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GRADE 11

NOVEMBER 2015

AGRICULTURAL SCIENCES P2

MARKS: 150

TIME: 2½ hours



This question paper consists of 16 pages.

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions in the ANSWER BOOK.
2. Start EACH question on a NEW page.
3. Read ALL the questions correctly and answer only what is asked.
4. Number the answers correctly according to the numbering system used in this question paper.
5. A non-programmable calculator may be used.
6. Show ALL your calculations, including units and formula, where applicable.
7. Write neatly and legibly.



SECTION A**QUESTION 1**

1.1 Various options are given 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 One of the by-products of photosynthesis is oxygen, which is released through the ... of leaves into the atmosphere.

- A mesophyll
- B stomata
- C chloroplast
- D cuticles

1.1.2 A soil cultivation system in which soil crumbs are broken down into smaller particles, using implements such as rakes over small areas to make the soil flat and level for new planting is called ...

- A harrowing.
- B mulching.
- C discing.
- D bare cultivation.

1.1.3 Plants suffering from phosphorus deficiency:

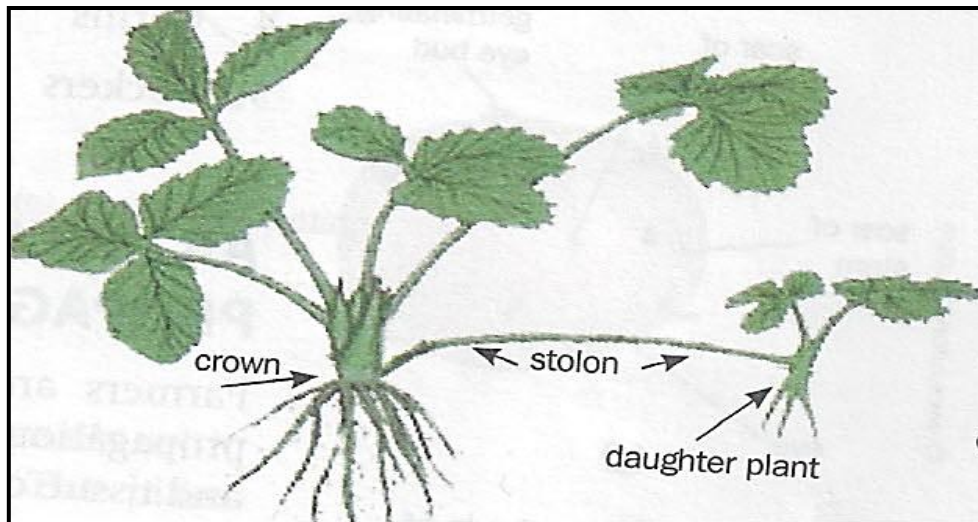
- (i) Have poor flowering, seeding, fruiting and poor yields
- (ii) Become stunted with thin, spindly stems
- (iii) Older foliage turn almost black with reddish or purple tints
- (iv) Die if shoots occur

Choose the correct combination:

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

- 1.1.4 Factors essential for germination of plants in hydroponics are ...
- A soil, carbon dioxide, light and favourable temperature.
 - B clay soil, humus, water and light.
 - C water, oxygen, favourable temperature and light.
 - D organic fertiliser, dark soil, agricultural lime and water.
- 1.1.5 Root rot disease in vegetable crops is caused by ...
- A nitrogen deficiency.
 - B fumigation of crops.
 - C high iron concentration in the soil.
 - D over irrigation or flooding.
- 1.1.6 Fruits that develop or come from flowers with many ovaries are ...
- A fleshy, simple fruits.
 - B indehiscent, dry fruits.
 - C accessory fruits.
 - D compound fruits.
- 1.1.7 ... refers to the breaking or scratching of the seed coat to break dormancy.
- A Ablactation
 - B Scarification
 - C Germination
 - D Pollination
- 1.1.8 An irrigation system that directs water to flow through narrow channels between rows of crops instead of distributing water evenly on the whole field.
- A Sprinkler irrigation
 - B Furrow irrigation
 - C Drip irrigation
 - D Aerial irrigation

- 1.1.9 The diagram of the plant below is an example of propagation through ...



