2022.M44C

2022L025A1EC

Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination

Biology

Sections A and B and Answerbook

Higher Level

3 hours

290 marks

Examination Number

Day and Month of Birth

For example, 3rd February is entered as 0302

Centre Stamp

Instructions

Write your Examination Number and your Day and Month of Birth in the boxes on the front cover.

Write your answers to all parts of the examination into this answerbook. This answerbook will be scanned and your work will be presented to an examiner on screen. Anything that you write outside of the answer areas may not be seen by the examiner.

Write your answers in blue or black pen. You may use a pencil for sketches, graphs and diagrams only.

There are three sections to this examination. Questions for Section **C** are supplied separately but your answers must be written in this answerbook.

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

Section **A**	Answer any **four** questions from this section. Each question carries 20 marks.
Section **B**	Answer any **one** question from this section. Each question carries 30 marks.
Section **C**	Answer any **three** questions from this section. Each question carries 60 marks.

Section A

Answer any four questions.
Write your answers in the spaces provided.

1. Answer any **five** of the following parts (a) to (f):

(a) Name the elements present in carbohydrates.

(b) Give **one** example of a structural polysaccharide.

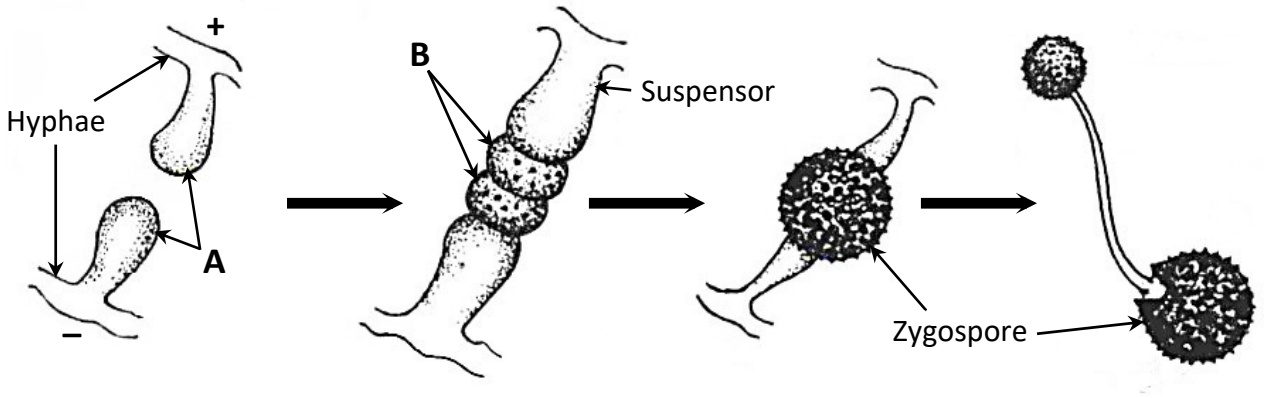
(c) Identify a non-metallic element, other than C, H, O and N, sometimes found in proteins.

(d) Name the molecular sub-units that combine together to form protein.

(e) Name **one** water-soluble vitamin present in food.

(f) Name **one** disorder associated with a deficiency of the vitamin named at part (e) above **or** of any other **named** vitamin.

2. The sequence of diagrams shows the stages of sexual reproduction in *Rhizopus*.



(a) Name the structures **A** and **B**.

A:
B:

(b) To which kingdom does *Rhizopus* belong?

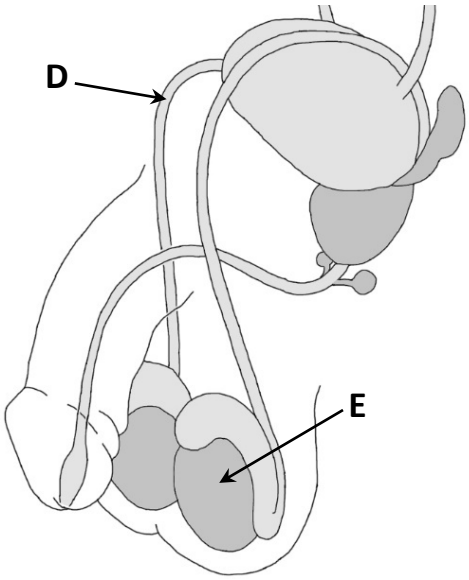
(c) What term is used to describe the nutrition of *Rhizopus*?

(d) What is the term given to a collection of hyphae?

(e) The zygospore can survive a long time in unsuitable conditions.
What feature does it have that aids this survival?

