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**GRADE 11**

**NOVEMBER 2017**

**AGRICULTURAL SCIENCES P2**

**MARKS:** 150

**TIME:** 3 hours



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This question paper consists of 14 pages.

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## INSTRUCTIONS AND INFORMATION

1. This question paper consists of TWO sections, namely SECTION A and SECTION B.
2. Answer ALL the questions in the ANSWER BOOK.
3. Start EACH question on a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Non-programmable calculators may be used.
6. Show ALL calculations, including formulae, where applicable and round off the answers to TWO decimal places.
7. Write neatly and legibly.



**SECTION A****QUESTION 1**

- 1.1 Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.1.1–1.1.10) in the ANSWER BOOK, for example 1.1.11 D.

1.1.1 ... is a plant part modified for the transportation of water and dissolved minerals from roots to the leaves of plants.

- A Phloem
- B Stalk
- C Xylem
- D Cuticle

(2)

1.1.2 The chemical benefits for applying agricultural lime on acidic soils are:

- i. It lowers toxic ions such as zinc and iron to leach.
- ii. It increases the availability of phosphorus to plants.
- iii. It increases the availability of manganese to plants.
- iv. It lowers the availability of heavy metals.

Choose the correct combination:

- A i, ii and iv
- B ii, iii and iv
- C i, ii and iii
- D i, iii and iv

(2)

1.1.3 One of the irrigation systems below is suitable for any soil type and any slope of the land:

- A Flood irrigation
- B Drip irrigation
- C Sprinkler irrigation
- D Basin irrigation

(2)

1.1.4 A scientific test conducted by some learners in a stream revealed that there was very high level of fertiliser in the water.

The situation could be described as ...

- A eutrophication.
- B leaching.
- C ammonification.
- D immobilisation.

(2)

1.1.5 Sugar cane and rose plants can be best propagated by ...

- A leaf cuttings.
- B bulbs.
- C rhizomes.
- D stem cuttings.

(2)

1.1.6 One of the following damages to plants is caused by plant pests:

- A Poor germination and growth of a seedling
- B Yellow leaves resulting in poor photosynthesis
- C Etiolation or elongation of plant seedlings
- D Grain and fruit damage before reaching maturity

(2)

1.1.7 A major by-product of photosynthesis necessary for human survival is ...

- A nitrogen gas.
- B carbon dioxide.
- C oxygen.
- D water molecules.

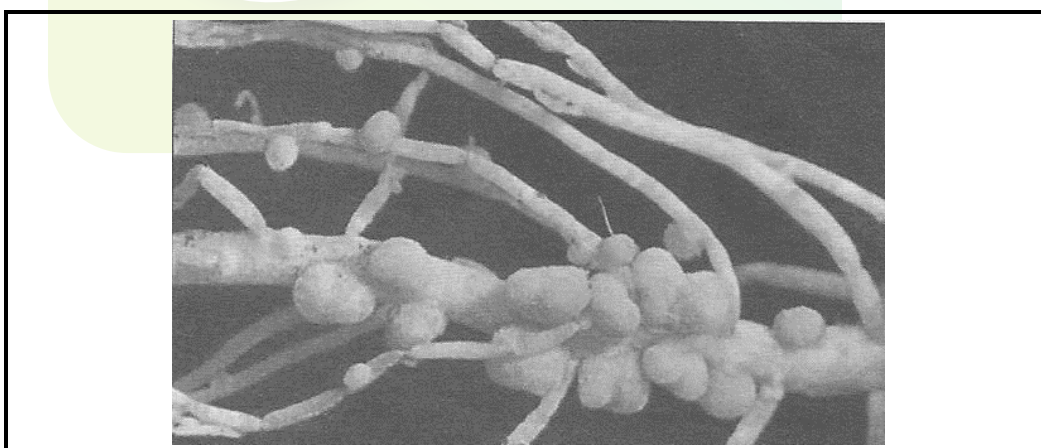
(2)

1.1.8 A tool used by farmers to measure the force with which water is held in the soil by the soil particles in kilopascals:

- A Neutron moisture meter
- B Tensiometer
- C Class A evaporation pan
- D Thermometer

(2)

1.1.9 The diagram below shows a form of nutrient fixation by a bacteria on the roots of legumes.



The plant nutrient associated with the description above is ...

