Write your Examination Number here ☞

Coimisiún na Scrúduithe Stáit
State Examinations Commission

LEAVING CERTIFICATE EXAMINATION, 2010

BIOLOGY - ORDINARY LEVEL

THURSDAY, 17 JUNE - MORNING, 9.30 to 12.30

Section A Answer any **five** questions from this section.
Each question carries 20 marks.
Write your answers in the spaces provided on **this examination paper**.

Section B Answer any **two** questions from this section.
Each question carries 30 marks.
Write your answers in the spaces provided on **this examination paper**.

Section C Answer any **four** questions from this section.
Each question carries 60 marks.
Write your answers in the **answer book**.

It is recommended that you should spend not more than 30 minutes on Section A and 30 minutes on Section B, leaving 120 minutes for Section C.

You must return this examination paper with your answer book at the end of the examination.

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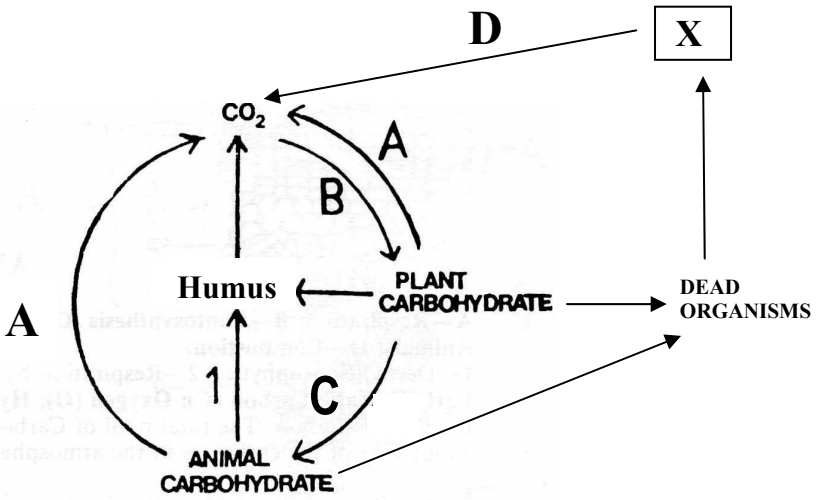
Section A

Answer any <u>five</u> questions.
Write your answers in the spaces provided.

1. (a) The diagram shows the carbon cycle.



Name the processes A, B, C, and D.

A. _____ B. _____

C. _____ D. _____

(b) Name the substances labelled X. _____

(c) Why are elements recycled in nature? _____

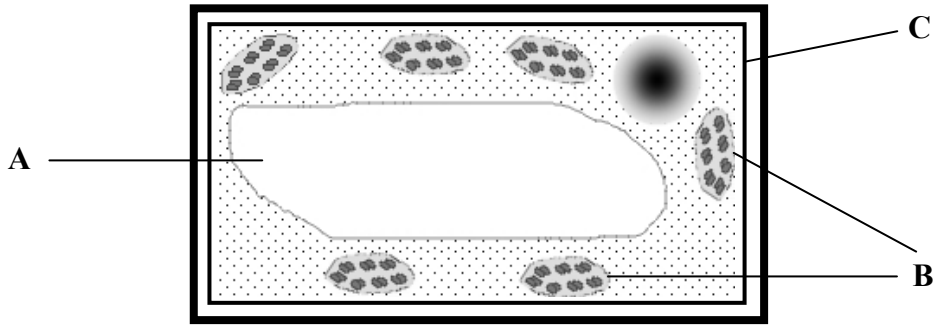
_____

(d) Name **one** group of organisms responsible for process 1 in the diagram. _____

2. Indicate whether each of the following statements is true (T) or false (F) by drawing a circle around T or F in each case.

Example: Polysaccharide molecules contain many sugar units.	**(T)**	**F**
(i) Cellulose is a protein.	**T**	**F**
(ii) Iodine turns starch to a blue-black colour.	**T**	**F**
(iii) Lipids are made of amino acids.	**T**	**F**
(iv) All vitamins are fat soluble.	**T**	**F**
(v) Eggs are a good source of fat in the diet.	**T**	**F**
(vi) Nitrogen is a trace element.	**T**	**F**
(vii) Glucose is a monosaccharide.	**T**	**F**

3. The diagram shows a cell.



(a) Is this a plant cell or an animal cell? _____

Give **two** reasons for the answer given above.

