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

**Write Your Examination Number here**

**AN ROINN OIDEACHAIS AGUS EOLAÍOCHTA**

**LEAVING CERTIFICATE EXAMINATION, 1999**

# BIOLOGY — ORDINARY LEVEL

WEDNESDAY, 16 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 *four* of the following.

(*a*) All proteins contain the elements carbon, hydrogen, oxygen, and .....

(*b*) Stomata are surrounded by kidney-shaped cells called ..... cells.

(*c*) The number of cotyledons in a plant seed determines whether the plant is a dicotyledon or a

.....

(*d*) The apparatus that is used to measure the water loss from a cut shoot is called a .....

(*e*) The structure in which an egg (ovum) travels from the ovary to the uterus is the .....

**2.** State a use for each of the following in laboratory practical work in biology.

(*a*) Lime water

.....

(*b*) Sodium hydroxide solution (or soda lime)

.....

(*c*) Benedict's (or Fehling's) solution

.....

(*d*) A glowing splint

.....

(*e*) Bicarbonate (hydrogen carbonate) indicator

.....

3. Answer the following by placing a tic (✓) in the box of your choice.

(*a*) The radicle of a germinating seed normally grows downwards. This is an example of

| | | | |
|---|---|---|---|
| Positive phototropism | ☐ | Negative phototropism | ☐ |
| Negative hydrotropism | ☐ | Positive geotropism | ☐ |

(*b*) A tendon connects

| | | | |
|---|---|---|---|
| A bone to a bone and is elastic | ☐ | A bone to a muscle and is elastic | ☐ |
| A bone to a bone and is non-elastic | ☐ | A bone to a muscle and is non-elastic | ☐ |

(*c*) The retina in the human eye contains

| | |
|---|---|
| Rod cells in the centre and cone cells at the edge | ☐ |
| Rod and cone cells scattered at random | ☐ |
| Alternating rings of rod and cone cells | ☐ |
| Cone cells at the centre and rod cells at the edge | ☐ |

(*d*) A parasite is an organism that

| | |
|---|---|
| Obtains its nourishment from dead matter | ☐ |
| Is always microscopic | ☐ |
| Obtains its nourishment from other living organisms | ☐ |
| Lives only on the surface of other living organisms | ☐ |

(*e*) The passive movement of molecules from regions of high to low concentration is

| | | | |
|---|---|---|---|
| Decomposition | ☐ | Diffusion | ☐ |
| Translocation | ☐ | Photosynthesis | ☐ |

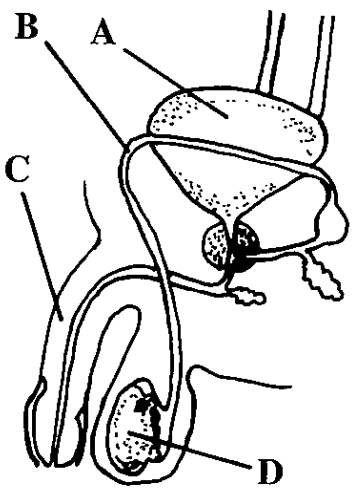
4. Name the parts labelled **A, B, C, D,** in the diagram.

**A** .....

**B** .....

**C** .....

**D** .....




Spermatozoa are produced by the part labelled .....

Name a substance that is stored temporarily in part **A.**

.....

Where is this substance produced?.....

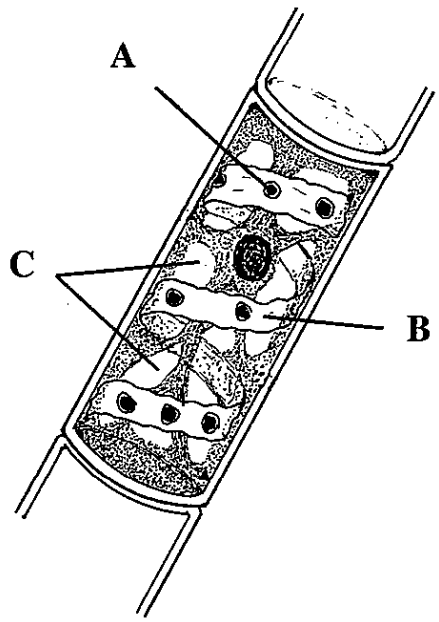
.....