- A carbon dioxide.
- B nitrogen.
- C boron.
- D sulphur.

(2)

1.1.10 Soil preparation which is done to breakdown clodes of soil into fine seed bed is regarded as ...

- A bare cultivation.
- B arboriculture.
- C secondary cultivation.
- D primary cultivation.

(2)  
(20)

1.2 Choose a description from COLUMN B that matches a term in COLUMN A. Write only the letter (A-J) next to the question number (1.2.1–1.2.5) in the ANSWER BOOK, for example 1.2.6 K.

COLUMN A		COLUMN B	
1.2.1	Dormancy	A	Required for nitrogen fixation
1.2.2	Primary cultivation	B	Produces pollen grains
1.2.3	Denitrification	C	Photosynthetic balance
1.2.4	Stigma	D	Failure of viable seed to germinate
1.2.5	Molybdenum	E	Receives pollen during pollination
		F	Cutting, turning and shattering of the soil with rotary tillers
		G	Nitrogen fixation in root nodules
		H	Anion-cation balance in cells
		I	Microbial conversion of nitrate to nitrogen gas
		J	Seed bed preparation for nursing seeds

(5 x 2) (10)

1.3 Give ONE word/term/phrase for each of the following descriptions. Write only the word/term/phrase next to the question number (1.3.1–1.3.5) in the ANSWER BOOK.

- 1.3.1 Accumulation of sodium in the soil or irrigation water
- 1.3.2 Chemicals that are absorbed and move within the plant and thus killing the whole plant
- 1.3.3 A change in the structure of a gene resulting in a variant form which may be transmitted to future generations
- 1.3.4 Growing crops in a medium other than soil
- 1.3.5 The practice of replanting the same crop species in the same field year after year

(5 x 2) (10)

1.4 Change the UNDERLINED WORD(S) in each of the following statements to make them TRUE. Write only the answer next to the question number (1.4.1–1.4.5) in the ANSWER BOOK.

1.4.1 Micro-irrigation involves the use of different pipes to drain excess water from a farm land.

1.4.2 The development of fruit without the stimulus is stimulative parthenocarp.

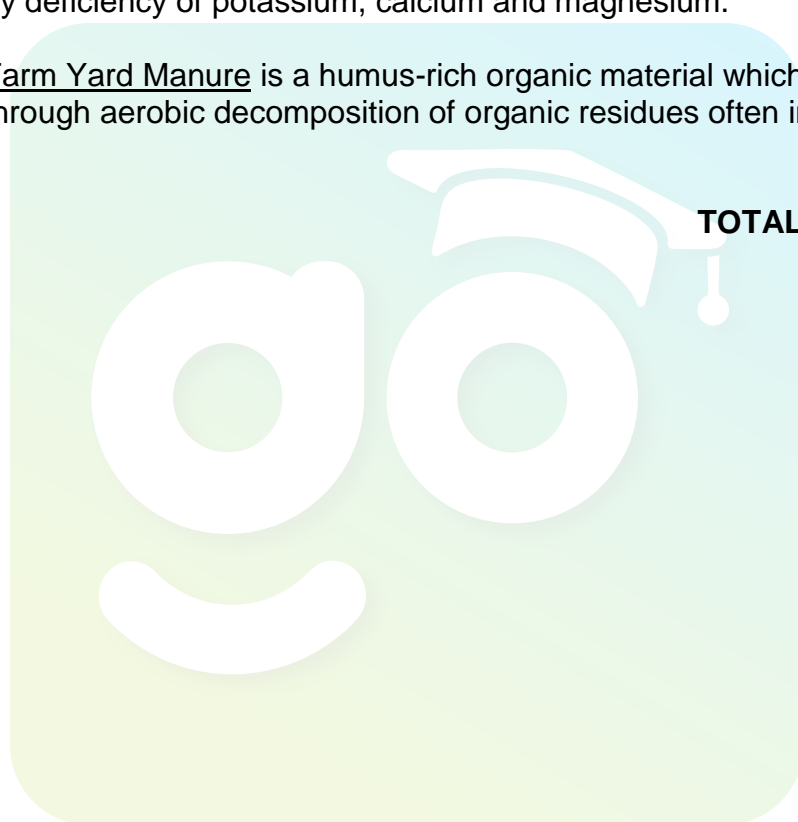
1.4.3 The diffusion of water molecules from a region of lower to higher concentration is adhesion.

