GCE ORDINARY LEVEL

SCIENCE

SEMINAR SERIES

STRUCTURED ESSAY 2

Don't take this book if you can't take the maximum use of it

Kings Perory

B.Sc (Reading) University of Colombo

071 063 9910 / 076 461 4264

WhatsApp Group QR

Past Paper Structured Essay 2 practice

1. (A) Nucleic acids are a main type of biomolecules contained in living matter.
(i) (a) What is the structural unit of nucleic acids? .....
(b) In addition to carbon, hydrogen and oxygen, name the other two elements that are necessarily contained in nucleic acids.

.....

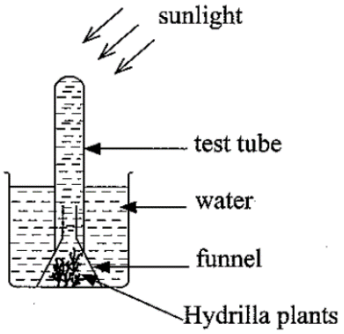
(ii) Name the two types of nucleic acids and state a structural difference between them.
(a) two types of nucleic acids

.....

(b) structural difference

.....

(B) Given below is a diagram of an experimental set up relating to photosynthesis.



(i) What is the observation that can be made sometime after the setting up of this apparatus?
.....

(ii) What test should be done to arrive at a conclusion from the observation in (i) above?
.....

(iii) What is the conclusion that could be made from that test?

.....

(iv) When some soda water is mixed to the water in the beaker while arranging this set up, the time to make that observation decreases. State the reason for this briefly.

.....

.....

(C)
(i) Several main tissue types found in the human body are given below.
• epithelial tissues • connective tissues • skeletal muscle tissues

State which of the above tissues are present in each of the following.
(a) blood : .....
(b) wall of the urinary bladder : .....
(c) epidermis of the skin : .....

(ii) The nervous tissue has three types of neurones according to its functions. Of them, name each of the following types of neurones.
(a) The type of neurones transmitting impulses from the receptors to the central nervous system:
.....

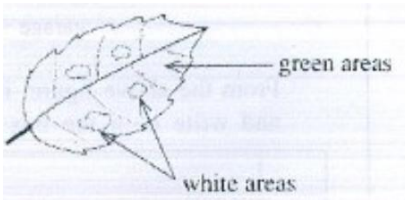
(b) The type of neurones transmitting impulses from the central nervous system to the effectors:
.....

2024 OL

Short summary note

Concept	Key Point
Structural unit of nucleic acids	Nucleotide
Additional elements	Nitrogen & Phosphorus
DNA vs RNA	Double vs single stranded
Photosynthesis product gas	Oxygen
Gas test	Rekindles glowing splint
Effect of soda water	Increases rate (adds CO_2)
Blood	Connective tissue
Bladder wall	Epithelial + Muscle
Skin	Epithelial
Sensory neurone	Receptor → CNS
Motor neurone	CNS → Effector

2. (A) A group of students preparing for a practical experiment sketched on a paper the diagram of a leaf with white and green areas of a shoe flower plant growing in a place well exposed to sunlight. The diagram is shown on the right. Later, that leaf was subjected to the starch test following the relevant steps.



(i) Name the chemical substance used to identify starch.

.....

(ii) Indicate in the following table the observations made after applying the chemical substance you mentioned in (i) above.

Area of the leaf subjected to the test	Observation
(a) Green areas	.....
(b) White areas	.....

(iii) What conclusion can be drawn as per the observations made in relation to the green and white areas of the leaf in the above experiment?

.....

(B) Several species of animals that could be seen either in home or in home garden are given below.
cockroach, gecko, spider, snail, leech, centipede

From the above list, select the animal species with each of the following characteristic and write on the dotted line opposite each.

(i) bears a vertebral column: .....

