5th Year Biology **Sample** SummerTest

Total: 240 marks

- Section A- Attempt 3 out of 4 questions (60 marks)
- Section B- attempt 2 out of 3 questions (60 marks)
- Section C-attempt 2 out of 3 questions (120 marks)

Section A- Attempt 3 out of 4 questions (60 marks)

Q1. (20 marks)

(a) Name the component of cells which contains phospholipids.

_____

(b) Name any **one** trace element required by humans.

_____

(c) Name any **two** minerals required by living organisms.

(i) _____

(ii) _____

(d) Name any **one** polysaccharide found in plants.

_____

(e) Name any **one** fat-soluble vitamin.

_____

Name **one** disorder associated with a deficiency of the vitamin you have named.

_____

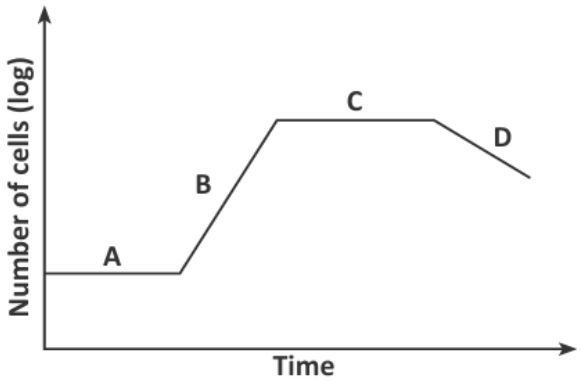
(f) Give **two** reasons water is required by all living all organisms.

(i) _____

(ii) _____

Q2. (20 marks)

The diagram shows a typical growth curve for bacteria.



(a) Name the kingdom to which bacteria belong.

(b) Identify the stage of the growth curve that corresponds to part **B**.

(c) Suggest **one** reason the number of cells remains constant during the stage labelled **A**.

(d) Name the method of asexual reproduction by which bacteria reproduce.

(e) Comment on the importance of the following structures present in bacterial cells:

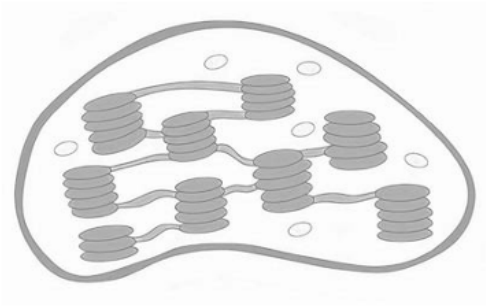
1. Plasmid:

2. Endospores:

(f) Name **one** organelle that is present in plant cells but absent in bacterial cells.

Q3. (20 marks)

The organelle shown in the diagram is found in plant cells.



(a) Name the organelle.

(b) State its function.

(c) Identify the type of microscope required to view this organelle.

(d) State the function of the following structures found in plant cells.

1. Cell wall.

2. Vacuoles.

(e) Identify the structural carbohydrate that is a component of the cell wall.

(f) Name the stain you used when examining the structure of a plant cell.

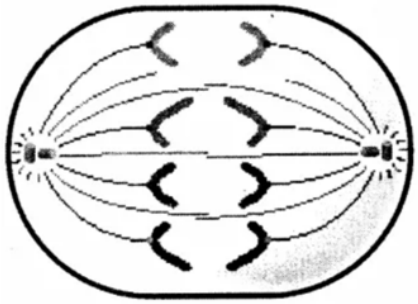
Q4. (20 marks)

Mitosis ensures cell continuity occurs. Explain the term "cell continuity".

Identify the stage of cell's cycle when cell division is not occurring **and** identify one activity that is happening in a cell during this time.

Describe one event that occurs during prophase of mitosis

The diagram represents a stage of mitosis.



Name the stage of mitosis and state the number of chromosomes in each cell after cell division has been completed.

Section B- attempt 2 out of 3 questions (60 marks)

Q5. (30 marks)

(A)

(i) Explain the purpose of a control in an experiment

(ii) Identify a suitable control when producing ethanol by anaerobic respiration.