1.4.4 Chlorosis refers to the death of tissues, particularly leaf tissue, caused by deficiency of potassium, calcium and magnesium.

1.4.5 Farm Yard Manure is a humus-rich organic material which is formed through aerobic decomposition of organic residues often in heaps.

(5 x 1) (5)

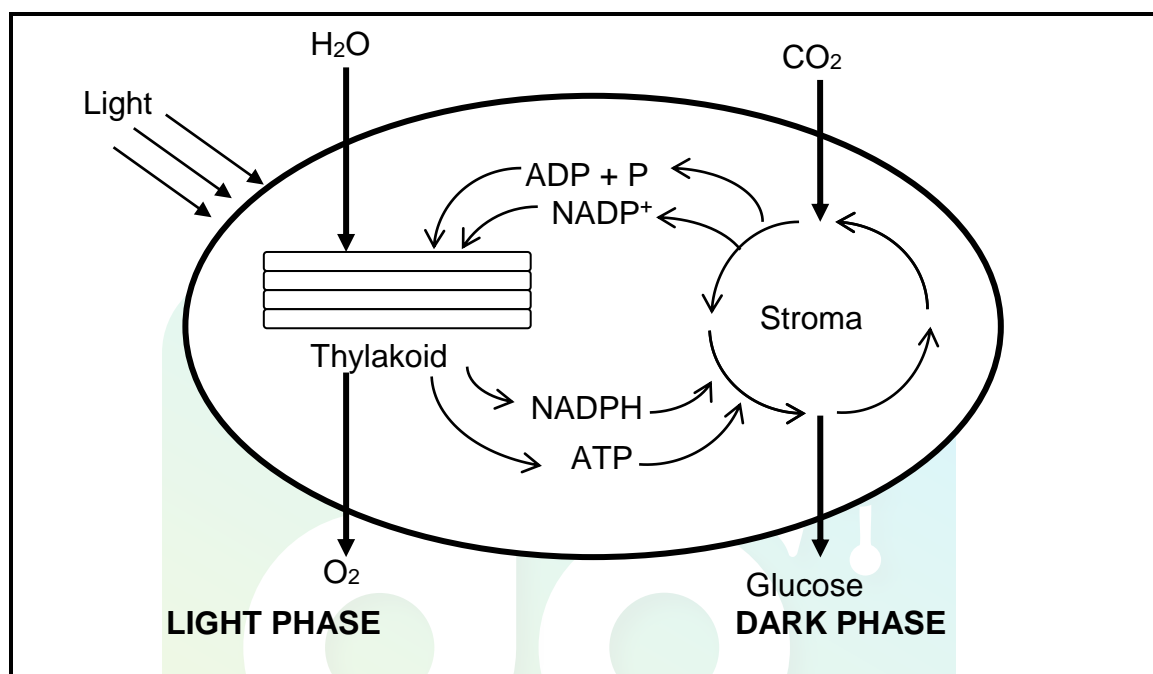
**TOTAL SECTION A: 45**



**SECTION B:****QUESTION 2: PLANT NUTRITION**

Start this question on a NEW page.