**5.** Write in column 2 the word from the following list that, in each case, most closely matches the description in column 1.

predation meiosis meristem plasmolysis evolution accommodation metamorphosis

| Column 1 | Column 2 |
|---|---|
| A change in body structure seen in the life cycle of insects | |
| A region of cell division at a plant root tip | |
| The shrinkage of cytoplasm because of the withdrawal of water from a plant cell by osmosis | |
| A process involved in the production of human gametes | |
| The development of new types of organisms from existing ones | |
| The catching and killing for food of one animal by another | |
| The adjustment of the lens in the eye to produce a clear image on the retina | |

**6.** The diagram shows a plant cell.




(i) Name the plant from which the cell was drawn.

.....

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

**A** .....

**B**.....

**C** .....

(iii) State a function of **A** *and* **B.**

**A** .....

**B**.....

(iv) This plant sometimes undergoes a process called <u>conjugation</u>. Explain the underlined term.

.....

7. The picture below shows a light microscope.

(i) Name the parts labelled **A, B, C, D.**

**A** ..... **B**.....

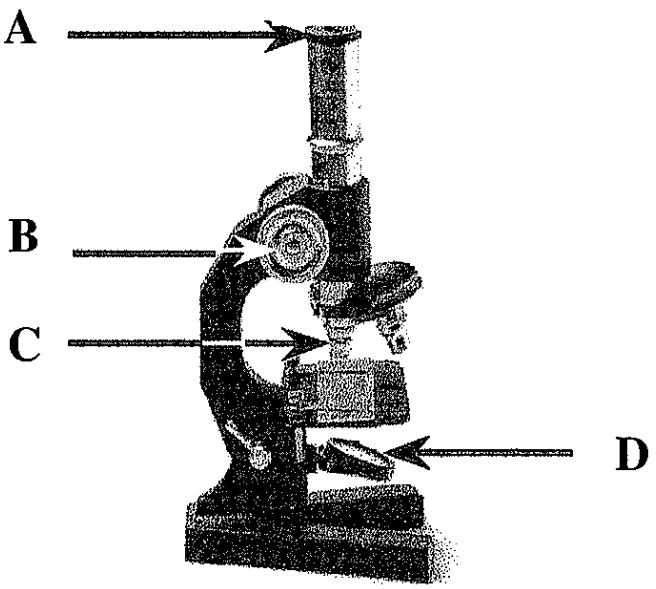
**C** ..... **D** .....

(ii) An object viewed with this microscope is calculated to be magnified 300 times (x300).

If the magnifying power of C is x30, what is the magnifying power of A? .....

(iii) Give a reason why the light microscope cannot be used to examine the structure of a virus.

.....



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# LEAVING CERTIFICATE EXAMINATION, 1999

# BIOLOGY — ORDINARY LEVEL

WEDNESDAY, 16 JUNE — AFTERNOON 2.00 to 5.00

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*) (i) Give three reasons why animals need food for survival.

(ii) Draw a diagram to show the human digestive system.

Label the following six parts on your diagram:

rectum, oesophagus, pancreas, anus, stomach, duodenum.

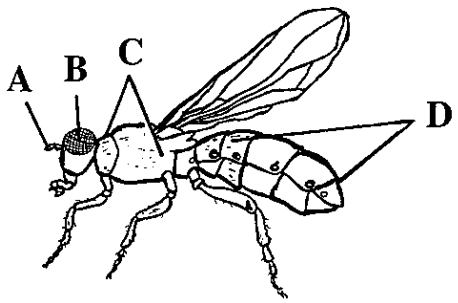
(iii) What is meant by peristalsis?

State its function in the digestive system. (46)

(*b*) An enzyme may be described as an organic catalyst. Explain the underlined term.

