

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, 1995

BIOLOGY — HIGHER LEVEL

31281

WEDNESDAY, 14 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.

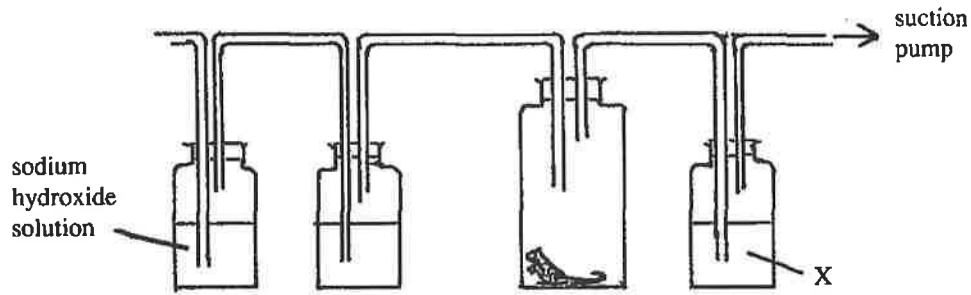
1. Answer *five* of the following.

- (a) The Eustachian tube connects the pharynx and the
- (b) An organism which reproduces by budding is
- (c) Intercostal muscles function in the process of
- (d) *Amoeba* gets rid of excess water through the
- (e) Cobalt chloride paper is used to test for
- (f) Two major components of cell membranes are proteins and

2. Answer the following.

- (a) Name a plant which displays hypogeal germination
- (b) State the location of the middle lamella.
- (c) State the location of fascicular cambium.....
- (d) A tissue in angiosperms which contains lignin is
- (e) State a function of bark in trees.
- (f) State what the ovule of a flowering plant becomes following fertilisation.
- (g) Name a part of a flower which develops into a fruit.

3. The apparatus shown below may be used to demonstrate aerobic respiration.



(a) What is aerobic respiration?

.....

(b) Write a summary equation for aerobic respiration.

.....

(c) State the purpose of the sodium hydroxide in this experiment.

.....

(d) Name the solution labelled X.

.....

(e) Suggest a control for this experiment.

.....

(f) How would you use the apparatus to demonstrate respiration by a plant?

.....

4. (i) What is an enzyme?

.....

(ii) State *two* factors, other than temperature and pH, which influence the rate of enzyme action.

.....

(iii) How would you measure the rate of enzyme action in a laboratory experiment?

.....

(iv) Give the term used to describe

(a) the substance upon which an enzyme acts:.....

(b) the substance that results from this action.....

(v) Thromboplastin (thrombokinase) acts on
 and converts it to.....

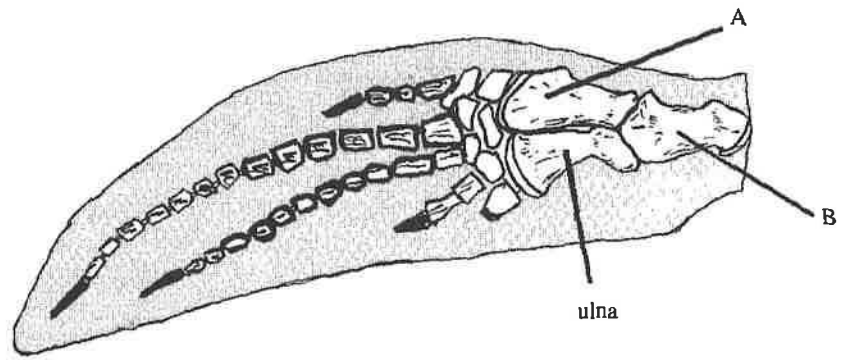
5. (a) (i) What is a mutation?

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.....

(ii) Give two causes of mutation.

.....
.....

(b) The diagram shows the bones present in the fin of a whale.



(i) The fin is an example of a pentadactyl limb. Give the meaning of the underlined term.

.....

(ii) Pentadactyl limbs are present in a range of organisms. What is the significance of this fact?

.....

(iii) Name the bones labelled A and B in the diagram.

A B

6. Suggest a biological explanation for each of the following observations.

(a) A person walking at night may be dazzled by the headlights of an oncoming car.

.....
.....

(b) The thickest hedgerows are generally those which are subjected to regular cutting.

.....
.....

(c) The breathing rate of a trained athlete returns to normal after a period of exercise more rapidly than does the breathing rate of an unfit person.