2.1 The sketch below shows the light phase and dark phase of photosynthesis.



2.1.1 Indicate the part of a plastid where the following occur:

- |                 |     |
|-----------------|-----|
| (a) Light phase | (1) |
| (b) Dark phase  | (1) |

2.1.2 Predict TWO benefits of the processes in QUESTION 2.1 to mankind. (2)

2.1.3 Mention TWO storage organs of a plant where excess products of the process in QUESTION 2.1 could be stored. (2)

2.1.4 Differentiate between photosynthesis and respiration with regard to energy use in both processes. (2)



- 2.2 Two ion-uptake mechanisms have been indicated in the table below. Match the ion-uptake mechanisms to the statements in QUESTIONS 2.2.1, 2.2.2 and 2.2.3.

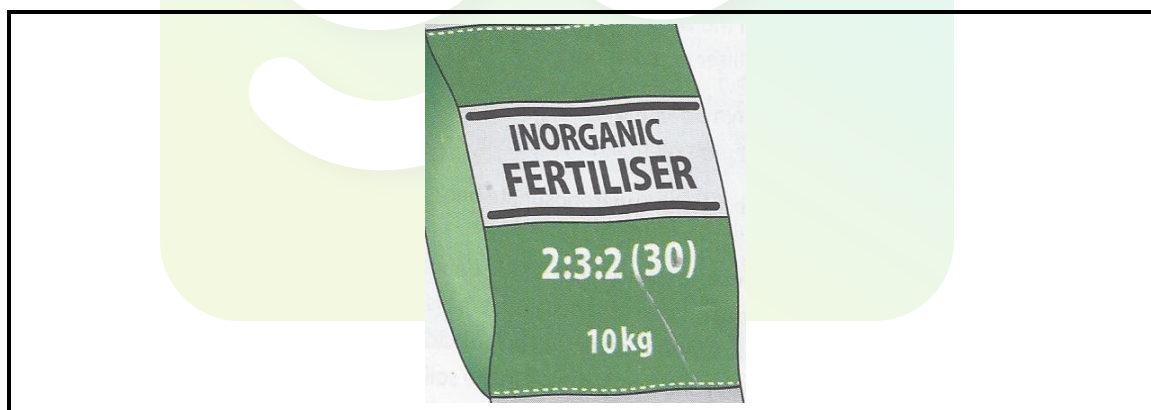
Passive ion uptake; Active ion uptake
---------------------------------------

- 2.2.1 Movement of molecules from an area of low concentration to an area of high concentration (1)
- 2.2.2 Requires energy and the use of carrier proteins to move nutrients (1)
- 2.2.3 Mineral nutrient ions cross the cell membrane without requiring energy (1)

- 2.3 Farm manure is rich in fibre that improves the soil structure and its water retention properties. It is a rich source of nitrogen to organic farming. Notwithstanding its importance in farming, several factors may affect the composition of farm manure. Where farmers identify their soils to be acidic; they apply agricultural lime to neutralise the soil acidity.

- 2.3.1 Identify THREE advantages of farm manure from the scenario above. (3)
- 2.3.2 Name TWO examples of agricultural lime used to neutralise soil acidity. (2)
- 2.3.3 Predict THREE factors that could negatively affect the composition of farm manure. (3)

- 2.4 The picture below shows an example of a bag of inorganic fertiliser.