(b) (i) In relation to investigations you carried out on food:

1. Name the chemical used to test for starch.

2. Outline how you added the chemical named above to the source of starch.

3. Identify the **type** of sugar that gives a positive result with Benedict's reagent **or** Fehling's reagent.

4. Describe a positive result for this test.

5. Name the test **or** the chemicals used to identify a protein.

(ii) When examining animal cells using a light microscope:

1. Describe how you obtained a sample of animal cells.

2. State **one** precaution you took when staining the cell.

3. Name the part of the microscope that allowed you to control the amount of light passing through the sample of cells.

Q6. (30 marks)

(a) (i) Describe the energy conversion that occurs during the process of photosynthesis.

(ii) Name the stage of photosynthesis that is not controlled by enzymes.

(b) Answer the following questions in relation to an activity that you carried out to investigate the influence of light intensity **or** carbon dioxide concentration on the rate of photosynthesis.

(i) Name the plant you used for this investigation. Give **one** reason this plant was suitable for the investigation.

Plant:
Reason:

(ii) How did you ensure that the temperature remained constant throughout the investigation?

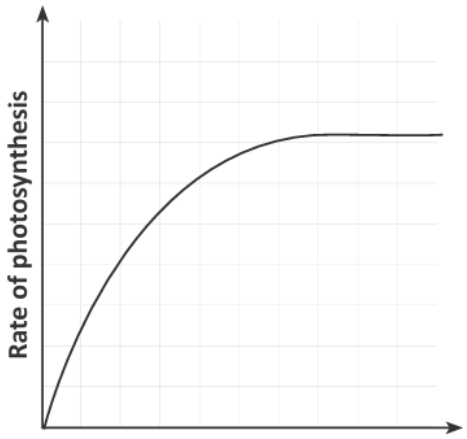
(iii) Why is it important to maintain a constant temperature during the investigation?

(iv) In the case of either light intensity **or** carbon dioxide concentration, indicate:

1. The factor you kept constant:

2. How you achieved this:

(v) Explain why the graph below is an accurate representation of the results of this investigation.



(vi) Indicate how the results used to draw this graph were obtained.

(vii) Explain the role of the vascular tissue in the process of photosynthesis.

Q7. (30 marks)

(a) (i) What is an *enzyme*?

_____

(ii) What is meant by the *specificity* of an enzyme?

_____

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

(i) Name the enzyme **and** the substrate that you used.

Enzyme. _____

Substrate. _____

(ii) Describe how you measured the rate of enzyme activity.

_____

_____

_____

(iii) State **one** factor that you kept constant during this investigation.

_____

(iv) How did you keep the factor referred to in (b)(iii) constant?

_____

(v) How did you vary the pH?

_____

(vi) Using suitably labelled axes, draw a graph of the results that you obtained.

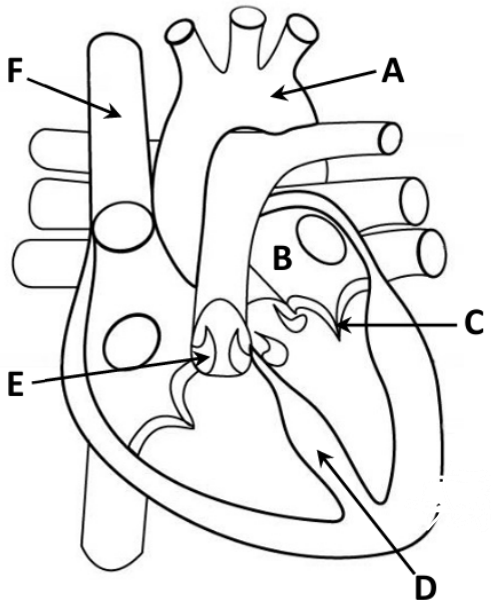
Section C(120 marks)

Answer 2 out of 3 questions(attempt 2 whole sections from (a), (b), (c), in question 8)

Q8. (60 marks)

(a)

The diagram shows a sketch of the internal parts of the human heart.



(i) Name the parts labelled **A**, **B**, **C**, **D**, **E and F**.

(ii) The function of the part labelled **D** is to separate the two sides of the heart.
State **one** reason why this is important.

(iii) The heart is composed of specialised muscle tissue.
Name this type of muscle **and** give **one** characteristic of this specialised muscle tissue.

(iv) The wall of the left ventricle is thicker than the wall of the right ventricle.
Explain why this is necessary.

(v) The SA (sinoatrial) and AV (atrioventricular) nodes are involved in the control of the heart cycle. State their respective locations in the heart **and** describe how each carries out their role in heartbeat control.

(b)

(i) Explain the relationship between the following pairs of terms:
   1. Tissues and organs
   2. Organs and organ systems.

