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GRADE 11

NOVEMBER 2019

AGRICULTURAL SCIENCES P2

MARKS: 150

TIME: 2½ hours



★ I A G R S E 2 ★

This question paper consists of 15 pages.

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. You may use a non-programmable calculator.
6. Show ALL calculations, including formulae, where applicable.
7. Write neatly and legibly.



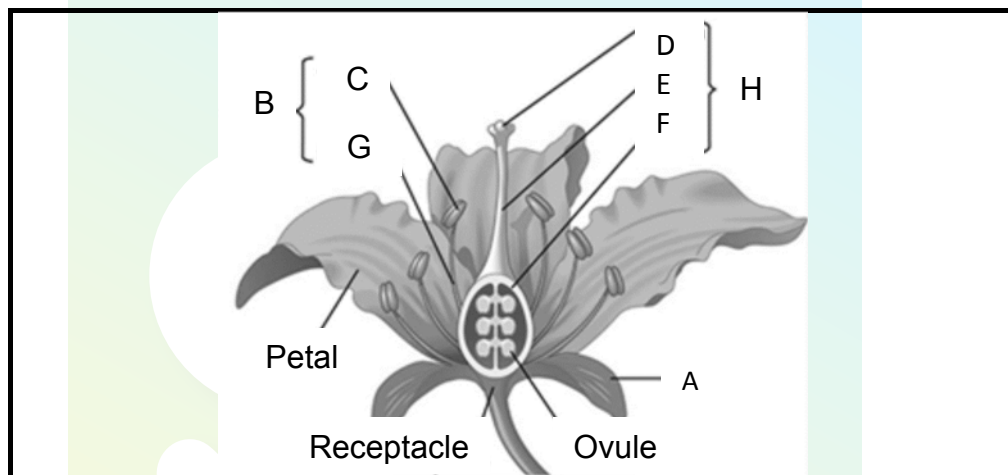
SECTION A**QUESTION 1**

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 your ANSWER BOOK, for example 1.1.11 D.

1.1.1 Which ONE of the following mechanisms is NOT involved in the movement of water from the roots to stems and leaves?

- A Root pressure
- B Guttation
- C Capillary action
- D Transpiration pull

1.1.2 The letter **H** in the diagram below represents the ...



- A stamen.
- B stigma.
- C pistil.
- D androecium.

1.1.3 The following methods can be used by farmers to increase the rate of photosynthesis.

- (i) Growing crops in green houses
- (ii) Trellising plants
- (iii) Intercropping
- (iv) Using optimum plant density

Choose the correct combination:

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

1.1.4 Which ONE of the following is an example of a stored grain pest?

- A Nematode
- B Spider mite
- C Aphid
- D Weevil

1.1.5 ... is the simplest method of plant improvement.

- A Selection
- B Hybridisation
- C Mutation
- D Genetic modification

1.1.6 Farmers make use of irrigation scheduling to ...

- (i) reduce energy costs.
- (ii) avoid over watering.
- (iii) avoid under watering.
- (iv) avoid fungal diseases.

Choose the correct combination:

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

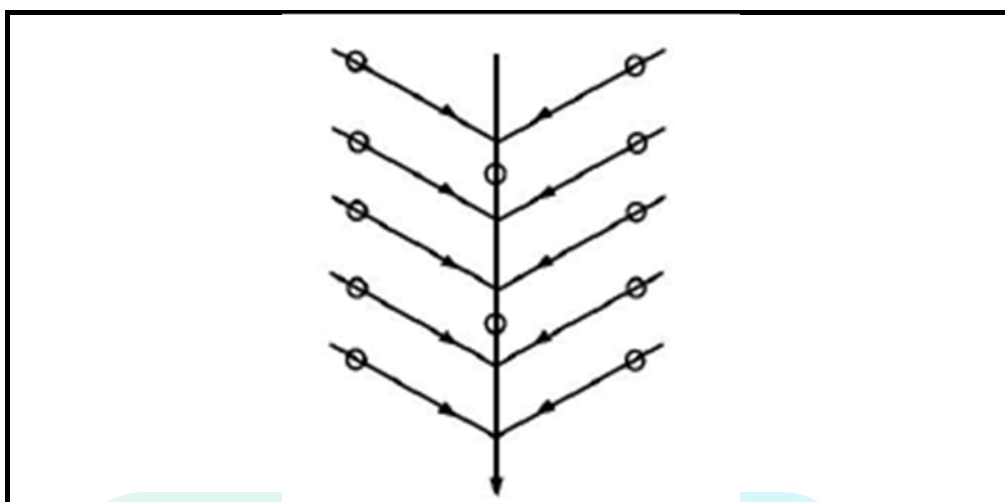
1.1.7 ... is NOT a requirement for aquaculture farmers to achieve high yields.