(f) Give an example of an organism belonging to the same kingdom as *Rhizopus* that is of benefit to humans.

3. The diagram shows the male reproductive system.



(a) Name the structures **D** and **E**.

D:
E:

(b) **On the diagram**, mark with the letter **X** an organ that produces seminal fluid.

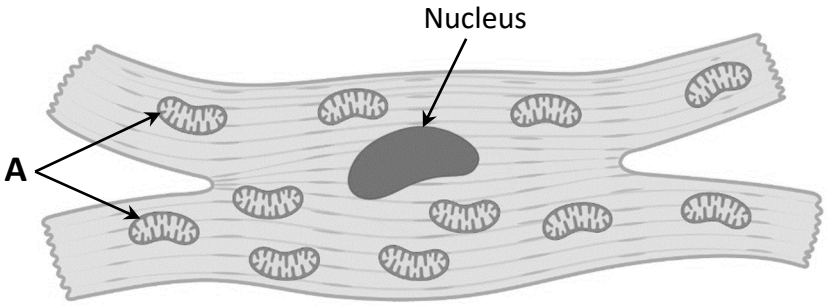
(c) Name a hormone involved in sperm production.

(d) Explain the importance of meiosis in the production of sperm.

(e) Give **one** cause of male infertility.

(f) Give **one** corrective measure for the cause of male infertility stated at part (e) above.

4. Aerobic respiration is described as a two-stage process. The diagram represents a muscle cell in which aerobic respiration is taking place.



(a) What name is given to stage 1 of respiration?

(b) Where in the cell does stage 1 occur?

(c) Name the cell organelles, labelled **A** in the diagram above, in which stage 2 occurs.

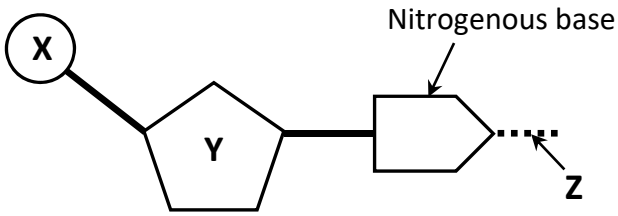
(d) Explain why muscle cells contain large numbers of the cell organelle named at part (c) above.

(e) ATP is an energy carrier involved in respiration.
What does ATP stand for?

(f) NAD is another energy carrier involved in respiration.
What is its function?

(g) Sometimes muscle cells respire anaerobically.
Name the by-product of anaerobic respiration in a muscle cell.

5. The diagram represents a single nucleotide of a DNA molecule.



(a) Name the parts of the molecule labelled **X** and **Y**.

X:
Y:

(b) State the type of bonding (shown by **Z**) that holds complementary bases together in a DNA molecule.

(c) A short part of one strand of a DNA molecule has the sequence shown in the table below. During transcription, mRNA is made using the code in DNA.
Complete the table to show the complementary mRNA base code.

DNA	**A**	**T**	**G**	**C**	**G**	**A**
mRNA						

(d) An analysis of a different DNA molecule showed it contained 20% thymine (T).
What percentage of the DNA molecule would be guanine (G)?

(e) How many nitrogenous bases are in a codon?

(f) Name a base that is a purine.

6. In the case of **each** of the following pairs of terms, clearly distinguish between the first term and second term by writing a brief sentence about each.

(a) Ecology and ecosystem.

(b) Habitat and niche.

(c) Population and community.

(d) Parasite and saprophyte.

(e) Qualitative survey and quantitative survey (in ecology).

7. Indicate whether the following statements are true or false by placing a tick (✓) in the appropriate box in **each** case.

		True	False
(a)	A virus particle contains both DNA and RNA.	☐	☐
(b)	The cochlea is an organ in the ear involved in balance.	☐	☐
(c)	Fertilisation in human reproduction usually occurs in the vagina.	☐	☐
(d)	A theory is a supported hypothesis.	☐	☐
(e)	A tarsal is a bone found in the wrist.	☐	☐
(f)	*Amoeba* reproduces asexually.	☐	☐
(g)	Male birds have two X chromosomes in their diploid cells**.**	☐	☐

Section B

Answer any one question.
Write your answers in the spaces provided.
Part (a) carries 6 marks and part (b) carries 24 marks in each question in this section.

8. (a) (i) Describe the shape of a DNA molecule.

(ii) Give **one** difference between coding and non-coding DNA.

(b) Answer the following questions based on the investigation to isolate DNA from plant tissue.

(i) Name a suitable plant tissue from which DNA may be isolated.

