Write your Examination Number here ⇨

Coimisiún na Scrúduithe Stáit
State Examinations Commission

LEAVING CERTIFICATE EXAMINATION, 2016

BIOLOGY – ORDINARY LEVEL

TUESDAY, 14 JUNE – AFTERNOON, 2.00 – 5.00

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.

Section A

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

1. Use your knowledge of ecology to answer the following questions.

(a) A herbivore is an animal that feeds on.....

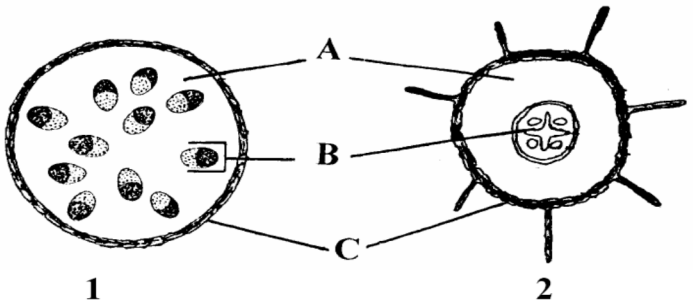
(b) The functional role of an organism in an ecosystem is called its .....

(c) A decomposer is an organism that feeds on.....

(d) In an ecosystem, the term *edaphic factor* refers to the.....

(e) The term *fauna* refers to.....

2. The diagram shows the internal structure of two plant parts.



(a) The letters A, B, C in the diagram represent three different tissue types.
Match **each** letter with its correct tissue type in the following list:

Vascular tissue ……..

Dermal tissue …….

Ground tissue …….

(b) Which of the two parts, 1 or 2, represents a young root? …….

(c) Give **one** feature of the part you have chosen that indicates it is a root.

…….....

…….....

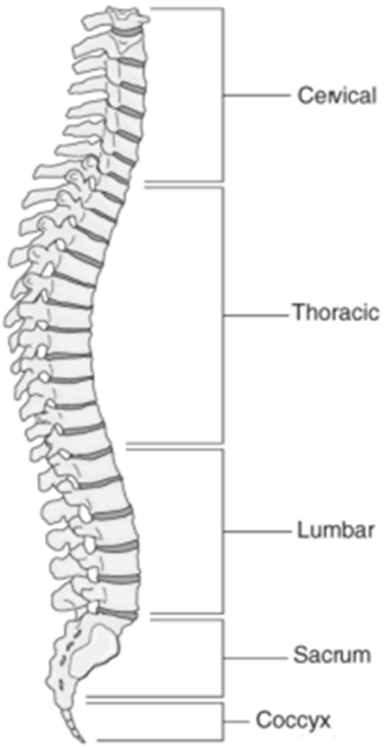
(d) Give **one** function of dermal tissue in plants. .....

(e) Give **one** function of ground tissue in plants. .....

3. Indicate whether the following statements are true or false by drawing a circle around **T** or **F** in each case.

Example:	**All cells have a cell membrane.**	**(T)**	**F**
(a)	Diffusion is the movement of molecules from where they are more concentrated to where they are less concentrated.	T	F
(b)	Semi-permeable means all substances can pass through.	T	F
(c)	Turgor pressure helps to give shape to plant cells.	T	F
(d)	Osmosis is the basis for some methods of food preservation.	T	F
(e)	Energy is required for diffusion to happen.	T	F
(f)	Osmosis concerns the movement of water.	T	F
(g)	Oxygen passes from our lungs to our blood by osmosis.	T	F

4. The diagram shows a section of the human skeleton.



(a) What common name is given to this section of the human skeleton?

…….....

(b) This section is made up of many small bones. What name is given to these bones?

…….....

(c) Discs are found between these small bones. What are these discs made from?

.....

(d) Give **two** functions of the human skeleton.

(i) .....

(ii) .....

(e) Arthritis and osteoporosis are two disorders of the musculoskeletal system. Answer the following in relation to **either** of the above disorders.

Name of disorder: .....

(i) **One** possible cause. .....

(ii) **One** treatment for the disorder. .....

5. Place each term from the following list into **Column B** to match a description in **Column A**. The first one has been completed for you.

~~**Hypothesis**~~, Control, Data, Blind test, Theory, Replicate.

Column A	**Column B**
An educated guess based on observations	**Hypothesis**
(a) Repeating an experiment	
(b) Information gathered during experiments	
(c) Used for comparison in experiments	
(d) Where only the investigator knows what treatment the participant is receiving	
(e) An idea supported by different experiments	

6. In humans, the allele for brown hair (B) is dominant to the allele for red hair (b). Complete the following cross between a brown haired man and a red haired woman.