(ii) Name **one** organ found in plants.

(iii) Explain the term *tissue culture*.

(iv) State **two** conditions necessary for successful tissue culture.

(v) Give **two** examples of the use of tissue culture.

(vi) Comment on the genetic make-up of the cells produced in tissue culture.

(vii) state the type of cell division involved in tissue culturing

(c)

Diffusion and osmosis are processes that have particular significance for cell shape and activity.

(i) Explain the underlined terms.

(ii) Describe in detail what happens to a plant cell that is placed in a solution with less dissolved solutes than its cytoplasm.

(iii) Describe what would happen to an animal cell if it was exposed to the same conditions as the plant cell at part (b) (ii) above. Explain your answer.

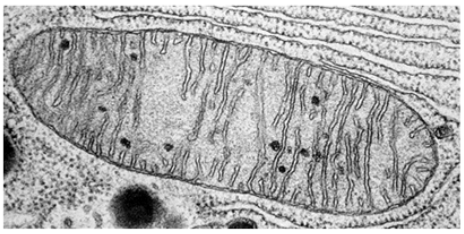
(iv) Describe the biological basis **and** the advantage of having a high salt or sugar concentration in foods (e.g. jam).

(v) Living cells can be classified into two major types based on the presence or absence of cell organelles.
What are the names of these **two** major types of cells?

Q9. (60 marks)

(a) (i) Distinguish between aerobic respiration **and** anaerobic respiration, by writing a brief sentence on each.

(ii) Identify the organelle shown in the transmission electron microscope image that is responsible for aerobic respiration.



(9)

(b) Respiration occurs in two stages.

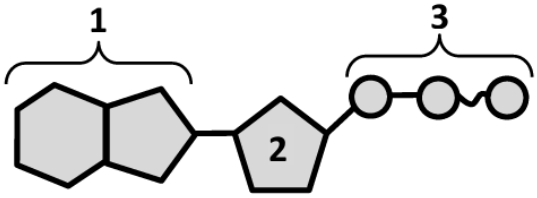
(i) Name stage 1 **and** state where in a cell it occurs.

(ii) The main product of stage 1 is pyruvate.
How many carbon atoms are present in pyruvate?

(iii) Pyruvate enters stage 2 and loses a molecule of carbon dioxide.
What name is given to this new molecule?

(iv) ATP is a product of stage 1 and stage 2.
Comment on the relative amounts of ATP produced by both of these stages.

(v) The diagram shows the structure of ATP.
Name the parts labelled **1**, **2** and **3**.



(vi) NAD is also involved in respiration.
What does NAD stand for?

(vii) Describe, in detail, the roles NAD **and** oxygen play in aerobic respiration.

(27)

(c) Enzymes are important in all metabolic reactions.

(i) What is an *enzyme*?

(ii) Describe in detail the active site theory of enzyme action.

(iii) Describe what happens to an enzyme if it is overheated.

(iv) Give **one** example of a catabolic enzyme **and one** example of an anabolic enzyme.

(24)

Q10. (60 marks)

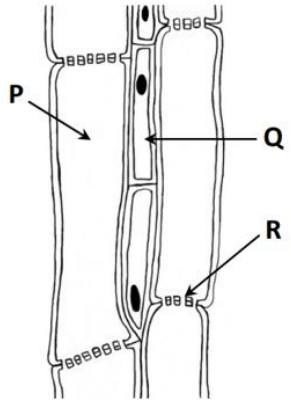
(a)

(i) Identify the type of cell division that occurs in the meristematic tissue of the root tip.

(ii) Explain the term cotyledon.

(b)

The diagram shows the structure of phloem.



(i) Identify the parts **P**, **Q** and **R**.

(ii) Draw a diagram of the longitudinal section of a stem.
On your diagram, label the following **three** plant tissues:
phloem; **xylem**; **dermal**.

(iii) Xylem transports water upwards through plants.
Give **two** structural features of xylem that allow this upward movement of water.

(iv) Distinguish between monocotyledonous **and** dicotyledonous plants, by writing a sentence on **each**, using the following headings:
1. Leaf vein type
2. Organisation of vascular bundles in the stem.

(v) Name a plant in which its leaves are modified to store food.

(vii) Identify the zone within the root where the vascular tissue and root hairs are located.

(c)

The photograph shows an industrial-sized greenhouse. Photosynthesis and crop growth can be controlled and maximised in greenhouses.