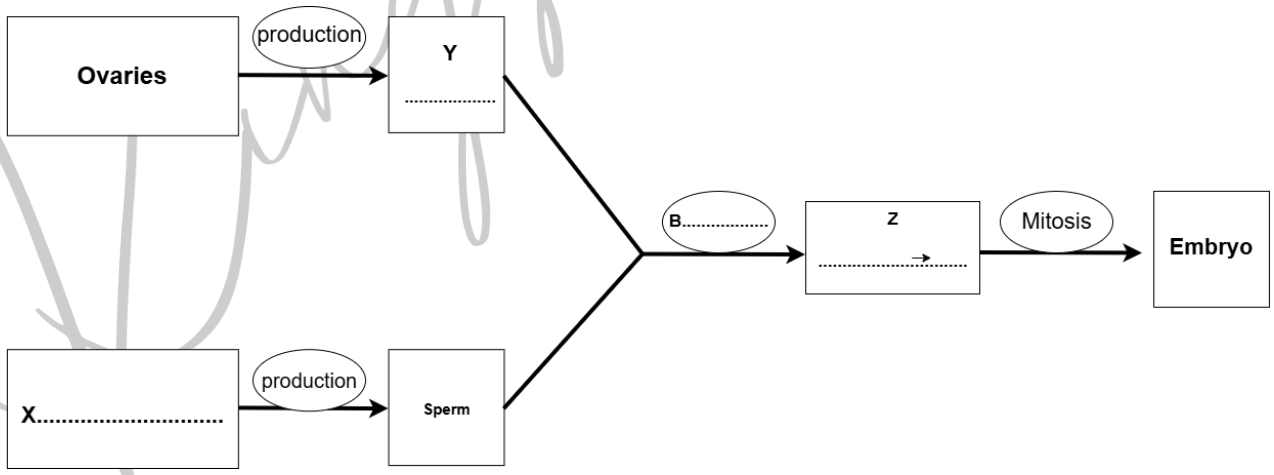
(ii) has a muscular foot: .....

(iii) body is divided into equal segments: .....

(iv) bears four pairs of legs: .....

(v) has a body consisting of three tagmas, head, thorax and abdomen: .....

(C) The following flow chart shows the steps of human reproduction up to the formation of the embryo. In it, structures/cells are shown in rectangles and processes are shown in ellipses.



(i) Write the structures/cells indicated as X, Y and Z in the respective rectangles.
X: .....
Y: .....
Z: .....

(ii) Write the process indicated as B in the respective ellipse.
.....

(iii) In which site does the process B occur?
.....

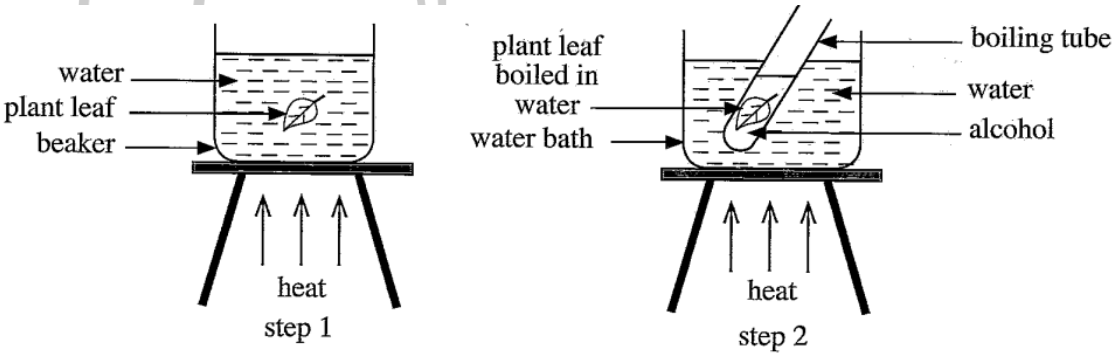
2023 OL

Short summary note

Concept	Key Point
Chemical to test starch	Iodine solution
Colour in green area	Dark blue / violet
Colour in white area	Brown/yellow
Photosynthesis occurs	Only in green parts (Chlorophyll)
Vertebrate animal	Gecko
Muscular foot animal	Snail
Segmented body	Leech
Four pairs of legs	Spider
3-part body	Cockroach
Male organ	Testes
Female organ	Ovary
Fertilization site	Fallopian Tube (FF)
Result of fertilization	Zygote → Embryo

3. (A)

The sketch given below indicates two steps of an experiment conducted to investigate whether starch is produced in plant leaves by photosynthesis.