Genotypes of parents (Bb) × (bb)

Possible gametes ( ) ( ) × ( )

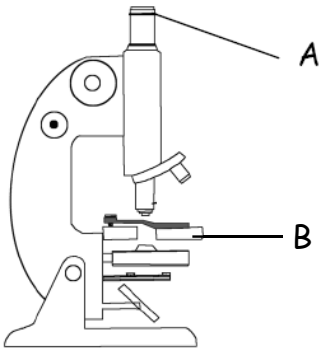
Genotypes of offspring ( ) ( )

Matching phenotypes of offspring ……. ……

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. (a) Name the parts of the light microscope labelled A and B.



A ……

B ……

(b) Answer the following questions in relation to obtaining and staining a sample of plant cells and viewing them under the microscope.

(i) From what plant did you obtain the cells?

……

(ii) How did you prepare the slide of the plant cell sample for examination?

……

……

……

……

(iii) What stain did you use on the cells?

……

(iv) How did you apply the stain?

……

……

(v) There are usually 3 objective lenses on a microscope – low, medium and high power. Which objective lens should you begin with when using the microscope?

……

(vi) Give **one** cell structure that you observed that indicated that the cells were plant cells.

……

[OVER]

8. (a) (i) To which group of biomolecules do enzymes belong?

……...

(ii) Give **one** biological explanation why washing powder may contain enzymes.

……..

(b) Answer the following 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 the substrate of this enzyme. ……

(iii) How did you vary the pH?

……..

……

(iv) Name **one** factor you kept constant.

……

(v) How did you keep this factor constant?

……

……

(vi) How did you measure the rate of enzyme activity? ……

……

……

(vii) What was the result of your investigation? ……

……

……

9. (a) Give **two** reasons why water is important for all living organisms.

(i)…….

(ii)…….

(b) For what purpose did you use each of the following in the course of your practical activities?

(i) Anaerobic jar.

Purpose. ……

(ii) Backed blade.

Purpose. ……

(iii) Sodium alginate.

Purpose. ……

(iv) Pooter.

Purpose. ……

(v) Freezer-cold ethanol.

Purpose. ……

(vi) IAA.

Purpose. ……

(vii) Starch agar or milk agar.

Purpose. ……

(viii) Limewater.

Purpose. ……....

[OVER]

Section C

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

10. (a) Explain the following terms used in genetics.

(i) Genotype.
(ii) Allele.
(iii) Haploid. **(9)**

(b) (i) The structure of DNA is organised into strands.
How many strands are there in DNA structure?
(ii) Blood samples can be put through a process called DNA profiling.
Explain the term *DNA profiling*.
(iii) During DNA profiling cells are broken down to release the DNA, which is then cut into fragments. The fragments are then separated.
1. What is used to cut the DNA?
2. On what basis are the DNA fragments separated?
(iv) Give **two** applications of DNA profiling.
(v) What is meant by genetic screening?

(27)

(c) The giant deer or 'Irish Elk' was a mammal that became extinct in Ireland about 9,000 years ago. Fossils of the 'Irish Elk' found in bogs and mud-dried lakes have been used to study the animal. Fossils are the remains of something that lived a long time ago and provide evidence that evolution has occurred. The study of these fossils has shown that the antlers of the deer measured about 3 m from tip to tip. Many possible causes, such as disease, severe cold or over-hunting have been put forward as to why the animal became extinct.

(i) What is a fossil?
(ii) Name **two** places where fossils of the 'Irish Elk' were found.
(iii) When did the 'Irish Elk' become extinct in Ireland?
(iv) Suggest **one** reason why this animal became extinct.
(v) What is meant by evolution?
(vi) Name **either one** of the two 19th century British naturalists who introduced the theory of evolution by natural selection.

(24)

11. (a) Explain the following terms used in ecology.

(i) Carnivore.
(ii) Abiotic factor.
(iii) Consumer. **(9)**

(b) There are many bee species in Ireland. Some of these species are bumblebees. The queen bee comes out of hibernation in the spring and makes a nest, often in an old mouse hole. Fertilised eggs become female worker bees. Unfertilised eggs become males and these leave the colony. Bumblebees are very important for pollination. When the female bee lands on a flower, she collects nectar and pollen from the flower. Bee numbers are in decline, in part due to the loss of their habitats. Many bee habitats have been lost due to farming, forestry and housing. Conservation programmes will have to be introduced if we are to halt this decline.

