L 41 M 44

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

Write Your Examination Number here

AN ROINN OIDEACHAIS

27164

LEAVING CERTIFICATE EXAMINATION 1994

BIOLOGY — HIGHER LEVEL

WEDNESDAY, 15 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:

(a) Which one of the following organisms has heterotrophic nutrition?

Yeast ☐ *Spirogyra* ☐ Buttercup ☐ *Fucus* ☐

(b) What is the human haploid chromosome number?

46 ☐ 48 ☐ 24 ☐ 23 ☐

(c) A dietary deficiency of which one of the following vitamins may lead to rickets?

Vitamin B ☐ Vitamin D ☐ Vitamin E ☐ Vitamin A ☐

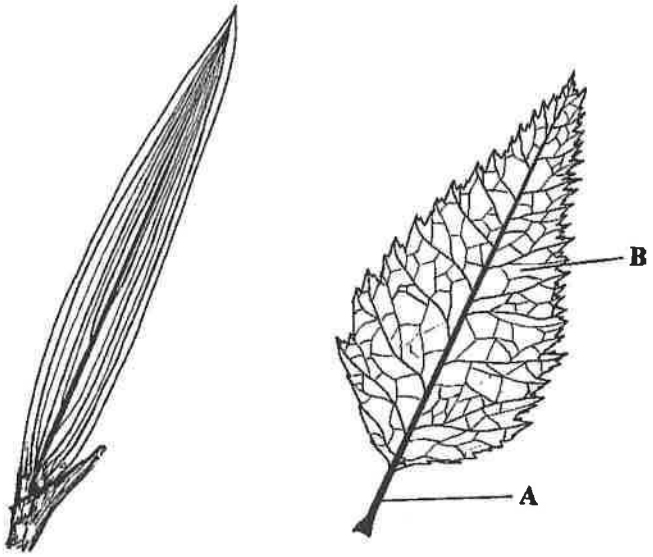
(d) In the human female fertilization normally takes place in the

Oviduct (Fallopian tube) ☐ Ovary ☐ Vagina ☐ Uterus ☐

(e) Which one of the following structures is part of a stamen?

Stigma ☐ Filament ☐ Style ☐ Receptacle ☐

2.



X Y

(a) Name a monocotyledon.....

(b) Which of the leaves X or Y is typical of monocotyledons?.....

(c) For each of the leaves state the term which is used to describe its venation (vein distribution)

X..... Y.....

(d) Name the parts A and B of leaf Y.

A..... B.....

(e) In the space below draw simple outline diagrams of transverse sections of (i) a monocotyledonous and (ii) a dicotyledonous stem to show the distribution of the vascular bundles.

Monocotyledon	*Dicotyledon*

3. State a precise location for each of the following.

(a) tricuspid valve.....

(b) pyloric sphincter.....

(c) Schwann cell.....

(d) medulla oblongata.....

(e) fovea.....

(f) prostate gland.....

(g) epiglottis.....

4. The diagram shows a human nephron.

(a) Draw in on the diagram the nephron's vascular supply including branches of the renal artery and vein. Label *three* parts which you have drawn.

(b) Name A, B, C.

A.....

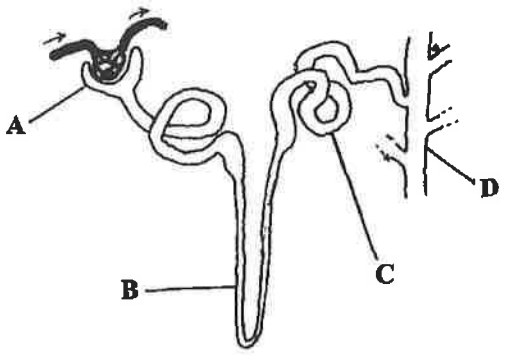
B.....

C.....

(c) Indicate on the diagram a target area for the hormone ADH.

(d) Name a process which takes place in D.

.....



5. In an experiment to investigate the growth of bacteria five sterile nutrient agar plates were treated as shown in the table and the results were observed after 48 hours.

Plate	Treatment	Placed in a	Observation
A	Left unopened	warm incubator	Plate clear
B	Left open in the laboratory for 5 minutes	warm incubator	A few colonies visible
C	Left open in the laboratory for 5 minutes	refrigerator	Plate clear
D	Left open in the dining hall during lunch time for five minutes	warm incubator	A lot of colonies visible
E	Surface of the agar covered with vinegar and then exposed as for D	warm incubator	Plate clear

(i) What does the term sterile mean with reference to the nutrient agar plates?

.....

(ii) What was plate A left unopened?.....

.....

(iii) What was the effect of the lower temperature on plate C? .....

.....

(iv) Explain why vinegar prevented bacteria growing on plate E. .....