.....
.....

(d) The leaves of crop plants in a field that has been tilled for many years may develop a yellow appearance.

.....
.....

(e) The application of lime to a field may reduce the incidence of liver fluke infestation of the cattle and sheep grazing the field.

.....
.....

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

(a) systole and diastole

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.....

(b) genus and species

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.....

(c) diploid and triploid

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.....

(d) antigen and antibiotic

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.....

(e) beri-beri and rickets

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.....

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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) Illustrate the main events of mitosis by drawing simple labelled diagrams to show the positions of chromosomes during prophase, metaphase, anaphase and telophase. (20)
- (b) In humans tongue rolling is governed by a single pair of allelic genes, **R** and **r**. The allele **R** is the dominant allele which allows tongue rolling whilst the allele **r** does not. Another pair of allelic genes, which are *not linked* to the tongue-rolling gene, govern hair colour. In this second pair brown hair, **B**, is dominant to red hair, **b**.
- Answer the following using the above information.
- (i) Draw a simple diagram to show the genotypes of all the possible gametes that a person, who is heterozygous in respect of tongue rolling *and* hair colour, can produce.
- (ii) State briefly how these gamete genotypes demonstrate the Principal of Independent Assortment.
- (iii) State the phenotype of the person. What other genotypes would give rise to this phenotype. (34)
- (c) In dalmation dogs the allele for black spots is dominant to the allele for brown spots. Is it possible for a dog breeder to discover whether a male dog with black spots is homozygous or heterozygous in respect of spot colour? Explain your answer. (16)
9. (a) *Rhizopus* and *Phytophthora infestans* are classified as Fungi. Give *two* reasons for including them in this group. State the type of nutrition employed by each of these organisms. Outline the importance of each of these nutritional types in nature. (24)
- (b) Describe how *Phytophthora infestans* achieves the following:
- (i) spreads from an infected over-wintering tuber to the new aerial shoots in the next growing season;
- (ii) the infection of the new tubers in the soil during or at the end of the growing season;
- (iii) spreads from an infected plant to another healthy uninfected plant in the field. (22)
- (c) Some young trees in a nursery were found to be dead or dying. It was observed that a fungus was growing on these trees. Design an experiment which you could carry out to determine whether this fungus was responsible for the condition of the trees. (24)

- 06
10. (a) Draw labelled diagrams to show the structure of (i) a named insect-pollinated flower; (ii) a named wind-pollinated flower.
Give two ways in which each flower is adapted for its method of pollination. (28)
- (b) In the case of each of the following structures: paraphyses, archegonium,
(i) name a plant in which it is found;
(ii) draw a labelled diagram to show its location;
(iii) briefly state its role in reproduction in that plant. (28)
- (c) The process of gamete formation in most of the plants you have studied on your biology course does not involve meiosis. Is this statement valid? Briefly explain your answer. (14)
11. (a) (i) Explain the following ecological terms: pyramid of numbers *and* food niche.
Name an ecosystem that you have studied and list *three* plants and *three* animals present there.
- (ii) Give *two* environmental factors which favour the presence of *one* of the plants you named in that ecosystem.
- (iii) The capture/recapture method is one of the ways by which the number of an animal species in the ecosystem may be estimated.
Outline, for *one* of the animals you named above, how you would carry out the following stages of the method:
- the initial capture of the animals;
- the tagging/marking of the animals;
- the release of the tagged/marked animals;
- the use of the figures which you obtained to determine the approximate number of the animal present in that ecosystem. (46)
- (b) Answer the following in relation to energy flow through an ecosystem.
- (i) State the form in which energy first enters the ecosystem.
- (ii) Name the process by which this energy is converted to a form which all living organisms can use.
- (iii) What is the approximate percentage of energy lost at each transfer stage within the ecosystem?
In what form is this energy usually lost from the food chain?
State the significance of the loss of energy at each transfer stage to (a) the length of food chains, *and* (b) the number of organisms at the final trophic level. (24)
12. (a) Explain *each* of the following terms: osmosis, plasmolysis, transpiration, translocation, guttation. (20)
- (b) What is the transpiration stream? On a suitably labelled diagram use arrows to trace the pathway of the transpiration stream. (18)
- (c) Outline the procedures you would carry out in *each* of the following:
(i) the preparation of a leafy shoot for use in a potometer;
(ii) setting up an experiment to demonstrate root pressure;
(iii) setting up an experiment to determine in which part of the stem translocation occurs;
(iv) setting up an experiment to investigate the effect on plant growth of a deficiency of one mineral element. (32)

