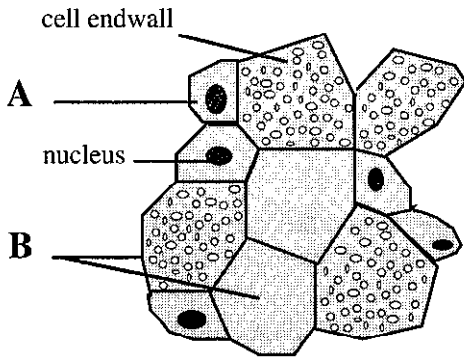




3. The diagram shows a flowering plant tissue in transverse section.



(a) Name the tissue shown.

.....

(b) Name the cell types labelled A and B.

A.....

B.....

(c) Where would you expect to find this tissue in a dicotyledonous stem during its first year of growth?

.....

(d) State the function of this tissue.

.....

(e) Name an experiment which you could carry out to investigate the function that you have given in (d).

.....

(f) In which zone of a young root is this tissue formed?

.....

(g) Define the term tissue.

.....

4. In each of the groups of terms below three have something in common which the fourth has not.

Underline the 'odd term' in each group. State the reason for your choice, including the relationship between the terms not underlined.

**Example:** crocodile          tortoise          frog          lizard

Reason: The frog is amphibian. The others are reptiles.

(a) pinna          retina          cochlea          ampulla

Reason: .....

.....

(b) tibia          fibula          ulna          femur

Reason: .....

.....

(c) wasp          spider          mosquito          house fly

Reason: .....

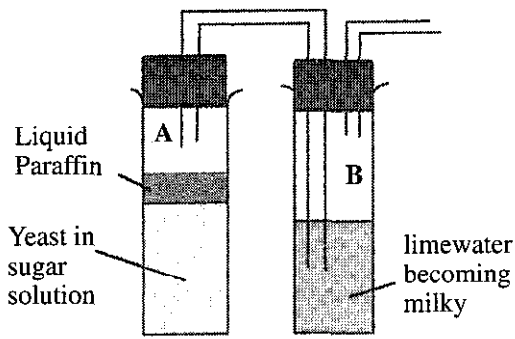
.....

(d) pulmonary vein          renal vein          hepatic vein          jugular vein

Reason: .....

.....

5. When the experiment shown in the diagram was set up the sugar solution in tube A was boiled and cooled before the addition of the yeast and the liquid paraffin.



- (a) What process is being investigated in this experiment?  
 .....
- (b) State the purpose of placing liquid paraffin in tube A.  
 .....
- (c) Why was the sugar solution boiled and cooled before the addition of the yeast?  
 .....

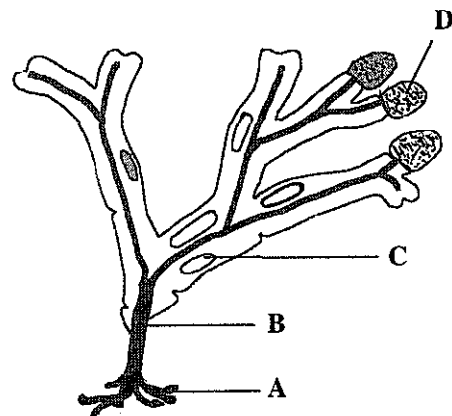
- (d) Suggest a control for this experiment.  
 .....

- (e) How would you keep the apparatus at a constant temperature?  
 .....

- (f) Name a substance which you would expect to find in tube A after a few days have elapsed.  
 .....

Write a chemical equation to show the formation by the yeast of the substance.  
 .....

6. The diagram shows *Fucus vesiculosus*, the common bladder wrack.



- (a) Name the parts labelled A, B, C, and D on the diagram.  
 A.....  
 B.....  
 C.....  
 D.....

- (b) *Fucus* is well adapted to life on the sea shore.

- (i) Give one feature shown in the diagram which is an adaptation to periods of high tide.  
 .....

- (ii) State the main problem confronting *Fucus* during the period of low tide.  
 .....

Indicate one way in which the plant overcomes this problem.  
 .....

- (c) State two ways, other than colour, in which *Fucus* differs from *Spirogyra*.

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

7. For each of the following distinguish clearly between the members of the pair of terms by writing a *brief* explanatory note on each term.

(a) hydrophyte and xerophyte

.....  
.....  
.....

(b) nitrogen fixation and nitrification

.....  
.....  
.....

(c) cuticle and bark

.....  
.....  
.....

(d) pharynx and larynx

.....  
.....  
.....

(e) epidermis and dermis

.....  
.....  
.....