- A Water temperature
- B Oxygen content of water
- C Market price
- D Feeding

1.1.8 Which ONE of the following sources of irrigation water is likely to be saline?

- A An aquifer
- B A lake
- C A river
- D Rainwater

1.1.9 The diagram below shows a ... drainage system.



- A herringbone
- B natural
- C grid
- D fishbone

1.1.10 ... is NOT an important consideration when installing a pipe drainage system.

- A Depth
- B Soil nutrient status
- C Slope
- D Pipe diameter

(10 x 2) (20)

- 1.2 Choose a word/term/concept/phrase from COLUMN B that best matches a description in COLUMN A. Write ONLY the letter (A–H) next to 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	Light dependent phase of photosynthesis	A	Grafting
1.2.2	Contains a small percentage of magnesium carbonate	B	Aquaculture
1.2.3	Physical or chemical treatment that weakens or softens the seed coat	C	Dolomitic lime
1.2.4	A whole scion with several buds is used to propagate a plant with desired characteristics	D	Hill reaction
1.2.5	A farming system that makes use of computers, global satellite positioning systems and remote sensing devices to measure environmental conditions	E	Scarification
		F	Budding
		G	Precision farming
		H	Calcitic lime

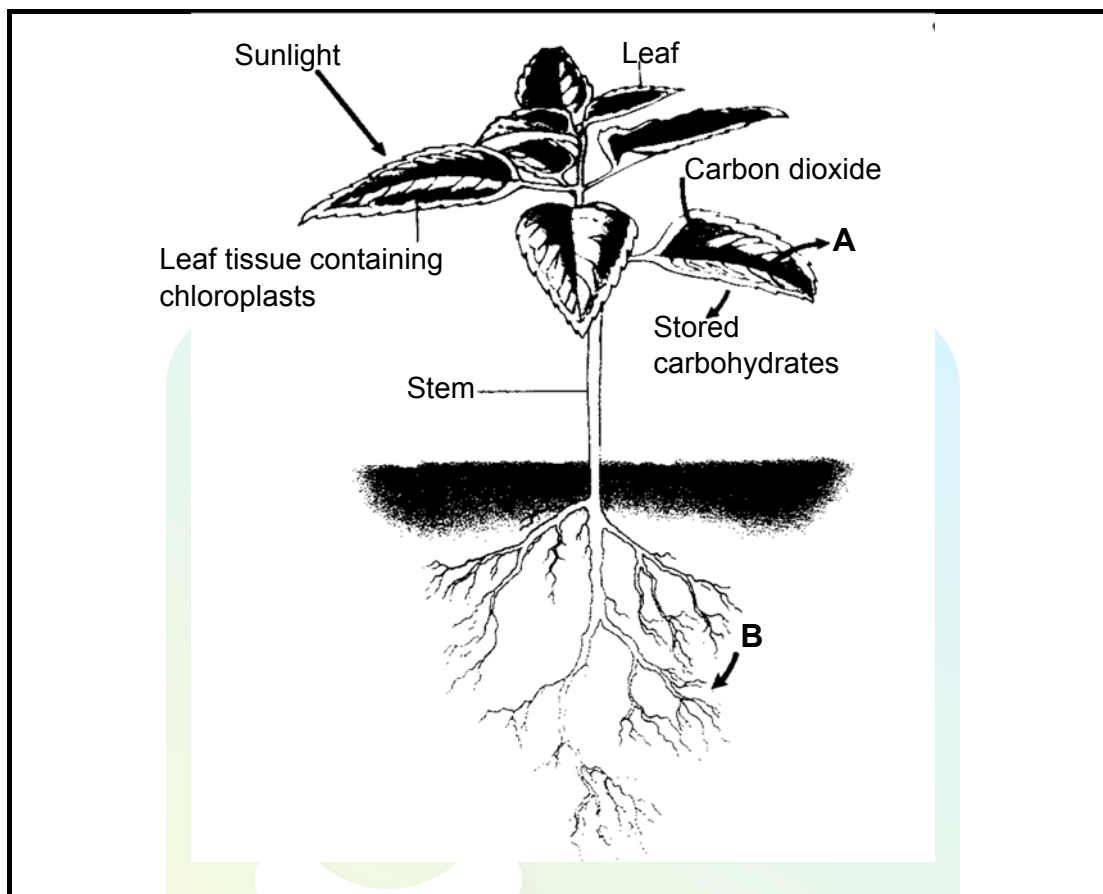
(5 x 2) (10)