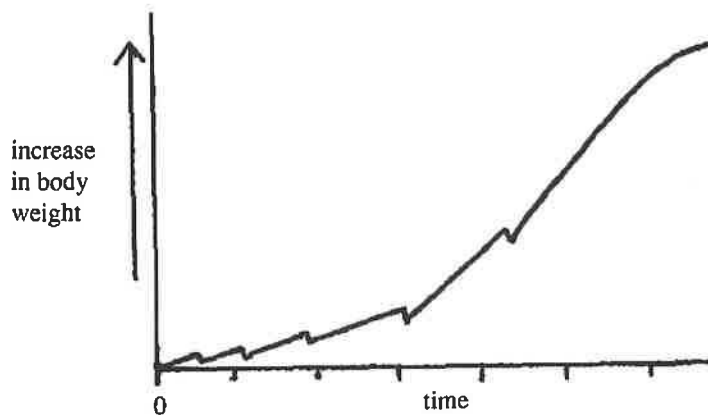
13. Glucose is a carbohydrate which is found in plasma and glomerular filtrate. It is reabsorbed in the nephron and converted to glycogen in the liver.

- (a) Define *each* of the terms that are underlined as used in the above statement. (24)
- (b) State briefly why you would expect the concentration of glucose in the glomerular filtrate to be normally similar to the concentration in the plasma.
Protein is not normally found in the glomerular filtrate. Suggest a reason for this and name one other component of blood which, for the same reason, is not present.
Indicate the site of reabsorption of the glucose in the nephron. (18)
- (c) Name a process, other than
- the conversion of glucose to glycogen, which may result in a decrease in the level of glucose in plasma;
 - the conversion of glycogen to glucose, which may cause a rise in the level of glucose in plasma.

Where, other than in the liver, may glycogen be found in the mammalian body? Name a substance in plants which is equivalent to glycogen in mammals.

Give *two* functions of the liver other than the storage of glycogen and, in the case of *one* of these functions, briefly outline how it is carried out. (28)

14. (a) The graph shows the changes in a locust's body weight after it had emerged from the egg.



- The locust's life cycle is an example of incomplete metamorphosis. Explain the underlined term.
 - From the graph, weight increase is seen to be interrupted at intervals. Suggest a reason for these interruptions.
 - Would you expect a similar growth curve for an insect which has complete metamorphosis, e.g. a butterfly? Explain your answer.
 - Name an animal other than an insect which undergoes metamorphosis in the course of its life cycle. (27)
- (b) Give a named example of an insect to illustrate *each* of the following:
- a vector (carrier) of organisms responsible for human disease;
 - a vector of organisms responsible for disease of crop plants;
 - an insect responsible for spoiling food;
 - an agent of pollination;
 - an insect which feeds on other insects. (15)
- (c) Make a two-column table and write a named member of the Phylum Platyhelminthes at the top of one column and a named member of the Phylum Annelida at the top of the other column. Complete the table to contrast the two organisms under the following headings:
- external appearance including colour;
 - presence or absence of a coelom;
 - organs of excretion;
 - presence or absence of spermathecae;
 - occurrence of hermaphroditism;
 - internal or external fertilisation. (28)

15. Answer *two* of the following.

(35, 35)

- (a) Draw a labelled diagram of a vertical section through a dicotyledonous leaf. Place an X on the main photosynthetic region and a Y on a region which is not composed of cells.

If you were conducting experiments to investigate the effect of various environmental factors on the rate of photosynthesis in the laboratory how would you vary each of the following: (i) light, (ii) carbon dioxide concentration, (iii) temperature.

- (b) Make a labelled diagram of the human eye in vertical section. Outline how accommodation is brought about.

- (c) What are (i) tissues, (ii) organs?

Parenchyma, collenchyma and sclerenchyma are tissues. For each tissue give an outline account of its structure, location and function.

Give the meaning of the term meristem. Describe how you would demonstrate in the laboratory the presence of DNA in a meristem.

- (d) Draw a labelled diagram of a vertical section of a mammalian tooth. List the types of teeth found in mammals and give the precise function of each type.

State two of the main differences between the dentition of carnivores and herbivores with reference to a named example in each case.