Describe an experiment to show that the rate of enzyme action is affected by temperature. In your experiment use three temperature settings: 20°C, 37°C and 60°C. (24)

**9.** (*a*) The diagram shows an insect.




(i) Name the structures labelled **A, B, C, D** and give one function for **A.**

(ii) State the function of spiracles.

(iii) Give *two* ways in which an insect can be distinguished from a spider.

(iv) Insects and spiders belong to the same phylum. Name this phylum and give *two* characteristics which all members of the phylum have in common. (36)

(*b*) (i) State *two* ways in which the blood vascular system of an earthworm is similar to that of a human.

(ii) The earthworm contains a coelom. Explain the underlined term.

Outline how an earthworm moves and mention the role of the coelom in movement.

(iii) Name the phylum to which the earthworm belongs and give *one* characteristic of this group. (34)

**10.** (*a*) (i) Write a balanced chemical equation to show the process of photosynthesis.

(ii) A pot plant was kept in the dark for three days after which a leaf (leaf 1) was removed. The leaf was tested for the presence of starch. A bright light was shone on the plant for 12 hours after which a second leaf (leaf 2) was removed and tested for starch.

The two leaves were treated as follows:

They were first placed in boiling water for 2 minutes, then placed in hot alcohol for a further two minutes. After rinsing with water, the leaves were placed in a dish containing iodine solution.

(*a*) State what the experiment was designed to show.

(*b*) Why was the plant kept in the dark for three days?

(*c*) Why were the leaves placed in boiling water?

(*d*) Why were the leaves placed in hot alcohol?

(*e*) Mention a safety precaution that should be taken when heating the alcohol.

(*f*) Why were the leaves put into iodine solution?

(*g*) What would you expect to see when *each* leaf is put into the iodine solution? (33)

(*b*) (i) Draw a diagram to show the external features of a woody stem from a named deciduous tree as seen in winter. Label the following on your diagram: A node, an internode and the terminal bud.

(ii) Give *one* reason why many trees lose their leaves in winter.

(iii) Name a coniferous tree. Some conifers have needle-shaped leaves. Explain why this is an advantage for these trees. (37)

**11.** (*a*) (i) Explain each of the following terms as used in genetics: chromosome, locus, gene.

(ii) 'Identical twins have the same genotype'. Briefly explain this statement.

(iii) The letters X and Y represent the types of sex chromosomes present in the cells of the human body.

State the number *and* the possible types of sex chromosomes present in each of the following:

(a) a muscle cell in a male, (b) a sperm cell, (c) an egg (ovum) cell. (36)

(*b*) A woman, whose blood type is group AB, marries a man homozygous for blood group B. Show by means of diagrams

(i) the possible genotypes of the man;

(ii) the genotype of the woman;

(iii) the genotypes of the gametes which are produced by the man *and* by the woman;

(iv) the possible genotypes *and* phenotypes of their children. (34)

**12.** (*a*) Outline clearly the difference between red blood cells, white blood cells and platelets under the following headings:

(i) structure,

(ii) function,

(iii) site of formation.

What is serum? (33)

(*b*) (i) Draw a large outline diagram to show the *internal* structure of the heart of a mammal.

(ii) Label the following on your diagram:

aorta, left ventricle, right atrium (right auricle), pulmonary vein.

(iii) Insert **X** on your diagram to mark the position of the pacemaker.

State the function of the pacemaker.

(iv) State the function of the coronary arteries.

State why they are not visible on the diagram.