- 1.3 Give ONE word/term/concept/phrase for each of the following descriptions. Write ONLY the term next to the question number (1.3.1–1.3.5) in the ANSWER BOOK.
- 1.3.1 Application of fertiliser through irrigation water
- 1.3.2 The ability of a liquid to flow upwards in narrow spaces against the force of gravity
- 1.3.3 Chemicals that are used to control pests
- 1.3.4 A combination of different methods to optimise pest control
- 1.3.5 The artificial removal of excess water from the soil (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 in the ANSWER BOOK.
- 1.4.1 Micro-elements are plant nutrients required in large quantities.
- 1.4.2 Pathogens spread disease causing organisms from one host to another.
- 1.4.3 Monoculture is the farming of marine and freshwater aquatic organisms.
- 1.4.4 An evaporation pan measures how hard a plant has to work to extract water from the soil.
- 1.4.5 Green manuring is the covering of cultivated soil with different substances such as sawdust and straw to reduce water loss and prevent erosion. (5 x 1) (5)
- TOTAL SECTION A: 45**

SECTION B

QUESTION 2: PLANT STUDIES (NUTRITION)

2.1 The diagram below shows a process which takes place in plants. Analyse it and answer the questions that follow.



- 2.1.1 Name the process shown above. (1)
- 2.1.2 Deduce substances **A** and **B**. (2)
- 2.1.3 Plants are described as autotrophic due to the process shown above. Justify this statement. (2)
- 2.1.4 Tabulate TWO differences between the process shown above and cellular respiration. (5)

2.2 The soil's nutrient status is one of the most important factors affecting crop growth. Communal farmers usually experience low yields since they use a hit and miss approach to fertiliser application. This method involves blindly applying fertilisers without determining how much is actually required by plants.