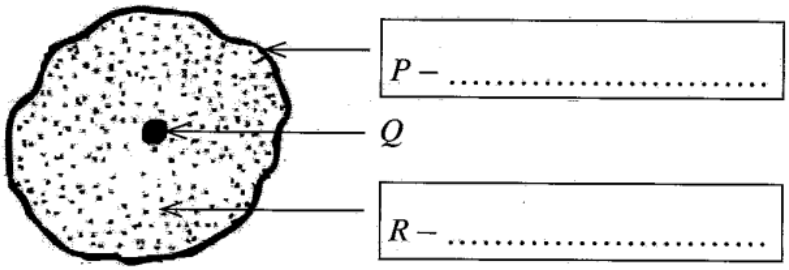


(i) Write the reason for each of the following.
(a) boiling the plant leaf in water in step 1 : .....
(b) boiling the plant leaf in alcohol in step 2 : .....
(c) using a water bath in step 2 : .....

(ii) During step 2, what colour change can be seen in alcohol in the boiling tube?

.....

(B)Given below is a sketch of an animal cell drawn based on the observations made under a light microscope.



(i) Write in relevant boxes the names of the structures labelled P and R.
(ii) State the function of P.

.....

(iii) Name a type of animal cell which does not contain the organelle Q. .....
(iv) What is the structure which is absent in an animal cell but is present in every plant cell?

.....

(C)

(i) The sex chromosomes contained in an egg mother cell and a sperm mother cell are indicated as XX and XY respectively.
Accordingly, fill in the boxes a, b, c, d, e and f in the Punnett square given below.

♂ – Male gamete
♀ – Female gamete

♂ \ ♀	X	(a) .....
(b)	(c)	(d) .....
Y	(e)	(f) .....

(ii) State a genetic disorder caused by sex-linked inheritance.

.....

Short summary note

Concept	Key Point
Purpose of experiment	To prove starch is formed in photosynthesis
Step 1	Boil leaf in water – kills cells
Step 2	Boil in alcohol – removes chlorophyll
Use of water bath	Prevents fire hazard (alcohol is flammable)
Observation	Alcohol becomes green
Plasma membrane	Controls entry and exit of substances
Cytoplasm	Organelles are embedded
Cell wall	Absent in animal cells
RBC	Lacks nucleus & vacuole
Female genotype	XX
Male genotype	XY
Sex-linked disorder	Haemophilia / Colour blindness
Disorders due to mutation	Albinism / Thallasemia

4. (A)

From the plants given in the box, select a plant which is an example for each of the following statements and write it on the dotted line opposite each.

Pinus, Coconut, Jack, Paddy, Marchantia, Acalypha (kuppamania/kuppameni), Cycas, Pogonatum

(i) A non-flowering plant without seeds .....
(ii) A non-flowering plant with seeds .....
(iii) A monocotyledonous flowering plant .....
(iv) A dicotyledonous flowering plant .....

(B)

In order to demonstrate the action of the enzyme amylase on starch during the process of digestion of food, a mixture was made by adding starch and amylase to water. The mixture was placed in a water bath at a temperature 37 °C. After five minutes, a drop from the mixture was taken out, a drop of iodine solution was added to it and the colour was observed. The above test was repeated at times given in the following table. The colour observed in each instance is shown in the table.

Time/minutes	5	15	25	35	45
Colour observed	Violet-blue	Blue	Blue	Yellow-brown	Yellow-brown

(i) What is the compound formed by the action of amylase on starch in the aqueous medium?

.....

(ii) Give the reason for the following observations.
(a) Appearance of blue colour after 15 minutes .....
(b) Appearance of yellow-brown colour after 35 minutes .....

(iii) Why is the mixture subjected to the experiment kept in a water bath at 37 °C?

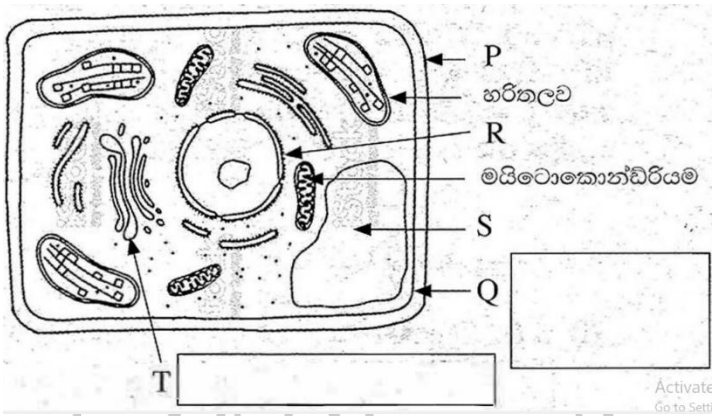
.....