(i) When does the queen bee come out of hibernation?
(ii) Where does she make her nest?
(iii) What do unfertilised eggs become?
(iv) Name **two** substances that the female bee collects from the flower.
(v) Explain the term *habitat*.
(vi) Give **one** reason why bee habitats have been lost.
(vii) What is meant by conservation? **(27)**

(c) Humans can have many effects on an ecosystem, e.g. pollution.

(i) Explain the term *pollution*.
(ii) Give **one** effect of a **named** pollutant in agriculture, industry or the home.
(iii) Give **one** specific way of controlling the pollution referred to in (ii) above.
(iv) Give **one** example of good waste management from agriculture, fisheries **or** forestry.
(v) Give **two** ways to minimise domestic waste.

(24)

[OVER]

12. (a) Give **one** role for **each** of the following in defence against disease.

(i) The skin.
(ii) Cilia in the airway.
(iii) Acid in the stomach. **(9)**

(b) (i) Draw a large labelled diagram of a typical bacterial cell.
(ii) Bacteria may be classified by their shape.
Name any **two** bacterial shapes.
(iii) Name the method by which bacteria reproduce.
(iv) 1. What structure do some bacterial cells form to survive harsh environmental conditions?
2. Give **one** example of such harsh environmental conditions.
3. What happens to the structure when environmental conditions return to normal?

(27)

(c) Answer the following questions in relation to the human endocrine system.

(i) Explain the term *endocrine*.
(ii) Give the location of a named endocrine gland in the body.
(iii) What is a hormone?
(iv) Name a hormone produced by the gland referred to in part (ii).
(v) Give a function of this hormone.
(vi) Give a deficiency symptom of this hormone.
(vii) Give **one** corrective measure for this deficiency.

(24)

13. (a) (i) Explain the term *metabolism*.

(ii) There are two types of metabolism – anabolism and catabolism.
State whether **each** of the following processes is an example of anabolism or catabolism.
1. Respiration.
2. Photosynthesis. **(9)**

(b) (i) Explain the term *respiration*.

(ii) Aerobic respiration occurs in two stages. Where in the cell does
1. Stage 1 occur?
2. Stage 2 occur?

(iii) Write a word equation for **aerobic** respiration.

(iv) What is meant by **anaerobic** respiration?

(v) Does aerobic respiration or anaerobic respiration produce more ATP?

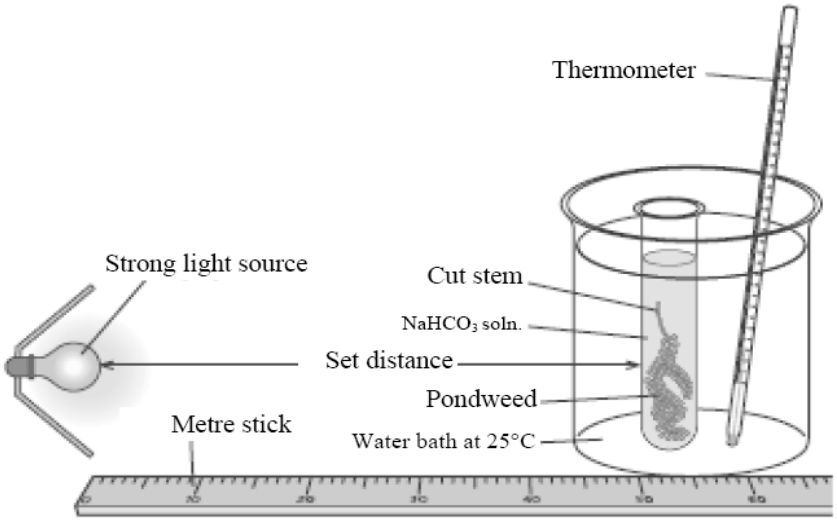
(vi) Fermentation is a form of anaerobic respiration carried out by yeasts.
Name **one** product of this fermentation.

(vii) What acid is produced when anaerobic respiration occurs in human muscle?

(27)

(c) (i) Explain the term *photosynthesis*.

(ii) The apparatus shown below may be used to investigate the effect of environmental factors on the rate of photosynthesis.
1. Name **one** environmental factor that has an effect on the rate of photosynthesis that could be investigated using the apparatus shown.
2. How would you vary this factor?
3. How would you measure the rate of photosynthesis?



(iii) From your knowledge of photosynthesis, suggest **two** ways by which a gardener could artificially increase the yield of vegetables in a greenhouse.