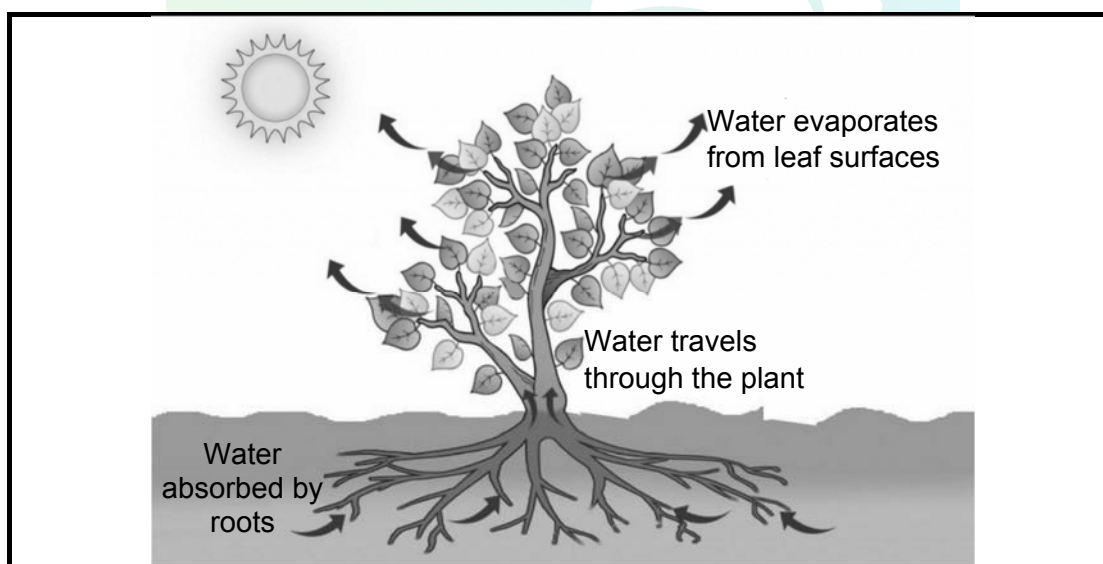
2.2.1 Explain TWO negative effects of using the hit and miss approach explained in the passage above. (2)

2.2.2 Suggest TWO methods that farmers can use to determine the amount of fertiliser to be applied. (2)

2.2.3 List TWO soil factors that can affect the availability of nutrients to plants. (2)

2.2.4 Low yields can also be caused by nutrients being unavailable to plants even if farmers apply fertilisers. Describe how each of the factors mentioned in QUESTION 2.2.3 affects nutrient availability. (2)

2.3 The picture below illustrates the transpiration process.



2.3.1 Suggest the mechanism through which roots absorb each of the following:

(a) Water (1)

(b) Minerals down their concentration gradient (1)

(c) Minerals against their concentration gradient (1)

2.3.2 Supply TWO adaptations of plants to reduce water loss through transpiration. (2)

2.3.3 The process shown above is essential for plant growth. Support this statement with TWO reasons. (2)

2.4 Organic fertilisers are plant and animal remains applied to the soil to add one or more plant nutrients.

2.4.1 Supply ONE example of an organic fertiliser. (1)

2.4.2 One of the major reasons why organic fertilisers are becoming popular is due to their environmental benefits. Give TWO of these benefits. (2)

2.4.3 Most commercial farmers are still using chemical fertilisers. Describe TWO advantages they have over organic fertilisers. (2)

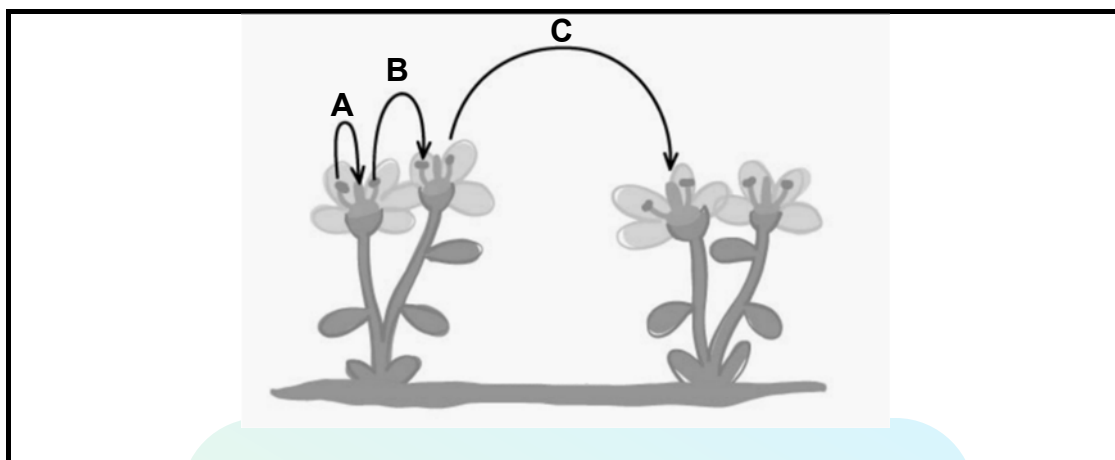
2.5 Analyse the table below and provide labels for the letters **A–E** to complete the table.