- A bulb.
B rhizome.
C corm.
D runners.
- 1.1.10 The seasonal climatic changes in South Africa limit aquatic farmers' choice in breeding all species of fish. This could be because...

- A of flooding and drought during summer and winter respectively.
B farmers are lazy to work with water during winter.
C of fluctuations in water temperatures.
D many plants wilt in winter and so feed becomes scarce.

(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 the question number (1.2.1–1.2.5) in the ANSWER BOOK, for example 1.2.6 I.

COLUMN A		COLUMN B	
1.2.1	ablactation	A	soilless technique for growing plants
1.2.2	biotechnology	B	long lasting effect on soil
1.2.3	pistil	C	septum and anther
1.2.4	phloem	D	water and dissolved nutrients transport from roots to leaves
1.2.5	organic fertilisers	E	falling of flowers and fruits after pollination
		F	scientific technique to modify organisms
		G	stigma, style and ovary
		H	nutrient transport to all parts of plant.

(5 x 2) (10)

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

- 1.3.1 Organisms that transmit diseases or parasites from plant to plant
- 1.3.2 The middle fleshy part of the fruit that we usually eat
- 1.3.3 Stems that grow at the soil surface or just below ground, which form adventitious roots at the nodes, and new plants from the buds
- 1.3.4 An instrument used by farmers to measure the moisture content of the soil directly or how hard the plant is working to extract water from the soil
- 1.3.5 The artificial removal of excess water from the root zone of a plant in 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 (1.4.1–1.4.5) in the ANSWER BOOK.

1.4.1 Active transport Is the spontaneous movement of molecules from a region of higher concentration, to a region of lower concentration.

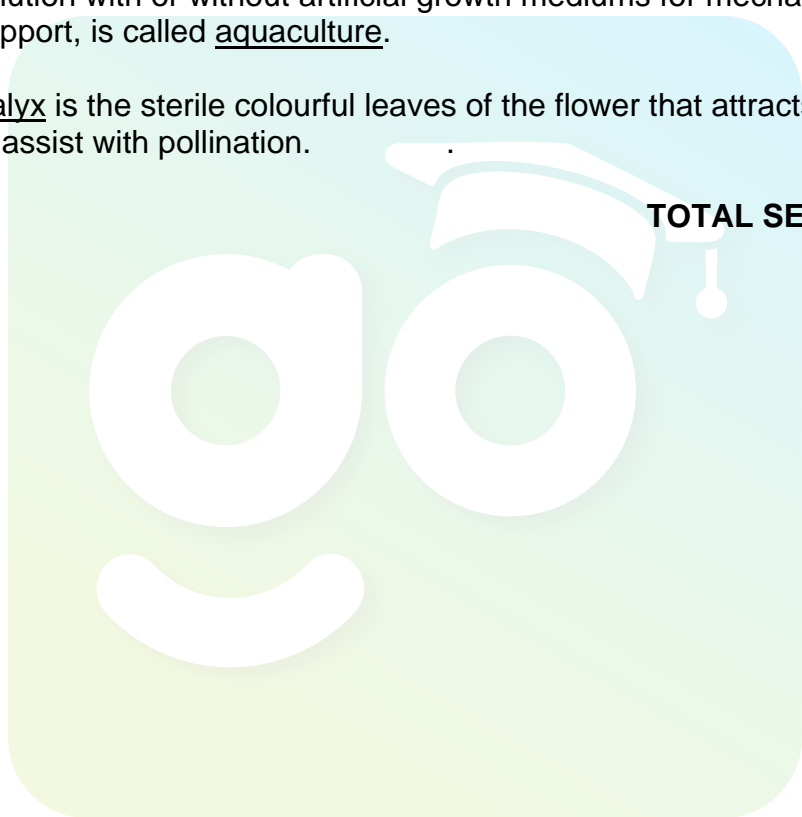
1.4.2 Chemical control involves using species-specific insects or other invertebrates and diseases, in order to control weeds.