## AN ROINN OIDEACHAIS

## LEAVING CERTIFICATE EXAMINATION, 1997

## BIOLOGY — HIGHER LEVEL

WEDNESDAY, 18 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)

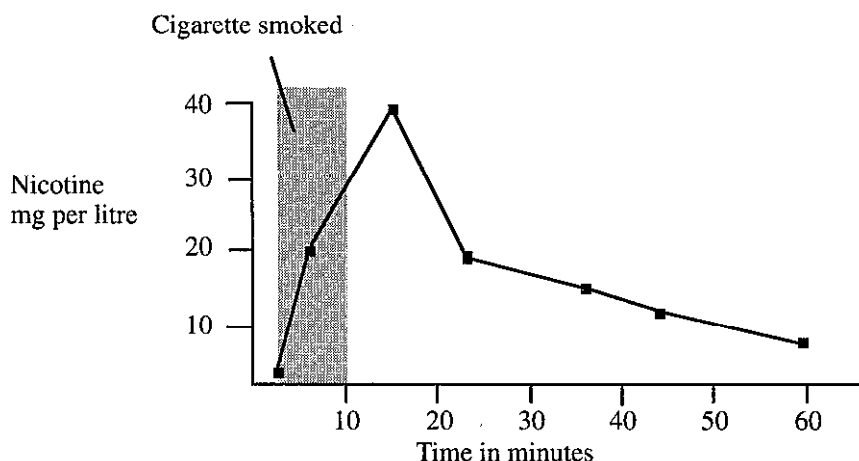
Write your answers to this part in your answer book.

Answer **four** questions. Each question carries 70 marks.

8. (a) Define each of the following terms: phenotype, linkage, locus, multiple alleles. (16)
- (b) In guinea pigs the allele for black hair (**B**) is dominant to the allele for brown hair (**b**) and the allele for short hair (**S**) is dominant to the allele for long hair (**s**). These two pairs of alleles are not linked.
- (i) Give the possible genotypes and phenotypes of the progeny of the following cross:  
black, short haired ( heterozygous for both) x brown, long haired
- (ii) Could progeny with the same phenotypes be produced in the above cross if the two pairs of alleles were linked? Explain your answer. (33)
- (c) List *three* areas of biological study which provide evidence for the occurrence of evolution. Select an example from *one* of these areas and describe how it provides evidence for evolution. (21)
9. (a) Draw a large diagram of the reproductive system of the human female and label five major parts. Indicate clearly on your diagram where (i) fertilisation, (ii) implantation, takes place. (20)
- (b) The hormones FSH, LH, oestrogen and progesterone regulate the events of the menstrual cycle.
- (i) Define the term hormone.
- (ii) State where each of the four hormones named is secreted.
- (iii) The level of oestrogen rises in the first half of the menstrual cycle.  
What stimulates this production of oestrogen?  
State what happens in response to the rising level of oestrogen.
- (iv) What results from the rapid drop in the level of oestrogen and progesterone towards the end of the cycle?
- (v) Give a function of FSH and a function of LH in relation to the male reproductive system. (50)

10. (a) Answer the following by reference to the ecosystem you have studied.
- Draw an outline map of the ecosystem to an appropriate scale.
  - Name and describe in detail one method you used to survey the distribution of plants and outline the system you used to record the results of the survey.
  - Draw up a food web containing a minimum of nine organisms and three trophic levels.
  - Draw a pyramid of numbers involving any three of the organisms which you named in (iii).
  - Distinguish between abiotic and biotic factors. (26)
- (b) What is meant by the conservation of species? State three reasons why it is considered desirable to conserve species. (16)
- (c) Write notes on *four* of the following:
- pollution, (ii) climax community, (iii) energy in the ecosystem, (iv) competition, (v) succession. (28)

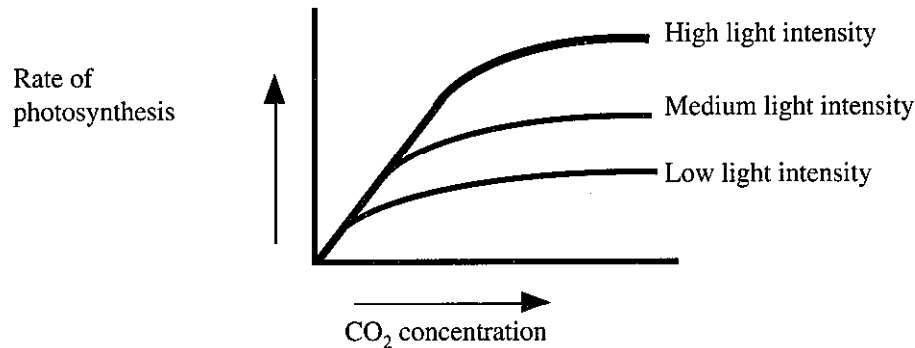
11. (a) (i) State, in relation to erythrocytes (red blood cells) in the adult human,
- an exact location in which they are formed;
  - one way, other than colour and function, in which they differ from white blood cells;
  - one way in which they are adapted so that they can pass through very narrow capillaries.
- (ii) Name the oxygen-transporting chemical present in erythrocytes *and* the mineral element which is a major component of this chemical. If a person shows signs of anaemia what does this signify?
- (iii) Outline the changes that take place leading to the formation of fibrin in order to stop the bleeding when, for instance, you cut a finger.
- (iv) State briefly the relationship between antigens, antibodies and lymphocytes. (46)
- (b) The graph shows the changes in nicotine in a person's blood during and after smoking a cigarette.