Mineral	Form in which it is absorbed by plants	Mineral type	Deficiency symptom
Nitrogen	A	B	Chlorosis
C	PO_3^-	Macro element	D
Zinc	Zn^{2+}	E	Small leaf disease

(5)
[35]

QUESTION 3: PLANT REPRODUCTION AND PROTECTION

3.1 The diagram below illustrates pollination in plants.



3.1.1 Identify the pollination types **B** and **C** in the diagram above. (2)

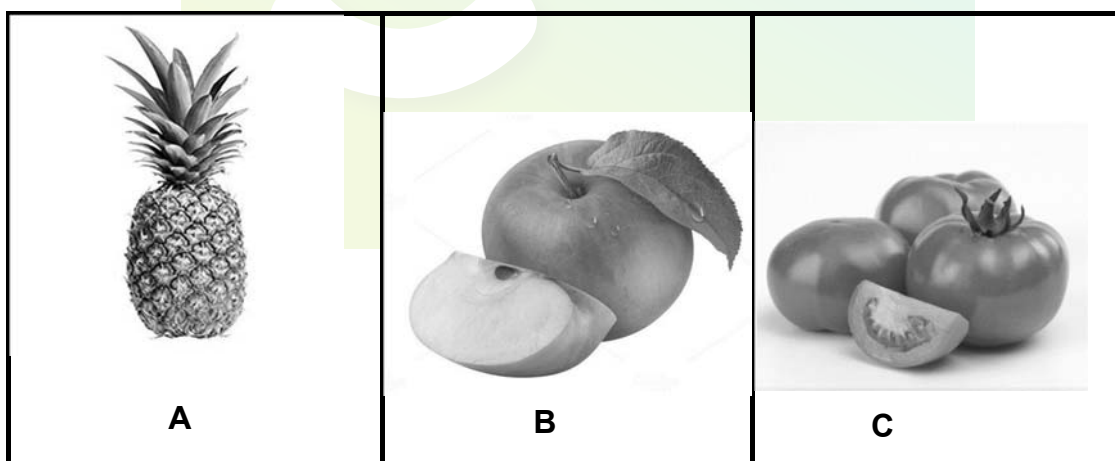
3.1.2 Describe TWO advantages of pollination type **A**. (2)

3.1.3 After pollination, double fertilisation occurs. Describe this process. (2)

3.1.4 Classify the type of reproduction depicted above as sexual or asexual. (1)

3.1.5 Deduce whether the plant above is insect or wind pollinated. Justify your choice. (2)

3.2 The pictures below show three different fruit types.



3.2.1 Classify each of the fruits **A**, **B** and **C** above as simple, compound or accessory. (3)

3.2.2 Briefly explain the reason behind your classification of fruit **B** in QUESTION 3.2.1. (2)

3.2.3 Name the part of a flower from which the fruit structure below develops:

(a) Seeds (1)

(b) Fruit (1)

3.3 One of the major challenges that crop farmers are faced with is weed control. Weeds compete with cultivated crops for space, water and nutrients resulting in reduced yields. Farmers must choose cost-effective and ecologically sustainable methods to control weeds.

3.3.1 From the passage above, deduce ONE way in which weeds reduce yields. (1)

3.3.2 Supply the name given to chemicals used to control weeds. (1)

3.3.3 Suggest TWO reasons why weeds grow more easily than cultivated crops. (2)

3.3.4 List TWO examples of weed seed dispersal agents. (2)

3.3.5 Recommend TWO ecologically sustainable weed control methods that can be used by farmers. (2)

3.3.6 The state plays a pivotal role in plant protection. Mention TWO ways in which the state contributes to plant protection. (2)

3.4 The table below shows a comparison of the performance of genetically modified and non-genetically modified cotton varieties over a period of 5 years.