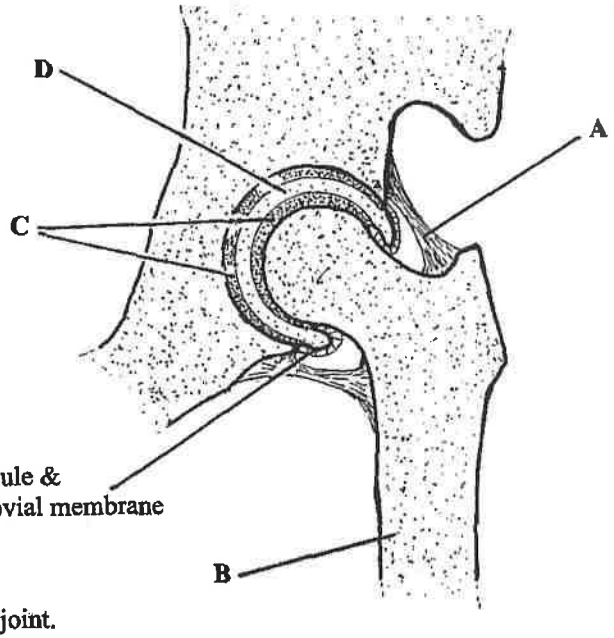
.....

(v) Name the method of food preservation shown by plate C. .....

(vi) What do the results for plate D suggest when compared to plate B?

.....

6. The diagram shows a vertical section through a hip joint.



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

A .....

B .....

C .....

D .....

(b) State the function of A.....

(c) State the function of C.....

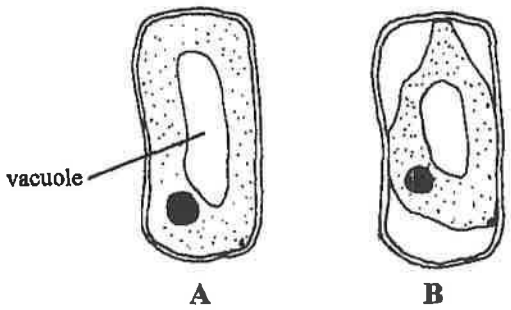
(d) State the function of D.....

(e) What type of joint is the elbow?.....

(f) Name and give a location in the body of one other type of joint.

Joint ..... Location .....

7. Diagram A shows a plant cell. Diagram B shows the same cell after it has been immersed in a certain solution for a period of time.



(a) Comment upon the concentration of the solution in which the cell was immersed.....

.....

(b) What term is used to describe the cell in diagram B?.....

(c) What procedure would you use to restore the cell in diagram B to its original condition?.....

.....

(d) If the cell in diagram A were placed in a different solution for the same length of time and then found to be unchanged what might be deduced concerning the concentration of this second solution?.....

.....

(e) Name two substances which you would expect to be present in the vacuole.

(i) ..... (ii).....

AN ROINN OIDEACHAIS

LEAVING CERTIFICATE EXAMINATION 1994

BIOLOGY — HIGHER LEVEL

WEDNESDAY, 15 JUNE — MORNING, 9.30 to 12.30

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)* Explain the following terms as used in genetics: homologous chromosomes, locus, alleles. (16)

(b) In the course of his study of inheritance in pea plants Mendel crossed plants which produced yellow seeds with ones that produced green seeds. He found that all the progeny produced yellow seeds. When these progeny were allowed to self-pollinate they produced 8023 plants of which 6022 produced yellow seeds and 2001 produced green seeds.

Using suitable symbols *and* simple chromosome diagrams show how these results were obtained. (30)

(c) Many years after Mendel had carried out his experimental crosses scientists investigated the inheritance of sex-linked traits of the fruit fly *Drosophila.* In one experiment a white-eyed male was crossed with a red-eyed female. All the progeny were red-eyed. These progeny were then crossbred and produced 4252 fruit flies. The following phenotypes constituted this second generation.

Red-eyed females	2128
White-eyed females	0
Red-eyed males	1069
White-eyed males	1055

Use suitable symbols *and* simple chromosome diagrams to show how the results of the crosses with the fruit flies were obtained. (24)

9. *(a)* (i) List *three* living and *three* non-living components of soil.

(ii) Give an outline account of the formation of soil. (30)

(b) Name a habitat which you have investigated. Answer the following by reference to this habitat.

(i) Name *two* producers and indicate the conditions which favours the presence of one of them.

(ii) Name a primary consumer and describe the procedures which you would adopt to estimate its population in the habitat.

(iii) What is a predator? Name a predator present in the habitat.

(iv) At which trophic level(s) would you find predators in a food web?

