Question 5



Ceisteanna 10 agus 13

Questions 10 and 13



Ceist 10

Question 10