Year	Yield (t)	
	Non-GM cotton	Bt Cotton
2010	70	85
2011	120	140
2012	80	90
2013	60	75
2014	90	110

3.4.1 Present the information in the table above in the form of a bar graph. (6)

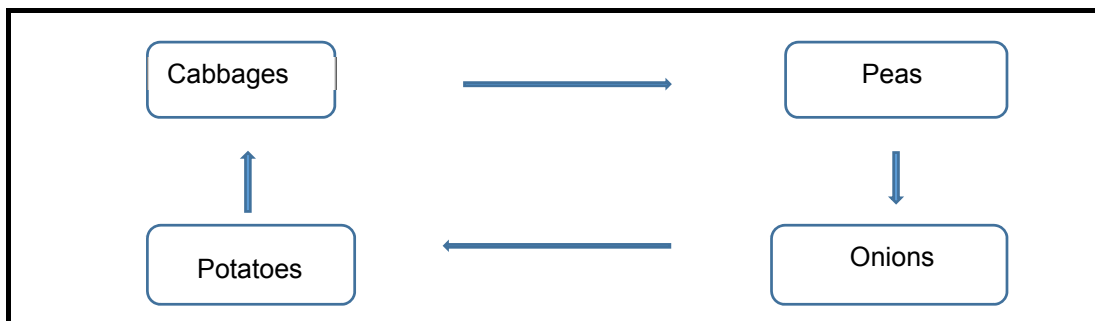
3.4.2 Determine the cotton variety that is more productive between the two in the table above. (1)

3.4.3 Suggest a possible reason for the differences in performance of the two varieties. (2)

[35]

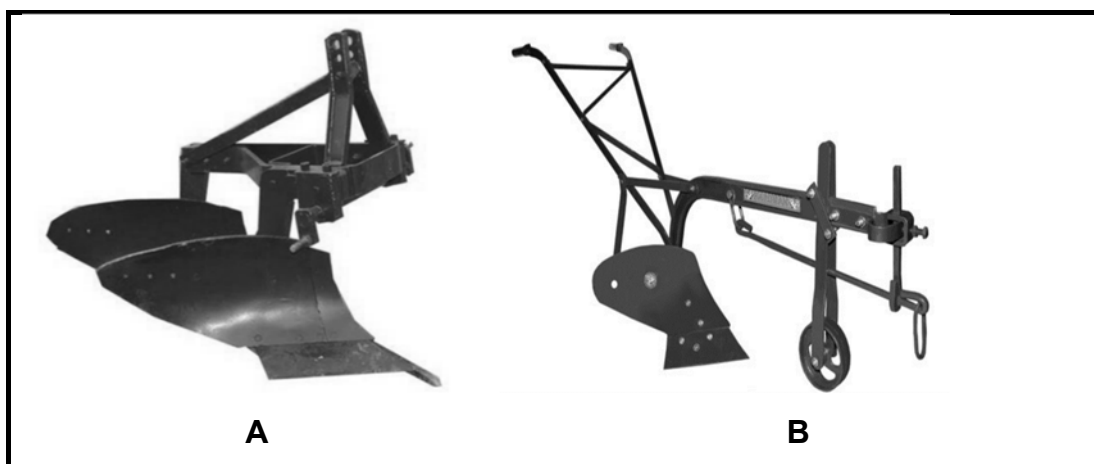
QUESTION 4: OPTIMAL RESOURCE UTILISATION

- 4.1 The schematic diagram below shows a practice used in agriculture. Analyse it and answer the questions that follow.