(24)

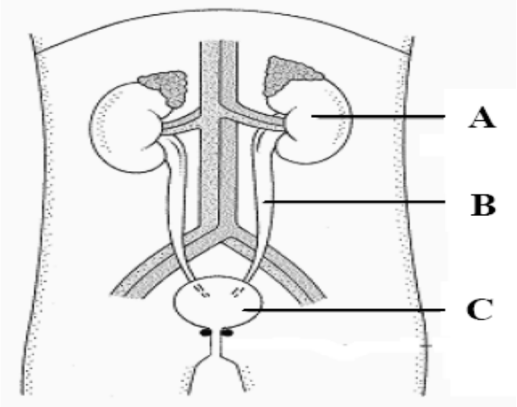
[OVER]

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

(a) Answer the following in relation to blood.

(i) What is blood plasma?
(ii) Name **two** types of cell found in the blood and give a function for **each**.
(iii) The ABO blood group system has four blood groups. Name any **two** of these groups.
(iv) Blood groups can be positive (+) or negative (−) according to whether the blood contains or does not contain a particular factor. Name this factor.
(v) Suggest a reason why it is important to know a person's blood group.
(vi) What is the function of platelets in the blood?

(b) (i) Explain the term *excretion*.
(ii) The diagram shows the human urinary system. Name the parts labelled A and B.
(iii) Give the function of the part labelled C.



(iv) Name **two** substances excreted by part A.
(v) Name the region of part A in which **each** of the following takes place:
1. Filtration.
2. Reabsorption.
(vi) Give a function of part A other than excretion.

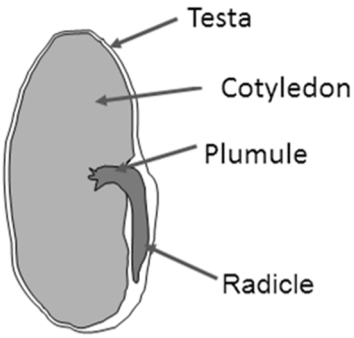
(c) (i) In the female menstrual cycle what is meant by the fertile period?
(ii) Name **two** hormones that have a role in the menstrual cycle.
(iii) What is meant by the term *infertility*?
(iv) Give **one** cause of infertility in women.
(v) *In vitro* fertilisation is one method used to deal with infertility. What is meant by *in vitro* fertilisation?
(vi) The placenta is a structure that forms in the womb between the mother and baby during pregnancy. Give **two** functions of the placenta.
(vii) Many babies are breast fed after birth. Give **two** benefits of breastfeeding.

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

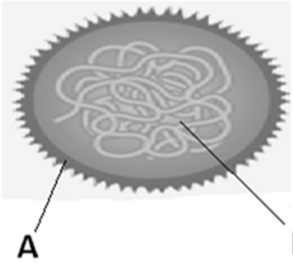
(a) (i) What is meant by vegetative propagation?

(ii) Give **two** examples of vegetative propagation and state whether **each** involves a stem, a root, a bud or a leaf.

(iii) Seeds are produced in flowering plant sexual reproduction.
In your answerbook, match each of the four labelled parts in the diagram of the seed with its correct function, from the following list:
1. Part that becomes the shoot.
2. Food store for seed.
3. Part that becomes the root.
4. Protection.



(b) The diagram shows a virus.



(i) Name the parts labelled A and B.

(ii) Name **two** diseases in humans caused by viruses.

(iii) Suggest **two** methods of transmission of viruses.

(iv) Why are viruses called obligate parasites?

(v) Viruses can be used in the production of vaccines.
What is a vaccine?

(vi) Antibiotics are not usually given to a person suffering from a viral infection.
Suggest a reason for this.

(c) Alzheimer's disease is a brain disorder that slowly destroys memory and thinking skills. Symptoms can include wandering and getting lost, repeating questions, problems recognising family and friends. Scientists believe that brain damage occurs due to over-production of amyloid protein. It is thought that as people age, social engagement and mentally stimulating pursuits may help to delay the onset of this disease.

(i) What **two** skills are destroyed by Alzheimer's disease?

(ii) Name the protein that may cause the brain damage associated with the disease.

(iii) Give **two** symptoms of Alzheimer's disease.

(iv) Give **one** possible activity that may delay the onset of the disease as people age.

(v) Nerve messages are carried around the body by neurons.
Name any **two** types of neuron.

(vi) Parkinson's disease and paralysis are other disorders associated with the nervous system.
Clearly choose **either** of these disorders and in relation to the one you have chosen give:
1. **One** possible cause.
2. **One** treatment.

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