(iv) Which component does not undergo a chemical change though contributes to the chemical reaction pertaining to the above experiment?

.....

(C)

Given below is a diagram of a typical plant cell drawn based on the electron microscopic observations.



(i) By which letter is the structure that helps to maintain the shape of plant cells named?

.....

(ii) Write the names of the organelles labelled Q and T in the relevant boxes.

(iii) By what letter is the organelle that can also be identified when observed under the optical microscope labelled?

.....

(iv) State the function carried out by the following organelles:
(a) Chloroplast .....
(b) Mitochondrion .....

2021 OL

Short summary note

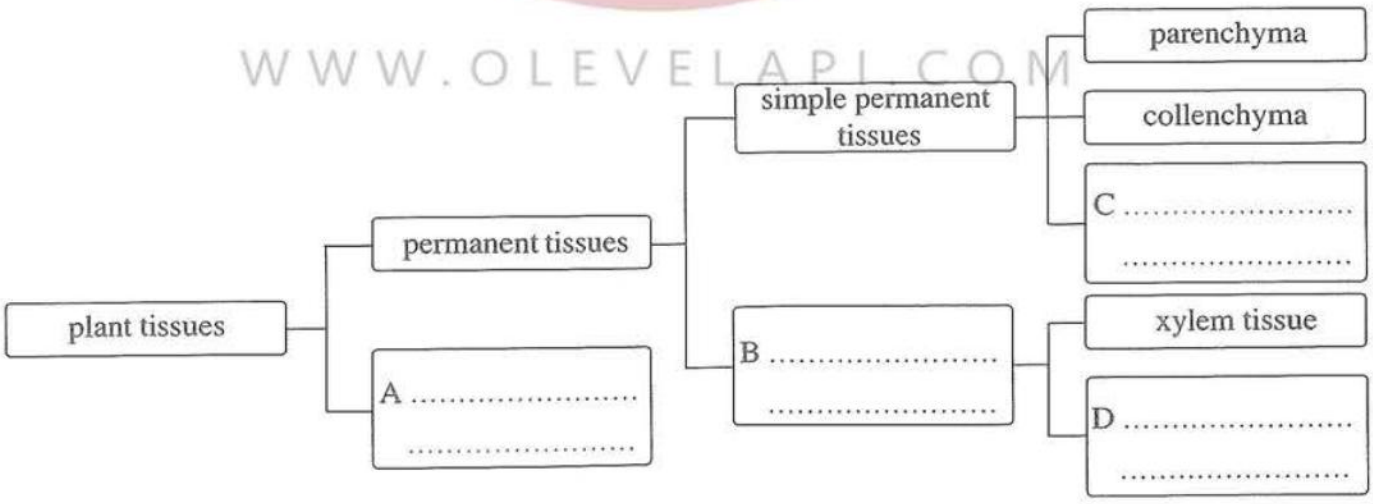
Concept	Key Point
Non-flowering without seeds (Gymnosperm)	Marchantia, Pogonatum, Selaginella, Nephrolepis, Salvinia, Acrosticum, Drynaria
Non-flowering with seeds (Only 2)	Cycas / Pinus
Monocot flowering	Paddy / Coconut
Dicot flowering (Angiosperm)	Jack / Acalypha
Enzyme	Amylase
Product of starch digestion	Maltose
Optimum temperature	37 °C
Catalyst (unchanged)	Amylase
Shape-maintaining structure	Cell wall
Visible under microscope	Nucleus
Photosynthesis organelle	Chloroplast
Respiration organelle / Energy production	Mitochondrion

5. (A)

Given below is an incomplete table about four organelles existing in a cell and their main functions. Fill in the blanks and complete the table.

(i)	Organelle	Function
1.	Nucleus	.....
2.	.....	providing energy required for metabolic activities
3.	Golgi complex	.....
4.	.....	protein transport

(B) An incomplete chart indicating the classification of plant tissues is shown below. Write the tissue types relevant to the boxes **A**, **B**, **C**, and **D** on the dotted lines given and complete the table.



(ii) What is the type of tissue in which photosynthesis occurs most?
.....

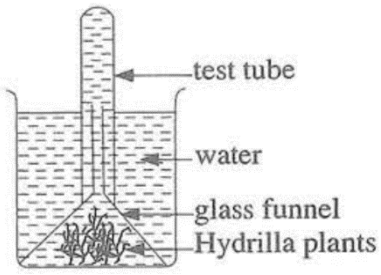
(iii) Name the type of tissue which contains sieve tube elements.
.....