1.4.3 In flood irrigation, water is applied slowly and exactly in the form of single drops, streams or in the form of a drizzle.

1.4.4 A production system whereby plants are cultivated in a nutritive solution with or without artificial growth mediums for mechanical support, is called aquaculture.

1.4.5 Calyx is the sterile colourful leaves of the flower that attracts animals, to assist with pollination. (5 x 1) (5)

TOTAL SECTION A: 45



SECTION B

Start this question on a NEW page.

QUESTION 2: PLANT NUTRITION

2.1 The storage organ is a part of a plant which is modified to store or retain carbohydrates or water. Most storage organs are often found below ground level where they are protected.

2.1.1 Supply THREE parts of a plant modified as storage organs. (3)

2.1.2 Indicate ONE chemical process that result in the formation and storage of carbohydrates in plants. (1)

2.1.3 State TWO requirements for the process indicated in QUESTION 2.1 (2)

2.1.4 Identify ONE product of the process indicated in QUESTION 2.1.1 that is stored in plants. (1)

2.2 The movement of water from the roots to the stems and leaves is very important. Water contains much-needed mineral nutrients. In this way the nutrients are transported to the different organs of the plant. Some of the processes take place through osmosis and diffusion.

2.2.1 Deduce THREE factors that influence the upward movement of water in plants. (3)

2.2.2 Summarise the role played by xylem vessels in the upward movement of water in plants. (2)

2.2.3 List TWO functions of water in plants. (2)

2.2.4 Distinguish between *osmosis* and *diffusion*. (4)

2.3 The following plant nutrient deficiency symptoms occur in some vegetable crops:

- (a) Growth of whole plant is stunted and restricted.
- (b) Leaf margins and ends become brown and necrotic
- (c) Poor leaf and root development

2.3.1 Match the mineral elements in the table that show the deficiency symptoms mentioned in QUESTION 2.3.

Sulphur
Calcium
Nitrogen
Potassium

(3)

2.4 A farmer bought two different bags of compound fertilisers. One fertiliser bag (Bag A) was labelled 8:1:3(30). The second fertiliser bag (Bag B) was labelled 1:2:7.(28). The farmer intends to cultivate leafy vegetables such as lettuce and spinach.

2.4.1 Recommend the fertiliser bag that could provide better yield for the leafy crops for the farmer.

(1)

2.4.2 Justify with TWO reasons, your choice of the fertiliser bag in QUESTION 2.4.1.

(2)

2.4.3 State the implications of the figure "30" in the brackets on Bag A 8:1:3(30) in QUESTION 2.4.

(2)

2.5 Four Grade 11 learners conducted a research on the performance of different organic fertilisers on the yield of maize on two hectares of land. The results in yield of the research is as follows:

Manure	Yield in bags
Compost	35
Green manure	30
Farm manure	45
House hold heaps	25

2.5.1 Represent the research findings in a bar graph and give an appropriate heading to your graph.

(5)