(i) Give **two** factors that horticulturists can adjust in a greenhouse to promote crop growth.

(ii) Write a balanced chemical equation for photosynthesis.

(iii) The biochemical processes in photosynthesis can be described under two main headings: the light stage and the dark stage.
Give a detailed account of **each** of these stages. **(27)**

5th Year Biology **Sample** SummerTest

Total: 240 marks

- Section A- Attempt 3 out of 4 questions (60 marks)
- Section B- attempt 2 out of 3 questions (60 marks)
- Section C-attempt 2 out of 3 questions (120 marks)

Solutions

Section A- Attempt 3 out of 4 questions (60 marks)

Q1. (20 marks)

(a) Name the component of cells which contains phospholipids.

cell membrane

(b) Name any **one** trace element required by humans.

Iron or Copper or Zinc

(c) Name any **two** minerals required by living organisms.

(i) Calcium

(ii) Magnesium

(d) Name any **one** polysaccharide found in plants.

Cellulose or Starch or lignin

(e) Name any **one** fat-soluble vitamin.

A, D, E or K

Name **one** disorder associated with a deficiency of the vitamin you have named.

Rickets (in children)

(f) Give **two** reasons water is required by all living all organisms.

(i) good solvent

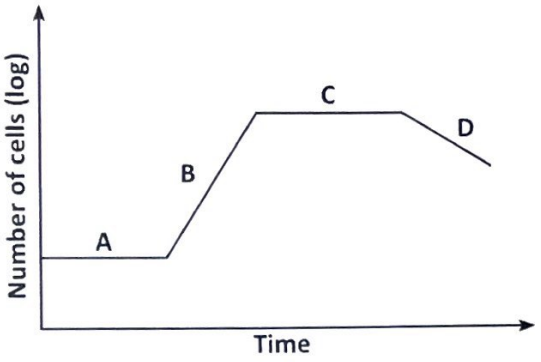
(ii) transport medium for chemical reactions

temp. regulations

} Any two.

Q2. (20 marks)

The diagram shows a typical growth curve for bacteria.



(a) Name the kingdom to which bacteria belong.

Monera

(b) Identify the stage of the growth curve that corresponds to part **B**.

Log

(c) Suggest **one** reason the number of cells remains constant during the stage labelled **A**.

bacteria adjusting to new environment ⇒ limited reproduction

(d) Name the method of asexual reproduction by which bacteria **reproduce**.

Binary fission.

(e) Comment on the importance of the following structures **present in bacterial cells:**

1. Plasmid:

Antibiotic resistance

2. Endospores:

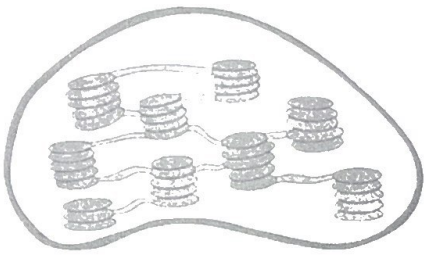
Protection during unfavourable conditions

(f) Name **one** organelle that is present in plant cells but absent in **bacterial cells.**

Chloroplast.

Q3. (20 marks)

The organelle shown in the diagram is found in plant cells.



(a) Name the organelle.

Chloroplast

(b) State its function.

Photosynthesis

(c) Identify the type of microscope required to view this organelle.

Electron

(d) State the function of the following structures found in plant cells.

1. Cell wall.

support / shape

2. Vacuoles.

storage.

(e) Identify the structural carbohydrate that is a component of the cell wall.

cellulose

(f) Name the stain you used when examining the structure of a plant cell.

Iodine

Q4. (20 marks)

Mitosis ensures cell continuity occurs. Explain the term "cell continuity".

cells arise from already existing cells.

Identify the stage of cell's cycle when cell division is not occurring **and** identify one activity that is happening in a cell during this time.

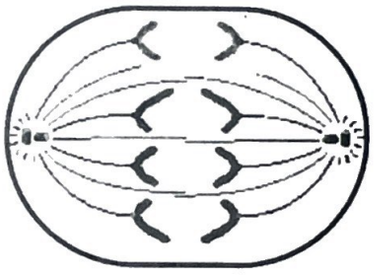
- Interphase
- Photosynthesis or Respiration or Protein Synthesis

Describe one event that occurs during prophase of mitosis

- nuclear membrane breaks down or
- spindle fibres grow

• or any other valid

The diagram represents a stage of mitosis.