(C)

An apparatus set by a group of students to investigate a product of photosynthesis is shown in the diagram.

(i) What is the gas collected in the test tube when this apparatus is kept in sunlight?

.....



(ii) State a test that can be done to identify that gas and the observation you make during the test.

Test : .....
Observation : .....

(iii) A new apparatus similar to the above apparatus was made by putting water saturated with carbon dioxide gas instead of normal water.

(a) State an observation that could be expected with regard to the evolution of gas bubbles in the new apparatus when comparing with the evolution of gas bubbles in the first apparatus under similar environmental conditions.

.....

(b) Give reasons for the observation you mentioned above.

.....

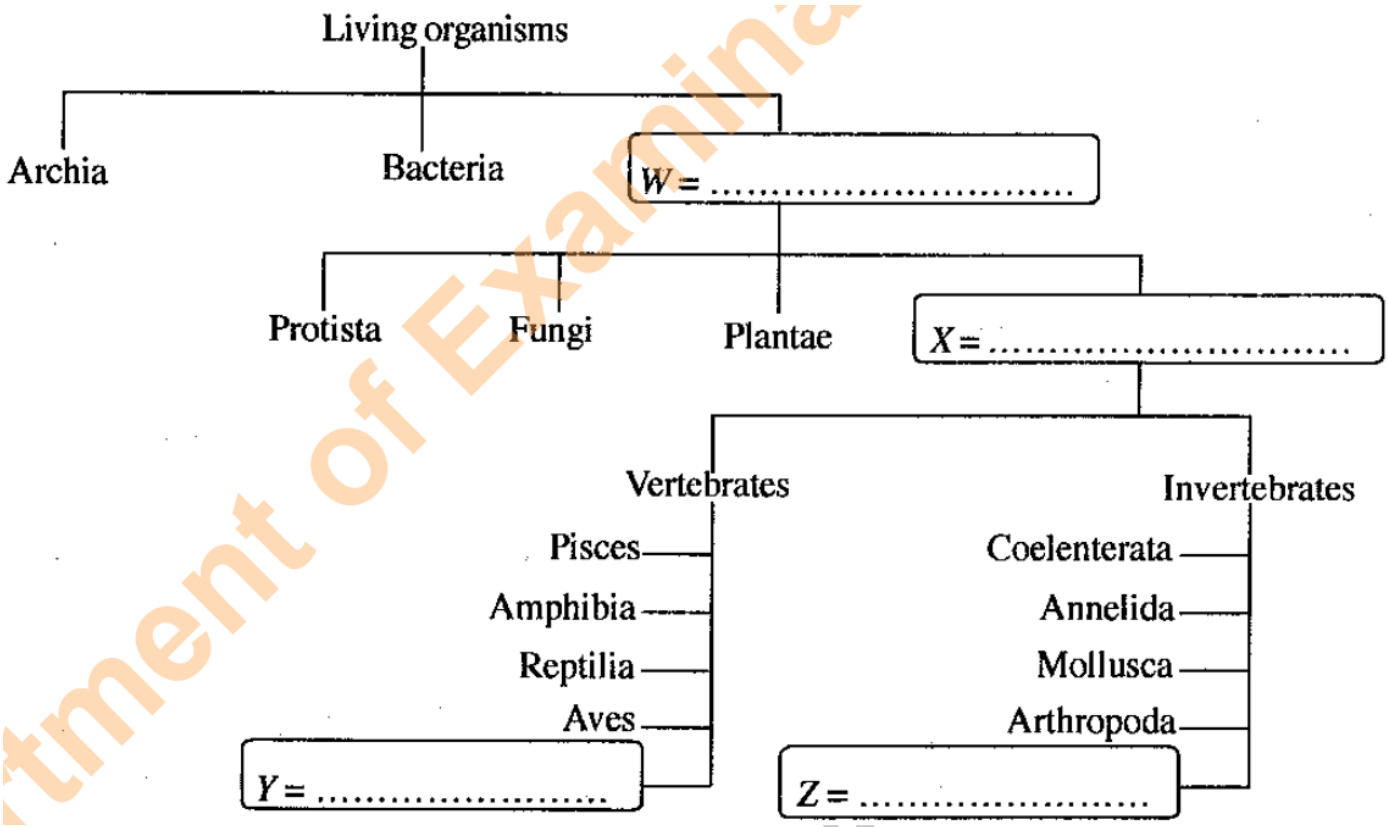
.....