(Adapted from 'Biology Principles and Processes', Roberts, Reiss and Monger. Nelson. 1993.)

- By what process do you think nicotine entered the person's blood?
- Into which artery does the nicotine first pass?
- From the graph find how long it takes for the nicotine to reach its highest concentration in the blood **once the cigarette has been finished**.
- Which organ do you associate with the removal of toxic substances such as nicotine from the blood? State two other functions of this organ.
- It is known that smoking promotes the formation of clots in blood vessels. Suggest *one* way death could result from the formation of a clot within a blood vessel. (24)

12. (a) Give a labelled diagram of a vertical section through a leaf to show the arrangement of the cells. Cell contents and vascular structures are not required. (16)
- (b) The process of photosynthesis is composed of two stages, the light phase and the dark phase.
- State precisely where each stage takes place in the cell.
  - State briefly the meaning of the term light phase.
  - Name the three products of the light phase. Indicate which of these are required by the dark phase and state briefly the fate of any that are not required. (24)
- (c) The graphs show the results of experiments to measure the rate of photosynthesis at different light intensities.



Answer the following making use of the information in the graphs as appropriate.

- State the relationship between  $\text{CO}_2$  concentration and the rate of photosynthesis.
  - Explain the effect of varying light intensity on the rate of photosynthesis.
  - Why would you keep the temperature constant during this experiment? (30)
13. (a) Make a two-column table placing *Rhizopus* at the top of one column and *Phytophthora* at the top of the other column. Complete the table to compare and contrast the two organisms under the following headings:
- normal habitat,
  - type of nutrition,
  - unicellular or multicellular,
  - septate or aseptate hyphae,
  - production of zoospores,
  - presence or absence of haustoria,
  - presence or absence of rhizoids. (28)
- (b) In relation to the preservation of food explain the biological basis of each of the following procedures:
- salting meat,
  - drying fruit,
  - pickling vegetables,
  - pasteurising milk. (15)
- (c) Summarise how you would carry out the following practical procedures in the laboratory.
- The preparation of a sterile agar plate.
  - The transfer of bacteria from a soil sample to the agar surface.
  - The incubation of the inoculated agar plates. (27)
14. (i) Give details of how you would dissect an earthworm to display the gut. (24)
- (ii) Draw a large diagram of a transverse section through the intestinal region of an earthworm. Label the following parts on the diagram: coelom, longitudinal muscles, circular muscles, typhlosole, seta (chaeta), ventral and dorsal blood vessels, nephridium, nerve cord.
- State the function of the typhlosole and name the structures in the human alimentary canal that fulfil the same function. (34)
- (iii) Name three structures to be seen in a dissected earthworm, (other than those listed above) and state a function for each. (12)

(a) What are carbohydrates?

Name four carbohydrates and in each case state a role for that carbohydrate in living organisms.

Describe two different laboratory tests used in the identification of carbohydrates and name a carbohydrate identified by each test.

- (i) State one way in which carbohydrates are similar to fats and one way in which they are different.
- (ii) Name an element which is always present in proteins but does not occur in carbohydrates.

(b) Answer this section by reference to the moss **or** fern. State which plant you have chosen.

- (i) Explain what is meant by dominant in relation to alternation of generations.
- (ii) Which generation is dominant in your chosen plant? Is this generation haploid or diploid?
- (iii) Draw a labelled diagram of the female reproductive organ. Where is this organ located?
- (iv) Describe the events that lead to fertilization following the release of the male gametes.
- (v) What type of division does the zygote first undergo?
- (vi) Explain why dry air is essential at one point for the successful completion of the life cycle.
- (vii) Explain the term vascular plant. Is the plant that you have chosen vascular or non-vascular?

(c) (i) Name four mineral elements which are required for the healthy growth of flowering plants. Give a function in the plant for each of *two* of the elements named.

(ii) In relation to mineral nutrition in flowering plants state (a) where and how minerals enter a plant, (b) how they are transported through the stem to the leaves.

(iii) Describe an experiment which you would carry out to determine the effects of the deficiency of a mineral in a plant. Include a labelled diagram in your answer.

(d) Give a precise biological explanation for *seven* of the following.

- (i) Most plants are perceived as green by the human eye.
- (ii) The necessity for killing aphids (e.g. green fly) on crop plants.
- (iii) *Spirogyra* does not have a contractile vacuole.
- (iv) Blood glucose levels rise in times of stress.
- (v) The human male is far more likely to suffer red-green colour blindness than the female.
- (vi) The volume of urine produced by a person may be considerably reduced during periods of very hot weather.
- (vii) Colour vision deteriorates as daylight declines in the evening.
- (viii) The extensive use of antibiotics in agriculture may pose a threat to human health.