Name the stage of mitosis and state the number of chromosomes in each cell after cell division has been completed.

Anaphase

After = 2.

Section B- attempt 2 out of 3 questions (60 marks)

Q5. (30 marks)

(A)

(i) Explain the purpose of a control in an experiment

For comparison with experimental results

(ii) Identify a suitable control when producing ethanol by anaerobic respiration.

no yeast (or alternatively no sugar)

(b) (i) In relation to investigations you carried out on food:

1. Name the chemical used to test for starch.

Iodine

2. Outline how you added the chemical named above to the source of starch.

Dropper

3. Identify the **type** of sugar that gives a positive result with Benedict's reagent **or** Fehling's reagent.

Reducing sugar

4. Describe a positive result for this test.

(Brick) Red.

5. Name the test **or** the chemicals used to identify a protein.

Biuret test (or biuret solution)

(ii) When examining animal cells using a light microscope:

1. Describe how you obtained a sample of animal cells.

swab inside of cheek with cotton bud.

2. State **one** precaution you took when staining the cell.

wear gloves to avoid staining hands

3. Name the part of the microscope that allowed you to control the amount of light passing through the sample of cells.

Diaphragm (or condenser)

Q6. (30 marks)

(a) (i) Describe the energy conversion that occurs during the process of photosynthesis.

Light → chemical.

(ii) Name the stage of photosynthesis that is not controlled by enzymes.

Light Stage.

(b) Answer the following questions in relation to an activity that you carried out to investigate the influence of light intensity **or** carbon dioxide concentration on the rate of photosynthesis.

(i) Name the plant you used for this investigation. Give **one** reason this plant was suitable for the investigation.

Plant: Elodea.

Reason: Aquatic plant - easier to see and count O_2 bubbles.

(ii) How did you ensure that the temperature remained constant throughout the investigation?

Temp. controlled waterbath. at 25°C.

(iii) Why is it important to maintain a constant temperature during the investigation?

enzymes in plants affected by temp. so much remain close to enzymes opt temp.

(iv) In the case of either light intensity **or** carbon dioxide concentration, indicate:

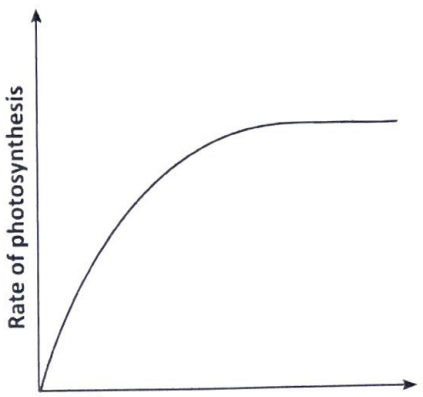
1. The factor you kept constant:

CO_2 conc.

2. How you achieved this:

Added fixed amount of Sodium bicarbonate.

(v) Explain why the graph below is an accurate representation of the results of this investigation.



as the light intensity increases, the rate of photo... increases to saturation pt, then light intensity continues to increase but photo rate remains constant

(vi) Indicate how the results used to draw this graph were obtained.

count no. of O_2 bubbles per min.

(vii) Explain the role of the vascular tissue in the process of photosynthesis.

transport water to cells needed for photolysis

Q7. (30 marks)

(a) (i) What is an *enzyme*?

biological catalyst made of protein

(ii) What is meant by the *specificity* of an enzyme?

each enzyme works on one substrate only

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

(i) Name the enzyme **and** the substrate that you used.

Enzyme. catalase

Substrate. hydrogen peroxide.

(ii) Describe how you measured the rate of enzyme activity.

vol of foam per unit time.

(iii) State **one** factor that you kept constant during this investigation.

temp.