- 2.4.1 Classify the type of fertiliser in the picture above. (1)
- 2.4.2 Justify your answer to QUESTION 2.4.1. (1)
- 2.4.3 Calculate the percentage of nitrogen in the bag of fertiliser. (4)

2.5

Some Grade 11 learners tested the effect of different nutrient elements on the formation of buds in a rose plant for six months. Their findings was recorded in a table as follows:

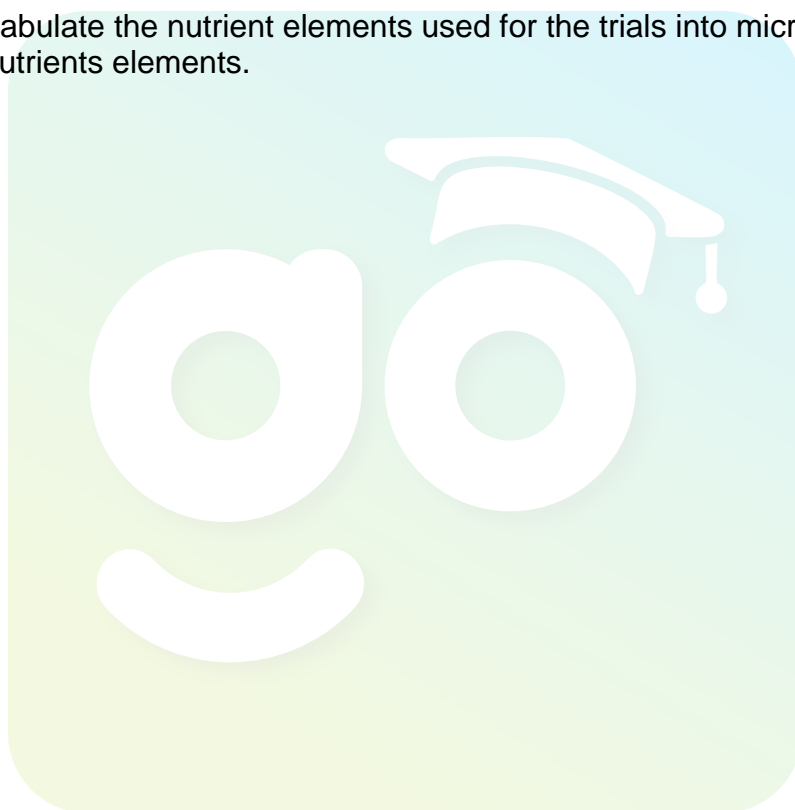
Nutrient element	Number of buds formed after three months
zinc	8
cobalt	5
nitrogen	20
boron	25
potassium	15

2.5.1 Draw their findings using a bar graph and give an appropriate heading to the graph.

(5)

2.5.2 Tabulate the nutrient elements used for the trials into micro and macro nutrients elements.

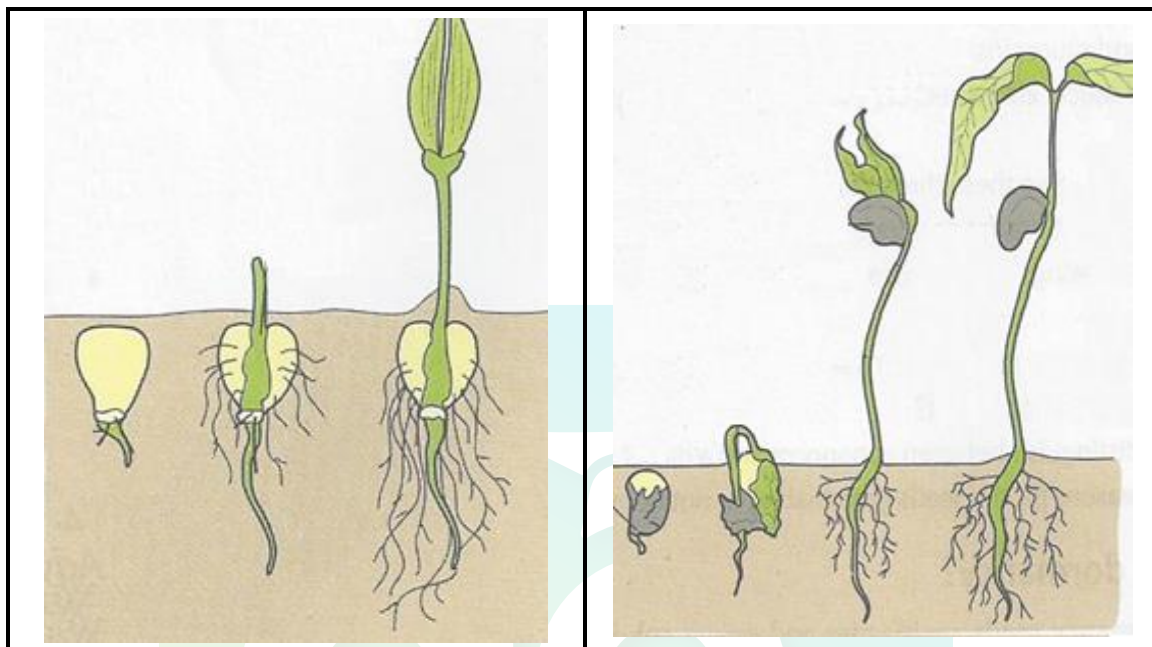
(5)