(ii) Explain the importance of the following steps in isolating DNA from plant tissue:

1. Chopping or making a paste of the plant tissue.

2. Adding a detergent to the chopped tissue.

3. Adding salt to the chopped tissue.

4. Filtering the mixture.

5. Adding ethanol.

(iii) Describe the appearance of the DNA isolated in this investigation.

(iv) Describe a safety precaution taken in this investigation.

9. (a) (i) What is an enzyme?

(ii) Enzymes are specific. What is meant by specificity in relation to enzymes?

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

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

(ii) Describe how you varied the pH in this activity.

(iii) Other variables that can affect enzyme activity were kept constant.
Name **one** other factor that affects the rate of enzyme activity.

(iv) Describe how the factor named at part (iii) above was kept constant during this investigation.

(v) Briefly describe how you measured the rate of enzyme activity.

(vi) Draw a labelled diagram of the apparatus that you used in this investigation.

10. (a) (i) Blood is a transport tissue in animals.
Name the protein in blood that is responsible for transporting oxygen.

(ii) In relation to plants, what is meant by the term *meristem*?

(b) Answer the following in relation to some laboratory investigations that you carried out.

(i) When dissecting, displaying, and identifying the parts of an ox's or sheep's heart:

1. Describe how you distinguished the left and right-hand sides of the heart prior to dissection.

2. Name **one** instrument you used to make incisions into the heart.

(ii) When investigating the effect of water, oxygen, and a suitable temperature on germination:

1. Name a suitable seed that you used.

2. How did you deprive the seeds of oxygen?

(iii) When demonstrating the digestive activity of germinating seeds:

1. What type of agar did you use?

2. How did you know digestion had occurred?

(iv) When preparing and examining microscopically a transverse section of a dicot stem:

1. Name a suitable dicot plant that you used.

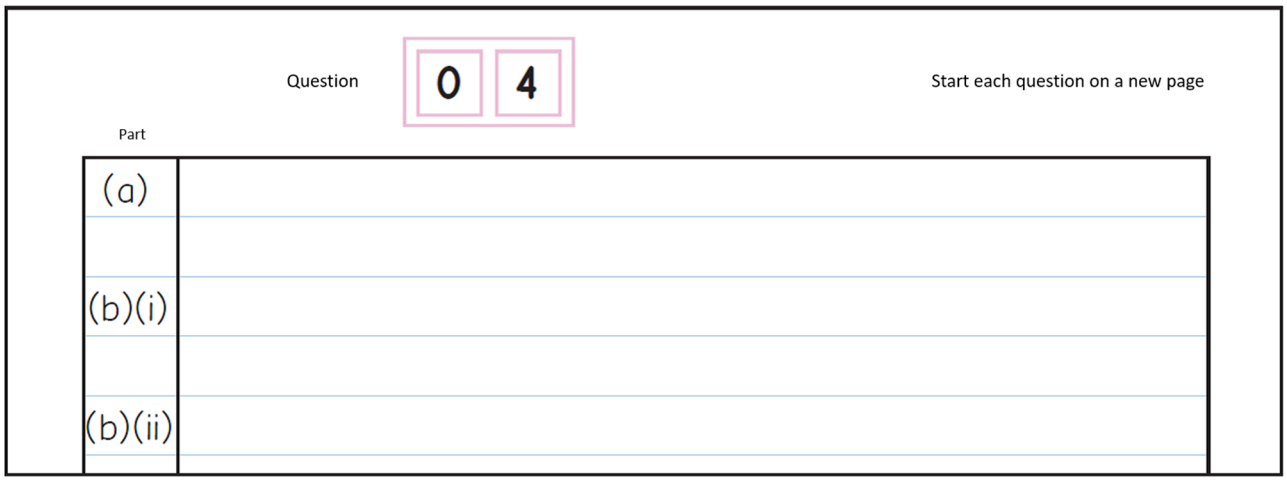
2. What did you observe under the microscope that showed you it was a dicot stem?

Answerbook for Section C

Instructions

Questions for Section **C** are supplied separately.

Start each question on a new page. Write the question number in the box at the top of each page. Use the left-hand column to label each part, as shown below.



There are two pages of graph paper on the next two pages of this answerbook. On pages with graph paper, the box for the question number is at the bottom of the page.

You do not need to use all of the pages in this answerbook. If you run out of space in this answerbook, you may ask the superintendent for more paper or graph paper.

Write your answers in blue or black pen. You may use a pencil for sketches, graphs and diagrams only.

Question

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Leaving Certificate – Higher Level

Biology Sections A and B and Answerbook

3 hours