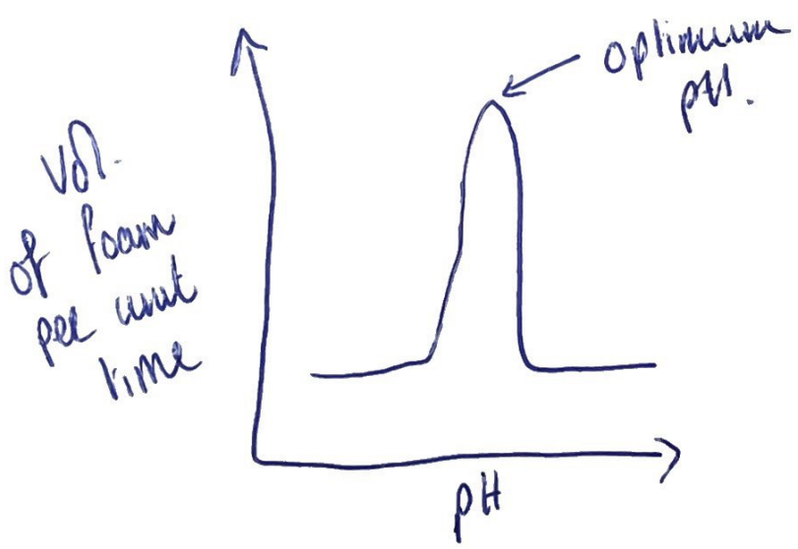
(iv) How did you keep the factor referred to in (b)(iii) constant?

temp. controlled water bath.

(v) How did you vary the pH?

different pH buffers

(vi) Using suitably labelled axes, draw a graph of the results that you obtained.



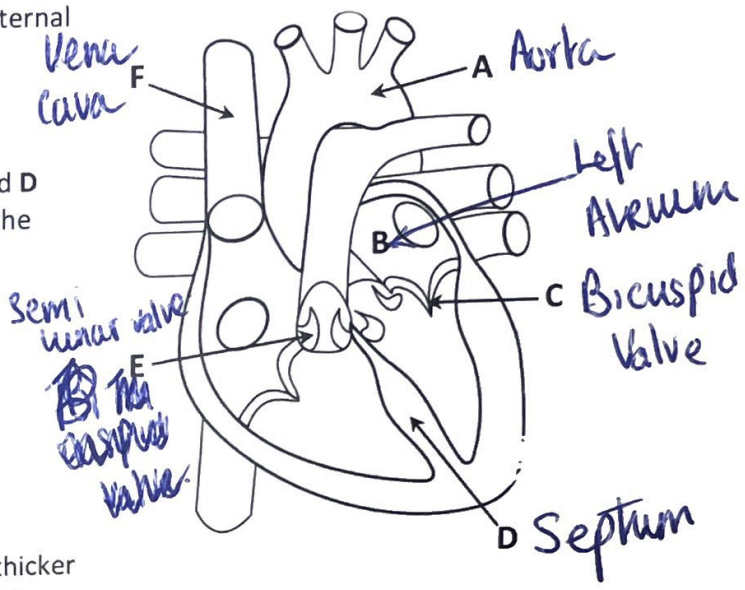
Section C(120 marks)

Answer 2 out of 3 questions(attempt 2 whole sections from (a), (b), (c), in question 8)

Q8. (60 marks)

(a)

The diagram shows a sketch of the internal parts of the human heart.



(i) Name the parts labelled **A, B, C, D, E and F.**

(ii) The function of the part labelled **D** is to separate the two sides of the heart.
State **one** reason why this is important.

(iii) The heart is composed of specialised muscle tissue.
Name this type of muscle **and** give **one** characteristic of this specialised muscle tissue.

(iv) The wall of the left ventricle is thicker than the wall of the right ventricle.
Explain why this is necessary.

(v) The SA (sinoatrial) and AV (atrioventricular) nodes are involved in the control of the heart cycle. State their respective locations in the heart **and** describe how each carries out their role in heartbeat control.

(ii) Function: seperates right and left side of heart
Reason: stop blood rich in O_2 from mixing with blood rich in CO_2

(iii) Cardiac muscle ; never tires

(iv) has to pump blood the furthest distance; around the entire body.

(v) SA – walls of right atrium next to septum
AV – walls of right ventricle next to septum

1. b

(i) tissue: a group of similar cells working together to carry out a common function.

Organ: a group of similar tissues working together to carry out a common function.

2. organs: group of tissues working together for a common purpose

Organ system: group of organs working together for a common purpose.

(ii) Leaf.

(iii) growth of cells outside of a living organism.

(iv) suitable temp and suitable pH.

(v) cancer research
skin grafting (any other valid

(vi) identical

(vii) mitosis

(c)

Diffusion: movement of molecules from a high molecule concentration to a low molecule conc. across a selectively permeable membrane.

Osmosis: movement of water molecules from an area of high water conc. to an area of low water conc. across a selectively permeable membrane.