**[35]**

**QUESTION 3: PLANT REPRODUCTION**

Start this question on a NEW page.

- 3.1 The diagrams below shows the germination of a dicotyledonous and monocotyledonous plants.

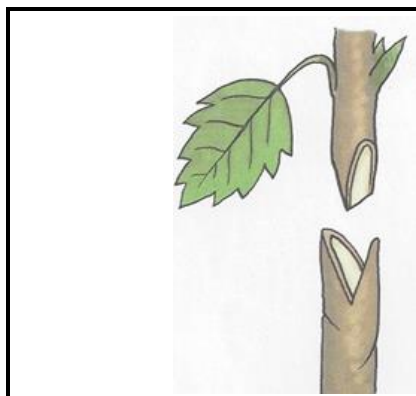
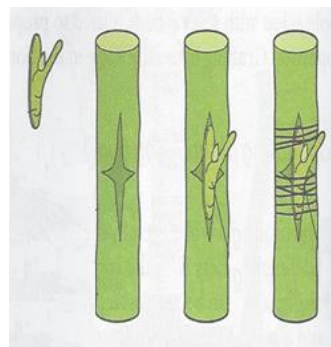


**FIGURE 3.1(a)**

**FIGURE 3.1(b)**

- 3.1.1 Identify the types of germination depicted in FIGURE 3.1(a) and FIGURE 3.1(b). (2)
- 3.1.2 Suggest TWO methods that could be used by farmers to break dormancy of the seed type in FIGURE 3.1(a). (2)
- 3.1.3 Enumerate THREE environmental conditions necessary for the successful germination of seeds. (3)

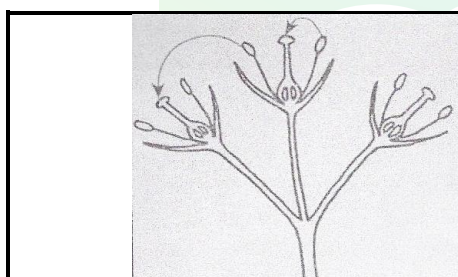
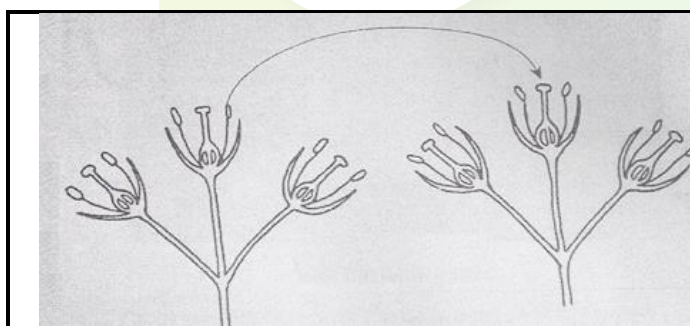
3.2