(v) In the case of the predator which you named in (iii) above describe two external features which are adaptations to its life in the habitat. (40)

10. *(a)* What is an enzyme? What is meant by specificity in relation to enzymes.
For each of the enzymes pepsin and amylase state (i) a site of secretion, (ii) a site of action, (iii) a substrate, (iv) a product. (30)

(b) In order to determine the effect of temperature on the inactivation of the enzyme trypsin the following experiment was carried out. Identical samples of the enzyme were subjected to a temperature of 60°C for varying periods of time. The percentage activity of each sample was then determined. The experiment was then repeated under the same conditions except for the fact that the temperature was raised to 80°C. Enzyme activity at 37°C was taken to be 100%.

The results of the investigations at 60°C and 80°C are shown in the following table.

Duration of heat treatment (minutes)	**Percentage (%) Activity of enzyme**	
	60°C	**80°C**
0	100	100
5	72	18
10	58	7
15	40	0
20	30	0
25	24	0
30	20	0

(i) On the graph paper provided draw graphs on the same axes to show the above results. Put duration of heating on the horizontal axis.

(ii) From your graphs determine how long it would take to reduce the enzyme's activity to 50% at 60°C *and* at 80°C.

(iii) If you were conducting this experiment how would you ensure that the temperature was maintained at 60°C?

(iv) Name a factor other than temperature which should be kept constant whilst testing the enzyme's percentage activity.

(v) What term is used to describe the condition of the enzyme sample that has been subjected to a temperature of 80°C for 15 minutes?

(vi) Suggest another way of reducing the enzyme's activity to 0%. (40)

11. *(a)* To which phylum do flatworms belong?

Name (i) a free-living flatworm; (ii) a parasitic flatworm. In the case of *each* of the organisms which you have named draw a labelled diagram to show its external structure.

Give one feature of each organism which may be considered an adaptation to its mode of living and explain the value of this feature to the organism. (46)

(b) Outline how you would distinguish in the field between organisms belonging to the following pairs of named phyla:

(i) Coelenterata (Cnidaria) and Echinodermata;

(ii) Nematoda and Annelida;

(iii) Arthropoda and Mollusca. (24)

12. *(a)* (i) Give an outline diagram to show the main features of the carbon cycle.

(ii) Explain each of the terms: oxidative phosphorylation; cyclic photophosphorylation. Give one location where each occurs. (30)

(b) What is meant by the term compensation point?

Describe an experiment which you would perform to demonstrate compensation point. (24)

(c) What happens to the rate of photosynthesis when a plant becomes light saturated? Using suitably labelled axes draw graphs to illustrate the effect of light saturation on the rate of photosynthesis in a shade plant and in a sun plant. (16)

13. *(a)* DNA in chromosomes, reducing sugar, water, protein, carbon dioxide, vitamin A *or* vitamin C.

For five of the substances in the above list state:

(i) the reagent(s) used in the laboratory to detect its presence;

(ii) the colour, if any, of the reagent(s);

(iii) the colour that indicates a positive reaction. (35)

(b) Multidisc, potometer, a named artificial plant hormone, Tullgren (or Baerman) funnel, clinostat.

Select *three* members of the above list and, in each case:

(i) state a use to which it may be put;

(ii) describe in detail how you would use it for the purpose you have stated. (35)

14. *(a)* Sporophytes and gametophytes occur in the life cycles of many plants. Explain the underlined terms. What is meant when a sporophyte or gametophyte is described as dominant? (18)

(b) In the case of the moss *or* fern and the flowering plant draw labelled diagrams to illustrate the gametophyte generations. Indicate, in each case, whether or not the gametophyte that you have drawn is dominant. (34)

(c) Referring to the moss *or* the fern explain the importance of (i) dry air, (ii) water, for the successful completion of the life cycle. (18)

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

(a) What is a virus? Why is it not possible to grow viruses in the laboratory using agar plates as is the case with bacteria?

For which of the following are viruses responsible:

tetanus, influenza, common cold, rabies, tuberculosis, ringworm?

It is possible to provide immunity against certain viruses by the introduction of a vaccine. What is a vaccine and how does its use result in immunity?

(b) Draw a large labelled diagram of a vertical section through human skin.

Outline the skin's role in each of the following:

(i) heat loss when internal body temperature rises;

(ii) heat retention when internal body temperature drops;

(iii) protection against ultra-violet light;

(iv) protection against invasion by pathogenic micro-organisms.

(c) What is a clone? Outline the significance of mitosis in relation to cloning. Give an example of the production of clones in nature.

Cloning is widely employed in horticulture. By reference to a named example of an artificial clone suggest one possible advantage and one possible disadvantage of cloning.

(d) Write notes on five of the following topics.

(i) the cell membrane;

(ii) lymph;

(iii) herbivorous dentition;

(iv) the thyroid gland;

(v) xerophytes;

(vi) sclerenchyma.