(ii) ~~loses water to the solution by osmosis~~
~~plant cell would have a flaccid appearance.~~
- plant cells would gain water by osmosis
- become fully turgid.

(iii) - animal cell would eventually burst as it doesn't have a cell wall.

(iv) - food coated in sugar/salt.
- water leaves food by osmosis
- M.O cannot reproduce as conditions not favourable.
- therefore food would not spoil and food preserved.

(v) Eukaryotes and prokaryotes

Q9.

a (i) Aerobic: release of energy from food in the presence of oxygen.
Anaerobic: release of energy from food in the absence of oxygen.

(ii) chloroplast.

b (i) Glycolysis
Cytosol.

(ii) 3

(iii) acetyl co enzyme A.

(iv)

Stage 1	Stage 2
2 ATP	36 ATP

(v) 1 = Adenine 2 = Ribose 3 = Phosphate X 3

(vi) Nicotinamide Adenine Dinucleotide

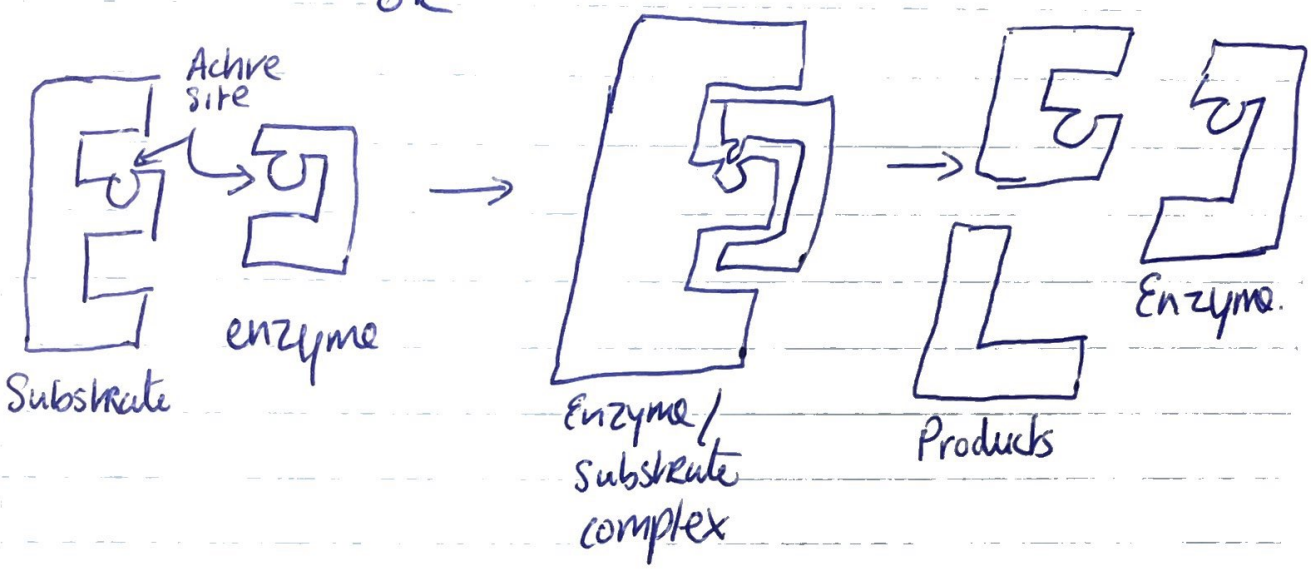
(vii) NAD - transport hydrogen ions and electrons to electron transport chain
O_2 - used in electron transport chain to form water.

c

(i) biological catalyst made of protein

(ii) • enzyme joins with substrate at active site
• shapes of enzyme and substrate complimentary.
• enzyme/substrate complex form
• products get released
• enzyme not changed and can be reused

OR



(iii) Denatured => loses it 3D/Folded/globular shape
=> no longer works

(iv) Catabolic: Amylase or Lipase or Protease or Catalase

Anabolic: DNA Polymerase or Ligase.

Q10. (60 marks)

(a)

(i) Identify the type of cell division that occurs in the meristematic tissue of the root tip.