**FIGURE 3.2(a)****FIGURE 3.2(b)**

3.2.1 Determine the types of asexual reproduction technique in FIGURE 3.2(a) and FIGURE 3.2(b). (2)

3.2.2 Give THREE reasons to justify the use of asexual reproduction in plant propagation. (3)

3.3 The diagrams below shows the germination of a dicotyledonous and monocotyledonous plants.

**DIAGRAM 1****PLANT A****DIAGRAM 2****PLANT A****PLANT B**

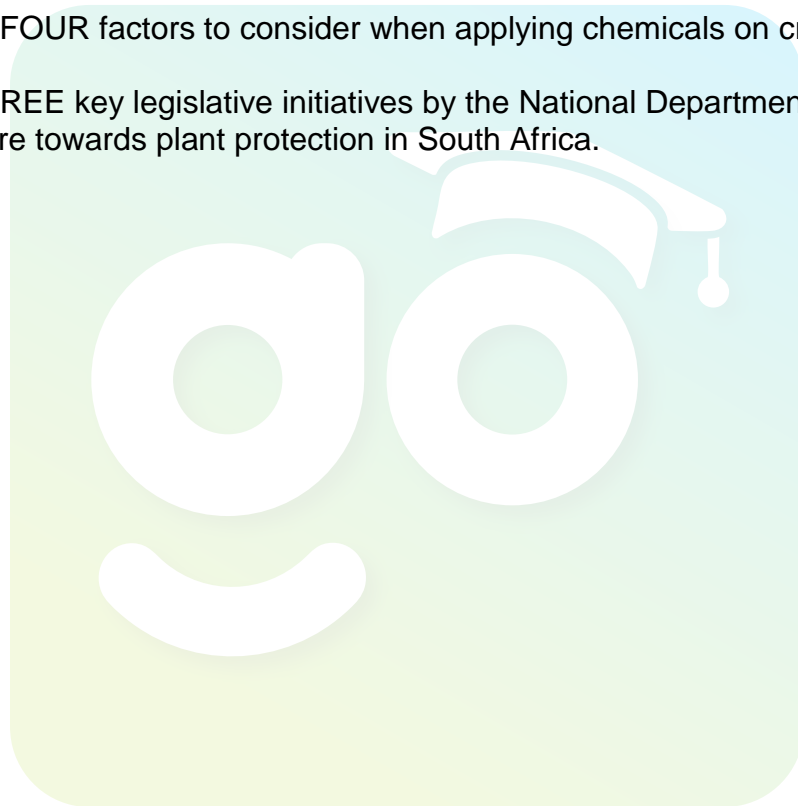
3.3.1 Deduce the process that is taking place in DIAGRAM 2. (1)

3.3.2 Explain briefly THREE ways in which plants are adapted to wind pollination. (3)

3.3.3 State THREE other agents of pollination apart from wind. (3)

- 3.4 Weeds are plants that grow where they are not wanted. Weeds have the ability to out-compete cultivated crops, which results in poor crop yields. To control weeds farmers can use chemical, mechanical, biological or cultural methods. Herbicides are chemicals used to control weeds. Herbicides could be grouped according to their mode of action, these are systemic herbicides or contact herbicides.

- 3.4.1 Give THREE reasons to support the suitability of contact herbicides to control weeds. (3)
- 3.4.2 Suggest THREE reasons why weeds easily out-compete cultivated crops. (3)
- 3.4.3 List THREE negative effects of weeds on the growth of food crops. (3)
- 3.5 Suggest FOUR factors to consider when applying chemicals on crops. (4)
- 3.6 State THREE key legislative initiatives by the National Department of Agriculture towards plant protection in South Africa. (3)

**[35]**

**QUESTION 4: OPTIMAL RESOURCES**

Start this question on a NEW page.