1. _____

2. _____

(b) Name the structures labelled A, B and C in the diagram.

A. _____

B. _____

C. _____

(c) Name a substance found in A. _____

4. Choose each term from the following list and place it in **Column A** to match a description from **Column B.** The first one has been completed as an example.

Dominant **Gamete** **Gene** **Mutation** ~~**Genetics**~~ **Genotype**

Column A	**Column B**
Genetics	**The study of biological inheritance**
(i)	The genetic make up of an individual
(ii)	A sex cell
(iii)	A change in the structure of DNA
(iv)	A part of DNA with information to make one protein
(v)	The allele expressed in the heterozygous condition

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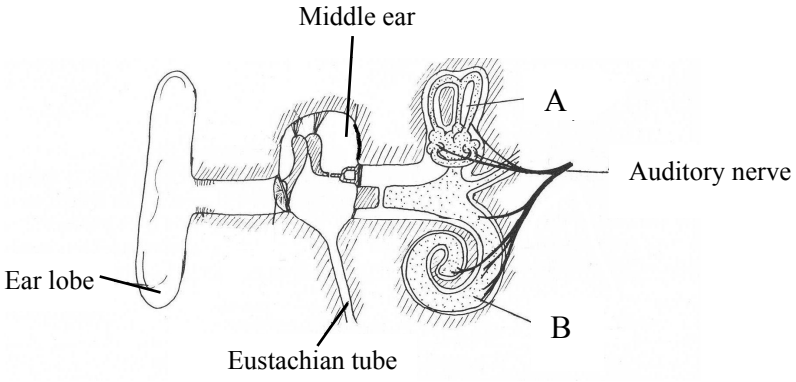
5. The diagram shows the external and internal structure of the human ear.



(i) Name the parts labelled A and B.

A. _____

B. _____

(ii) What is the function of B? _____

(iii) What is connected to the middle ear by the Eustachian tube? _____

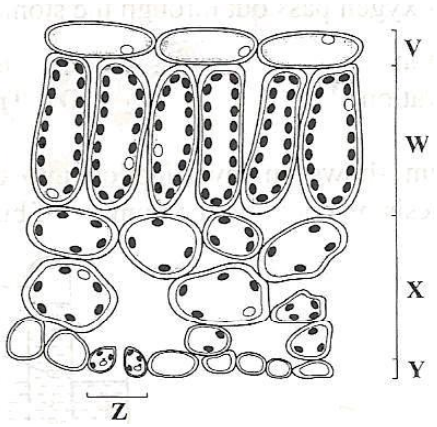
(iv) What is the function of the Eustachian tube? _____

(v) Name **one** disorder of the ear **or** of the eye and give a corrective measure for the disorder you have named.

Disorder. _____

Corrective measure. _____

6. The diagram below shows the internal structure of a leaf.



(i) Name the **one** tissue type that is found at **both** V and Y.

_____

(ii) The cells at W contain many organelles that carry out photosynthesis.
Suggest why the cells at W contain more of these organelles than the cells at X.

_____

_____

(iii) In layer X, gases can diffuse throughout the leaf.

Name **one** such gas. _____

(iv) State **one** function of the opening at Z.

_____

(v) Name the cells which are responsible for controlling the size of the opening at Z.

_____

[OVER

Section B

Answer any <u>two</u> questions.
Write your answers in the spaces provided.
Part (a) carries 6 marks and part (b) carries 24 marks in each question in this section.

7. In one of your laboratory activities you isolated DNA from a plant tissue.

(a) (i) Where in plant cells is DNA found? _____

(ii) What is meant by DNA profiling? _____

_____

_____

(b) (i) Give **one** reason why you first chopped the plant material into very small pieces.

_____

(ii) Detergent and salt were added to the chopped plant material, which was then heated.

Explain why the detergent was used. _____

_____

(iii) **How** was this mixture heated?

_____

(iv) **Why** was this mixture heated?

_____

(v) Later in the activity the mixture was blended for a maximum of 3 seconds.

What would happen to the DNA if the mixture was blended for longer than 3 seconds?

_____

(vi) Protease was then added to the mixture.

Why was protease added?

_____

(vii) The mixture was then filtered.

After filtration, where was the DNA of your plant tissue to be found?

_____

(viii) What should you do next to make the DNA visible?