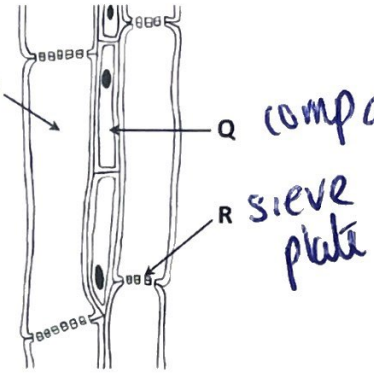
mitosis

(ii) Explain the term cotyledon.

seed leaf.

(b)

The diagram shows the structure of phloem.



Sieve tube

companion cell.

sieve plate

(i) Identify the parts **P**, **Q** and **R**.

(ii) Draw a diagram of the longitudinal section of a stem.
On your diagram, label the following **three** plant tissues:
phloem; **xylem**; **dermal**.

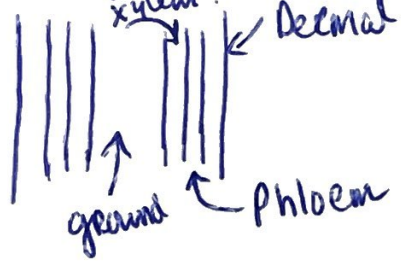
(iii) Xylem transports water upwards through plants.
Give **two** structural features of xylem that allow this upward movement of water.

(iv) Distinguish between monocotyledonous **and** dicotyledonous plants, by writing a sentence on **each**, using the following headings:
1. Leaf vein type
2. Organisation of vascular bundles in the stem.

(v) Name a plant in which its leaves are modified to store food.

(vii) Identify the zone within the root where the vascular tissue and root hairs are located.

(ii) L.S of Stem



(iii) Walls made of lignen,
- Xylem cells lie end to end to create continuous tube
- tubes narrow (any two)

(iv)

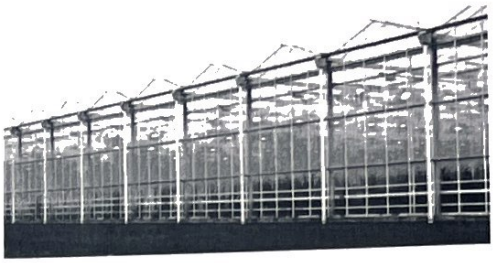
	Monocots	Dicots
1.	Parallel	netted
2.	Scattered	in a ring.

(v) Celery.

(vii) Differentation.

(c)

The photograph shows an industrial-sized greenhouse. Photosynthesis and crop growth can be controlled and maximised in greenhouses.



(i) Give **two** factors that horticulturists can adjust in a greenhouse to promote crop growth.

(ii) Write a balanced chemical equation for photosynthesis.

(iii) The biochemical processes in photosynthesis can be described under two main headings: the light stage and the dark stage.
Give a detailed account of **each** of these stages. **(27)**

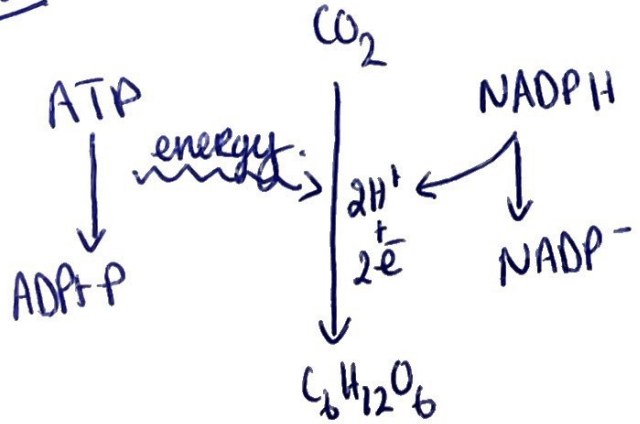
(i) Light intensity / temp. / CO_2 conc. (any two)

(ii) $6CO_2 + 6H_2O \xrightarrow[\text{chlorophyll}]{\text{light}} C_6H_{12}O_6 + 6O_2$.

(iii) Light – Granum

- electrons Return to chlorophyll (cyclic)
- electrons do not return to chlorophyll (non-cyclic)
- $ADP + P \xrightarrow{\text{energy}} A\cdot T\cdot P$
- $NADP^+ + 2\bar{e} \longrightarrow NADP^- + 2H^+ \longrightarrow NADPH$
- $H_2O \xrightarrow{\text{Photolysis}} 2\bar{e} + 2H^+ + \frac{1}{2}O_2$.

Dark – Stroma



- anabolic
- Reduction Reaction
- controlled by enzymes.