- 4.1 Crop farmers need to find efficient ways to reduce wastage on their farms and improve production. One of the modern ways to achieve this is through precision farming. Precision farming allows farmers to move away from blanket fertiliser application to applying fertiliser to a specific infertile area. Precision farming also allows farmers to compare harvest information and to identify non-fertile spots in their fields. This enables farmers to investigate the causes of infertile soil on their farms.

- 4.1.1 Identify THREE ways by which precision farming results in optimum use of resources from the scenario. (3)
- 4.1.2 Mention TWO modern equipment used in precision farming. (2)
- 4.1.3 Suggest THREE challenges a subsistence farmer might face if they decide to start precision farming. (3)

- 4.2 Irrigation is the application of water to the soil or any growth medium for the purpose of benefiting the plant. Flood irrigation and sprinkler irrigation are only two examples of many systems practised by farmers.

- 4.2.1 Differentiate between flood irrigation and sprinkler irrigation. (4)
- 4.2.2 Suggest TWO conditions under which flood irrigation could be applied. (2)
- 4.2.3 Give TWO advantages of sprinkler irrigation in crop production. (2)

- 4.3 Some useful information is provided in the table below:

(a)	Better air movement
(b)	Compaction occurs
(c)	Weakened aeration
(d)	No compaction

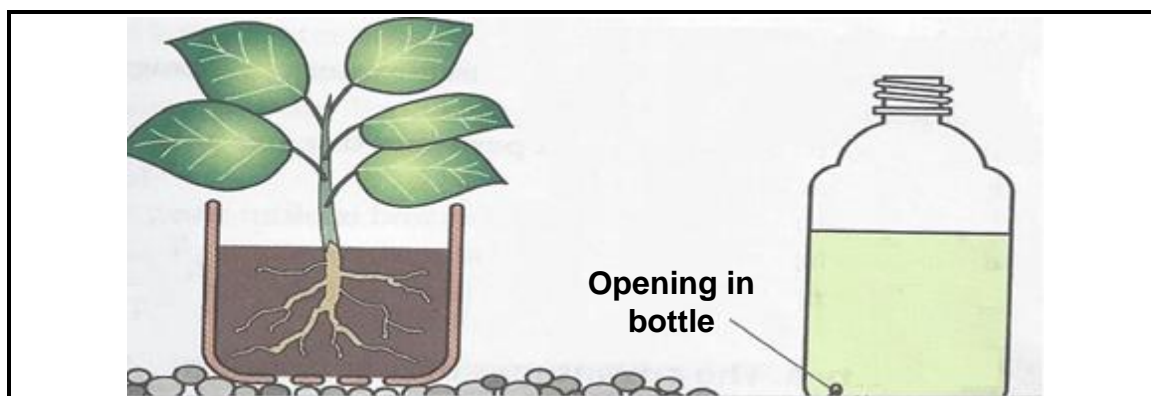
- 4.3.1 Match the information above to complete the effects of bare cultivation and mulching under the following headings:

Bare cultivation	Mulching

- (4)
- 4.3.2 Define the underlined terminology in QUESTION 4.3.1. (2)
- 4.3.3 Give TWO reasons to support the practice of mulching by vegetable farmers. (2)



- 4.4 The illustrations below indicate the cultivation of plants without using soil.



**FIGURE 4.4**

- 4.4.1 Indicate the growing techniques in FIGURE 4.4. (1)
- 4.4.2 Recommend THREE important factors to consider in selecting a growing medium for the technique in FIGURE 4.4. (3)
- 4.4.3 Mention TWO reasons why you would recommend the technique to a vegetable farmer. (2)
- 4.5 State TWO reasons why soil drainage should be carried out in a waterlogged land before vegetables are cultivated. (2)
- 4.6 Suggest THREE reasons why exotic breeds of fish are cultivated in aquaculture in South Africa. (3)

**[35]**

**TOTAL SECTION B: 105**

**GRAND TOTAL: 150**

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