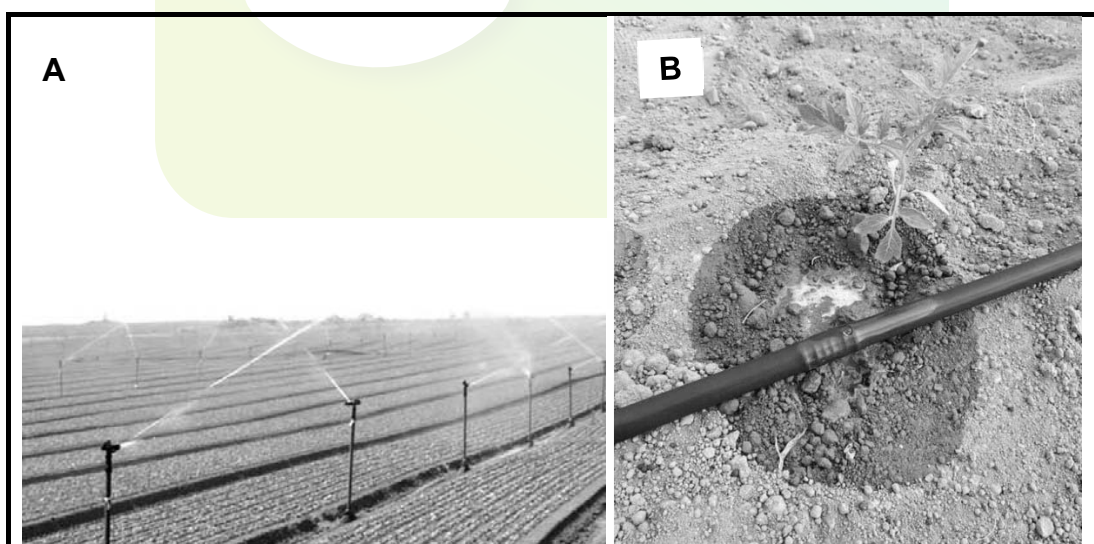
- 4.1.1 Identify the practice shown above. (1)
- 4.1.2. Deduce TWO principles that were used to design the program above. (2)
- 4.1.3 Suggest TWO reasons why the practice depicted above is recommended in crop production. (2)
- 4.1.4 Give ONE disadvantage of the above practice. (1)
- 4.2 Hydroponics is a method of growing plants without soil by using mineral nutrient solutions in a water solvent. Terrestrial plants may be grown with only their roots exposed to the mineral solution, or the roots may be supported by an inert medium such as perlite or gravel.
- 4.2.1 Give an example of a growing medium mentioned in the passage above. (1)
- 4.2.2 Deduce TWO benefits of the system described above. (2)
- 4.2.3 Differentiate between *open* and *closed hydroponic production systems*. (2)
- 4.2.4 Comment on the suitability of hydroponics for subsistence farming. (2)

4.3 Analyse the images below and answer the questions that follow.



- 4.3.1 Identify implement **B** above. (1)
- 4.3.2 Determine whether each of the implements above is used for primary or secondary tillage. (2)
- 4.3.3 Deduce TWO advantages of using implement **B** as compared to implement **A**. (2)
- 4.3.4 State TWO aims of primary soil cultivation. (2)
- 4.3.5 Recently farmers are being discouraged from using implements like ones above for tillage but rather to practice conservation tillage. Mention TWO practices of conservation tillage. (2)

4.4 The images below show examples of irrigation systems.



- 4.4.1 Identify irrigation systems **A** and **B** above. (2)
- 4.4.2 Determine the TWO criteria to be used to determine water quality for irrigation method **B**. (2)
- 4.4.3 Mention TWO advantages of irrigation system **A**. (2)

4.5 The structure below is common on farms.



- 4.5.1 Name the structure above. (1)
- 4.5.2 Identify TWO materials which were used to make the structure above. (2)
- 4.5.3 Justify the use of the structure above by farmers with TWO reasons. (2)
- 4.5.4 Give TWO environmental factors farmers should consider before setting up structures like the one above. (2)
- [35]

TOTAL SECTION B: 105
GRAND TOTAL: 150

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