2020 OL

Short summary note

Concept	Key Point
Organelle giving energy	Mitochondrion
Protein transport	Rough Endoplasmic Reticulum
Controls cell activities	Nucleus
Tissue for photosynthesis	Parenchyma
Tissue with sieve tubes	Phloem
Gas produced in sunlight	Oxygen
Test for oxygen	Reignites glowing splint
CO_2-saturated water effect	Increases photosynthesis rate

6. (A)An outline of the classification of living organisms is given below:



Answer the following questions using the above chart.

(i) Complete the above chart by writing the relevant group of living organisms on the dotted line in the boxes **W, X, Y,** and **Z.**

(ii) Name the domain to which living organisms not sensitive to antibiotics belong.
.....

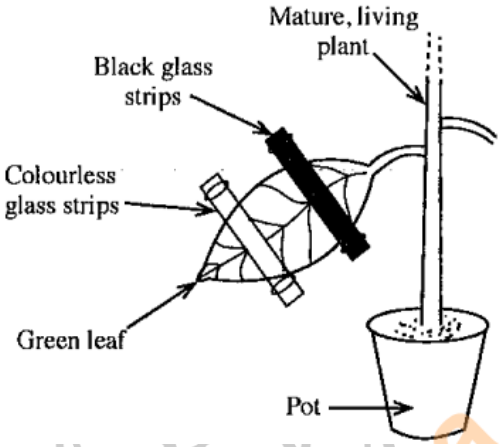
(iii) To which kingdom do algae belong?
.....

(iv) A characteristic specific to each group of invertebrate animals shown in the above classification chart is given below.
Opposite each characteristic, write the group of animals having that characteristic on the dotted line given.

(a) Bearing soft bodies .....
(b) Division of the body into equal segments .....
(c) Existing in two forms polyp and medusa .....

(B)

A set up arranged by a student to study a factor essential for the photosynthetic process is shown in the diagram.



This set up was kept in the dark for 48 hours and then was exposed to light for 5 hours. Afterwards the glass strips covering the leaf were removed and the leaf was tested for starch.

(i) To test which factor essential for photosynthesis was this set up used?

.....

(ii) What is the reason for keeping the set up in the dark for 48 hours?

.....

.....

(iii) Write the colour that can be seen in each of the following parts of the leaf during the test for starch.

Part covered with the black glass strips .....
Part covered with the colourless glass strips .....
Part exposed to direct light .....

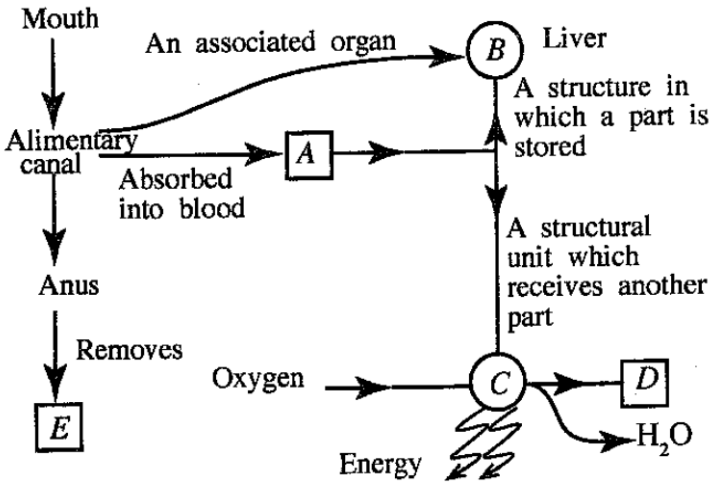
2019 OL

Short summary note

Concept	Key Point
Domain not sensitive to antibiotics	Archia / Eukarya
Kingdom of algae	Protista
Soft-bodied animals	Mollusca
Segmented animals	Annelida
Two forms (polyp, medusa)	Coelenterata
Factor tested	Light
Reason for dark period	Destarching
Blue-black colour area	Photosynthesis occurred
Brown colour area	No photosynthesis

7. (A)

The figure shows a part of a **concept map** prepared incorporating some functions occurring in the human body and the structures relevant to them.