_____

8. (a) (i) What is an enzyme? _____

(ii) Explain what is meant by the term *pH*. _____

_____

(b) Answer the following questions in relation to your investigation into the effect of pH on the rate of enzyme activity.

(i) Name the enzyme you used in this investigation. _____

(ii) Name

1. The substrate of this enzyme. _____

2. The product of this enzyme. _____

(iii) Draw a labelled diagram of the apparatus you used in your investigation.

(iv) How did you vary the pH? _____

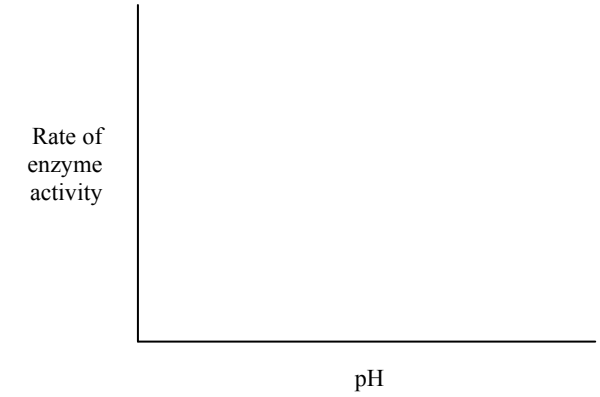
_____

(v) Name **one** factor you kept constant. _____

(vi) How did you keep the named factor constant? _____

_____

(vii) Draw a graph, on the axes given below, to show the results of this investigation.



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9. (a) (i) In biology, what is meant by the term *organ*? _____

_____

(ii) In school, a light microscope is normally used to examine cells and tissues.
Name a more powerful type of microscope that is used to show what cells are made of in much greater detail (cell ultrastructure).

_____

(b) Answer the following questions in relation to how you prepared and examined with a microscope a transverse section (T.S.) of a dicotyledonous stem.

(i) Name the plant that you used. _____

(ii) How did you make a section of the stem **and** prepare it for examination?

_____

_____

_____

_____

_____

_____

(iii) Describe how you examined your section of stem once you had placed the slide on the stage of the microscope.

_____

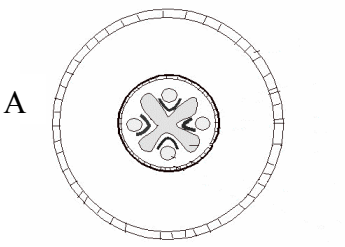
_____

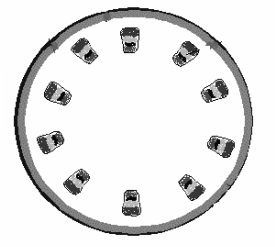
_____

_____

(iv) Which of the following diagrams, A or B, best represents what was seen on your slide?

_____

A 

B 

Section C

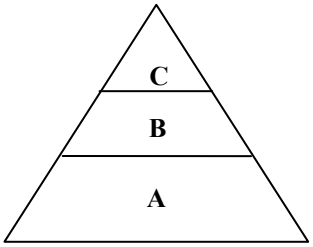
Answer any four questions.
Write your answers in the answer book.

10. (a) In ecology we study ecosystems, habitats and communities, in which every organism has its own niche.
Explain what is meant by
(i) *an ecosystem*
(ii) *a habitat*
(iii) *a niche*. (9)

(b) (i) Name an ecosystem you have studied **and** construct a simple food chain from that ecosystem.

(ii) What is meant by a *trophic* level?

(iii) Name the trophic levels A, B and C in the pyramid of numbers shown below.



(iv) If all the organisms at C were removed (e.g. by disease) suggest what would happen to the organisms at B?

(27)

(c) The great pressure put on wildlife by the growing human population has caused many species to become extinct. Habitat destruction, over-exploitation and environmental pollution have been the main causes.
There is a clear need for conservation if such a trend is to be halted. Conservation has many practical outcomes from which humans will benefit in future years.

(Adapted from Advanced Biology, 3rd Edition, J. Simpkins, J. I. Williams)

(i) Explain the underlined words from the passage.

(ii) State the effect of any **one** named pollutant.

(iii) Outline **one** conservation measure carried out by **one** of the following industries:

agriculture **or** forestry **or** fisheries.

(iv) Name **one** problem associated with waste disposal.