Give one reason why blockage of these arteries may result in a heart attack. (37)

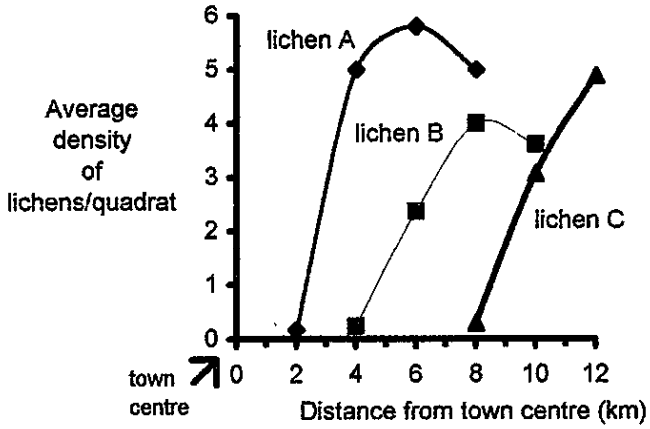
**13.** (*a*) Explain the terms (i) ecosystem, (ii) quadrat, (iii) pollution, as used in ecology.

Outline how you would use a quadrat. (28)

(*b*) Lichens are organisms that are very sensitive to air pollution, some species being more sensitive than others. The more sensitive types will not grow in areas with polluted air.

In a survey of the effects of air pollution around an industrial town, three different species of lichen, **A, B** and **C,** were examined. In the survey, an estimate was made of the density of each type of lichen growing on tree trunks at different distances along a line from the centre of the town.

The results of the survey are shown on the graph.




(i) Which one of the three types of lichen is the most sensitive to air pollution? Give the reason for your choice.

(ii) Find from the graphs the distance from the town centre at which lichen **B** shows half its maximum density.

(iii) The graphs give no indication as to the direction from the town centre the survey was made.

Give *one* reason why the results shown on the graphs might be different if the survey had been made in the opposite direction from town centre.

(iv) Name *two* substances that may be found in polluted air in towns.

(v) Suggest *two* ways of reducing the air pollution in towns. (42)

**14.** (*a*) (i) Explain the terms pollination *and* fertilisation.

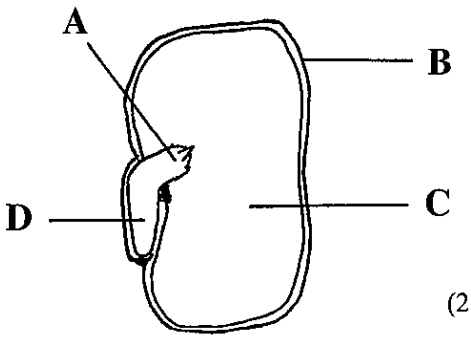
(ii) Draw a large diagram to show a vertical section through an insect-pollinated flower.

Label the following parts on your diagram:

ovary, sepal, anther, stigma, petal.

(iii) Beehives are often placed in orchards. How do the beekeeper *and* the orchard-owner benefit from this practice? (43)

*(b)* The diagram is of a section through a broad bean seed.




(i) Name the parts labelled **A, B, C, D.**

(ii) Which parts represent the embryo plant?

(iii) Give three conditions necessary for the germination of a seed such as this.

(iv) Amylase was found in part of the seed. Suggest a reason for this. (27)

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

(*a*) Give a function of *each* of the following parts of the skin.

sebaceous gland, erector muscle, adipose tissue, malpighian layer, receptor cell.

Outline how the skin helps to conserve heat when a person is very cold, and loose heat when a person becomes hot.

(*b*) Name three minerals (ions) that are essential for healthy plant growth.

Give one function for *each* of the minerals you name.

Describe an experiment to show the effect of a deficiency of *any one* mineral on the growth of a plant.

(*c*) Bacteria are classified according to their shape into three main groups. Name each group.

In a laboratory experiment, a petri dish of sterilised nutrient agar was inoculated with a sample of a culture of a species of bacteria and a multidisc placed on the agar in the dish and the lid replaced. The petri dish and contents were then incubated for 48 hours at 37°C.

(i) Give the meaning of the *four* underlined terms.

(ii) Suggest why a temperature of 37°C was used when incubating the petri dish.

(iii) What is the function of the multidisc in the experiment?

(iv) State briefly what you would expect to observe at the end of this experiment.

(*d*) Draw a diagram of a neurone and label its parts.

Explain the terms stimulus and synapse.

State two ways in which nerve action differs from hormonal action.