(i) **A** is a digestive product containing only carbon, hydrogen and oxygen.
Name it.
.....

(ii) State a digestive product absorbed by the lacteal in the alimentary canal without being absorbed into blood.
.....

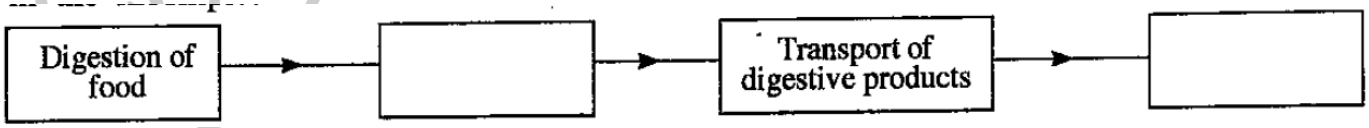
(iii) A part of the nutrient **A** is stored in **B** (liver).
Before this storing, it gets converted into another chemical substance.
What is that chemical substance?
.....

(iv) What structural unit is represented by **C**?
.....

(v) **D** is produced as a product of a chemical process taking place in **C**.
What is **D**?
.....

(vi) What is the reason for not considering **E** an excretory product?
.....

(vii) Four main processes taking place in the body relevant to the above concept map are given in the incomplete flow chart below.
Fill in the blank boxes in it.



(B)

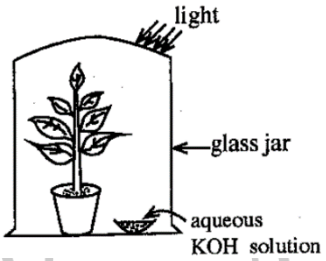
The figure below indicates a part of a dicotyledonous plant with a leaf.

(i) What is the main morphological feature that can be used to identify that this leaf belongs to a dicotyledonous plant?
.....

(ii) State a morphological feature of the root system of the plant to which this leaf belongs.
.....

(iii) State a morphological feature in which the stem of a monocotyledonous plant differs from the stem of the plant to which this leaf belongs.
.....

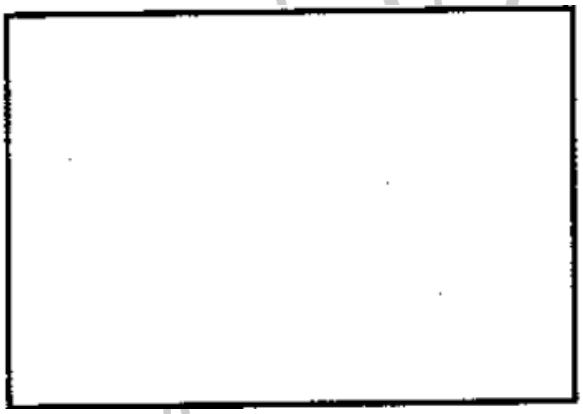
(C)



The figure indicates an apparatus set up by a student for an experiment conducted with regard to photosynthesis.

(i) Mention the aim of this experiment.
.....

(ii) Draw a labelled sketch of a set-up of a control experiment suitable for this experiment in the given box.
.....



2018 OL

Short summary note

Concept	Answer
A	Glucose
B	Liver
C	Cell
D	Carbon dioxide
E	Faeces
Glucose stored as	Glycogen – in liver
Lacteal-absorbed nutrient	Fatty acids + glycerol
Dicot leaf venation	Reticulate
Root system	Tap root
Monocot vs dicot stem	Compare a coconut tree and a mango tree
Aim of photosynthesis test	CO_2 needed for photosynthesis
Result	Only leaf with CO_2 turns blue-black

Additional tips

The most repeated lessons for structured essay 2

- ☑ Photosynthesis
- ☑ Cells & Organelles
- ☑ Classification of Organisms
- ☑ Enzymes / Digestion
- ☑ Human Reproduction

Lesson	Probability	What to Study
Photosynthesis	🌕 100%	All experiments, colour changes, control setups
Cell Structure & Organelles	🌕 90%	Functions, diagrams, differences
Enzyme Action	🌕 85%	Temperature effect, substrate-product link
Human Reproduction	🌗 75%	Gametes, fertilization, zygote
Chemical Basis of Life	🌘 50%	Nucleic acids, organic compounds
Biological Process	May or maynot	All (However needed for Essay 5)