(v) State **one** role of microorganisms in waste management. (24)

[OVER

11. (a) Many characteristics are passed on to children by their parents.

(i) Give **one** example of an **inherited** human characteristic.

(ii) Give **one** example of a **non-inherited** human characteristic.

(iii) Which structures in sperm and egg nuclei are responsible for biological inheritance? (9)

(b) When a pure-breeding black cat was mated with a pure-breeding white cat, all the kittens were black.

(i) Which fur colour, black or white, is **recessive** in these cats?

(ii) Using capital letters for dominant and lower case letters for recessive, give:

1. The genotypes of the parent cats.

2. The genotype of the kittens.

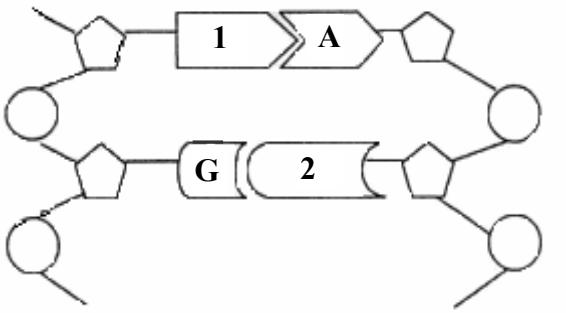
(iii) Is the genotype of the kittens referred to as homozygous or heterozygous?

(iv) Give a reason for your answer to part (iii).

(v) In relation to fur colour, what will be the genotypes of the gametes that these kittens will produce?

(vi) What are *alleles*? (27)

(c) The diagram shows a short section of a DNA molecule.



(i) Name the bases numbered 1 and 2 in the diagram above.

(ii) Protein synthesis involves both transcription and translation.

Where in a cell does **transcription** occur?

(iii) What type of RNA is involved in transcription?

(iv) In what organelle does **translation** occur?

(v) Name the small biomolecules that are joined together to make a protein.

(vi) What must happen to the newly formed protein before it can begin to work?

(vii) Give **one** function of proteins in living organisms. (24)

12. (a) (i) What is meant by *metabolism*?

(ii) Give **two** reasons why living things need energy. (9)

(b) (i) Which biological process is represented by the following word equation:

glucose + *oxygen* → *carbon dioxide* + *water* + *energy?*

(ii) The above process occurs in two stages, Stage 1 and Stage 2, that take place in different parts of the cell.

Say where in the cell Stage 1 occurs **and** where in the cell Stage 2 occurs.

(iii) Does the whole process release a large amount or a small amount of energy?

(iv) Write a word equation to show what happens when **yeast** breaks down glucose in the absence of oxygen.

(v) Give **one** industrial application of this process.

(vi) When **muscles** break down glucose in the absence of oxygen, one main product is produced. Name this product. (27)

(c) (i) Draw a labelled diagram of the apparatus you used to investigate the effect of light intensity **or** carbon dioxide concentration on the rate of photosynthesis.

(ii) How did you vary the light intensity **or** the carbon dioxide concentration?

(iii) How did you measure the rate of photosynthesis?

(iv) What is the relationship between the rate of photosynthesis and **either** the light intensity **or** the carbon dioxide concentration

(v) Most Irish tomatoes are grown in greenhouses. State **two** ways a commercial producer could increase her/his crop yield of tomatoes. (24)

[OVER

13. (a) (i) What is meant by a 'balanced' diet?

(ii) Distinguish between autotrophic nutrition and heterotrophic nutrition. (9)

(b) (i) Explain the word *digestion*.

(ii) Give **one** role for **each** of the following types of teeth:
1. Incisors
2. Molars.

(iii) Peristalsis begins when food enters the oesophagus.
What is meant by *peristalsis*?

(iv) Describe the following changes that happen to food in the stomach:
1. Mechanical changes
2. Chemical changes.

(v) What is the pH of the stomach contents?

(vi) Where does the partially digested food go when it leaves the stomach? (27)

(c) The liver, the gall bladder and the pancreas all play a part in digestion. Digested food is carried to the liver where it is processed. Undigested food enters the large intestine.

(i) State
1. **One** role of the pancreas in digestion.
2. **One** role of the gall bladder in digestion.

(ii) From what part of the digestive system does the digested food enter the blood?

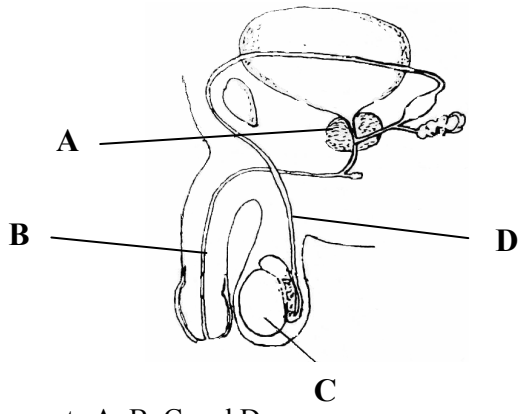
(iii) Name the blood vessel that carries the digested food to the liver.

(iv) State **two** functions of the liver – other than the processing of digested food.

(v) The colon contains many symbiotic bacteria – mostly 'good' bacteria.
State **two** benefits we get from these bacteria. (24)

14. Answer any **two** of the parts (a), (b), (c). (30, 30)

(a) The diagram shows the human male reproductive system.



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

(ii) What is the function of part D?

(iii) Name the principal male sex hormone.

(iv) Name **two** male secondary sexual characteristics.

(v) Draw a labelled diagram of a human sperm cell.

(b) The diagram shows a foetus in the uterus.

(i) From what tissues is the placenta formed?

(ii) Give **two** functions of the placenta.

(iii) Describe the process of birth.

(iv) Give any **one** biological benefit of breastfeeding.

(v) List **two** methods of contraception.

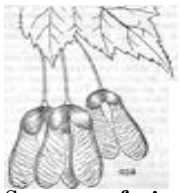
(c) (i) What is meant by *fertilisation*?

(ii) Name the part of the flower in each case
1. Where fertilisation occurs
2. That becomes the fruit.

(iii) Each seed is made up of an embryo, a food store and a seed coat (testa). One function of fruit is to aid dispersal.

Explain **each** of the underlined terms.

Blackberries



Sycamore fruit

(iv) By which method is **each** of the fruits shown above dispersed?

(v) What term is given to the growth of an embryo into a plant?

(vi) In order for this growth to be successful, certain environmental conditions must be present. Name any **two** of these conditions.

[OVER

15. Answer any **two** of the parts (a), (b), (c). (30, 30)

(a) Water is vital for the survival of living things. Plants absorb water from the soil.

(i) Through which microscopic **structures** does water enter a plant from the soil?

(ii) By what **process** does water enter a plant?

(iii) Name the **tissue** that water travels through in a plant.

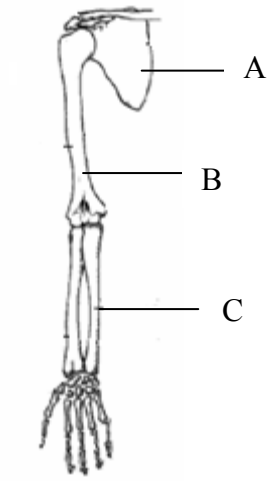
(iv) Draw a labelled diagram of one cell of the tissue referred to in (iii) above.

(v) Name **one** process that causes water to move upwards in a plant.

(vi) Consider that night has fallen and the plant is in darkness.
Suggest what will happen to the **amount** of water moving through the plant **and** give a reason for your answer.

(vii) State **two** ways by which plants have adapted to protect themselves.

(b) The diagram shows the bones of the human arm.



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

(ii) What structures attach a muscle to a bone?

(iii) Which upper arm muscle contracts to raise the lower arm?

(iv) What is meant by the term *antagonistic pair* in reference to muscles?

(v) Name the type of joint at the elbow.

(vi) Apart from movement, give **one** other function of the skeleton.

(vii) Suggest **one** reason why the bones of birds are almost hollow.

(c) *Rhizopus* is a type of mould often found growing on stale bread.

(i) Draw a diagram of *Rhizopus* **and** on it label a hypha, a sporangium and a sporangiophore.

(ii) Explain how *Rhizopus* gets its food.

(iii) What form of heterotrophic nutrition does *Rhizopus* have?

(iv) Outline the importance of this type of nutrition in nature.

(v) To what kingdom does *Rhizopus* belong?

(vi) Name **one** economically harmful member of this kingdom.

(vii) Mushrooms also belong to this kingdom. A restaurant owner decides to collect and cook wild mushrooms from a local forest.

Suggest **one** reason why this may not be a good idea.

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