2.6 Outline the differences between active ion uptake and passive ion uptake of nutrients in plants.

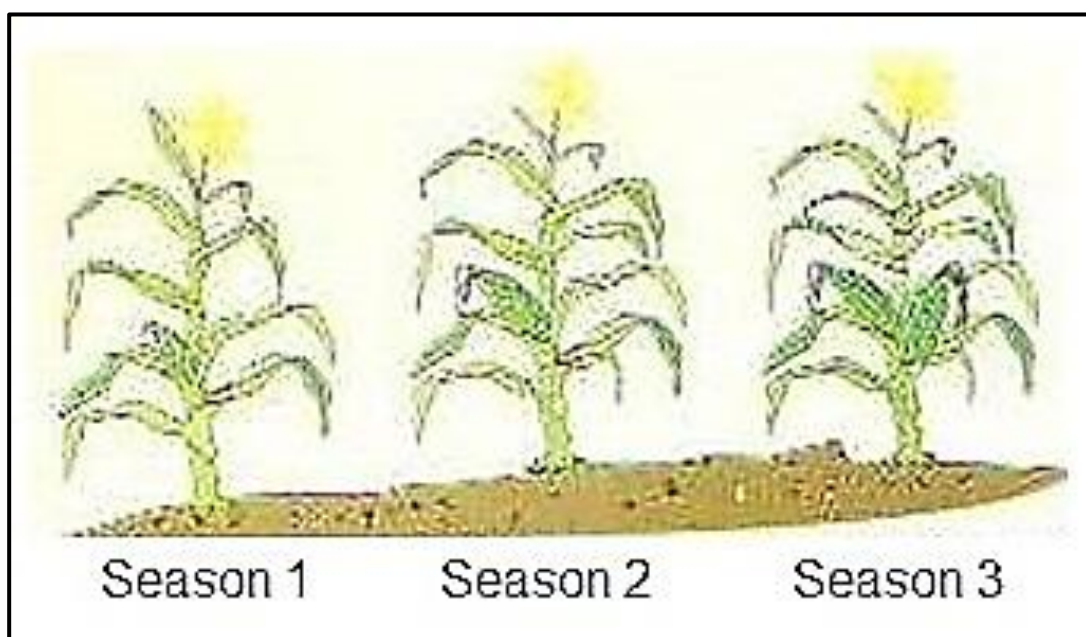
(4)

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QUESTION 3: PLANT REPRODUCTION

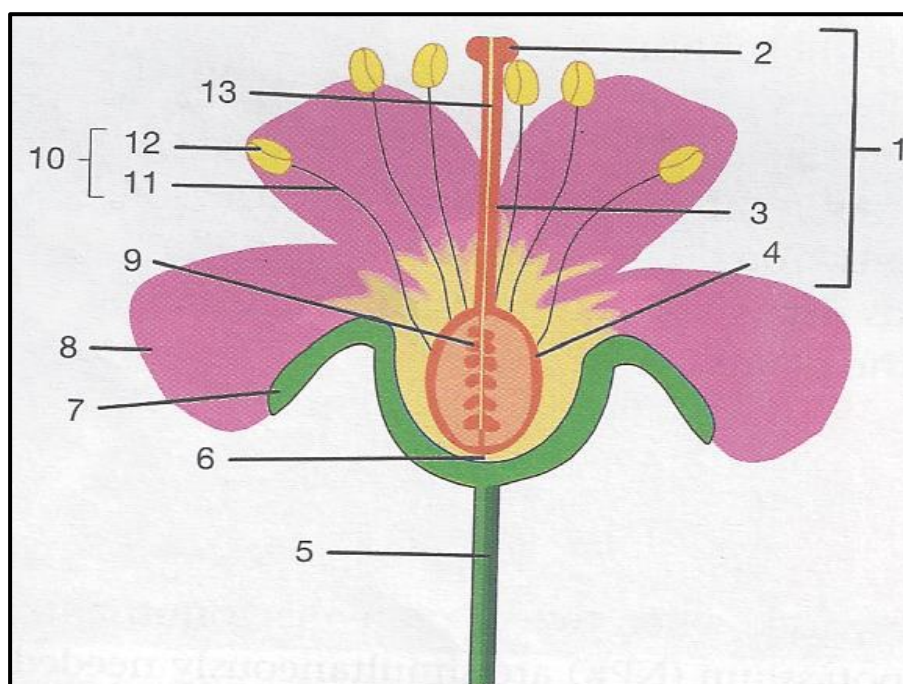
Start this question on a NEW page.

- 3.1 A farmer used three planting seasons for a plant breeding process. After the first breeding season the plant yielded one small cob. After the second breeding season the size of the cob became bigger with many seeds. After the third breeding season there were two big cobs on one plant as shown in the photo below.



- 3.1.1 Deduce the breeding process in 3.1. (1)
- 3.1.2 Justify your answer in QUESTION 3.1.1 with ONE reason by comparing the yields of the maize. (2)
- 3.1.3 State TWO advantages of the process in QUESTION 3.1.1. (2)

3.2 The sketch below is a dicotyledonous flower.

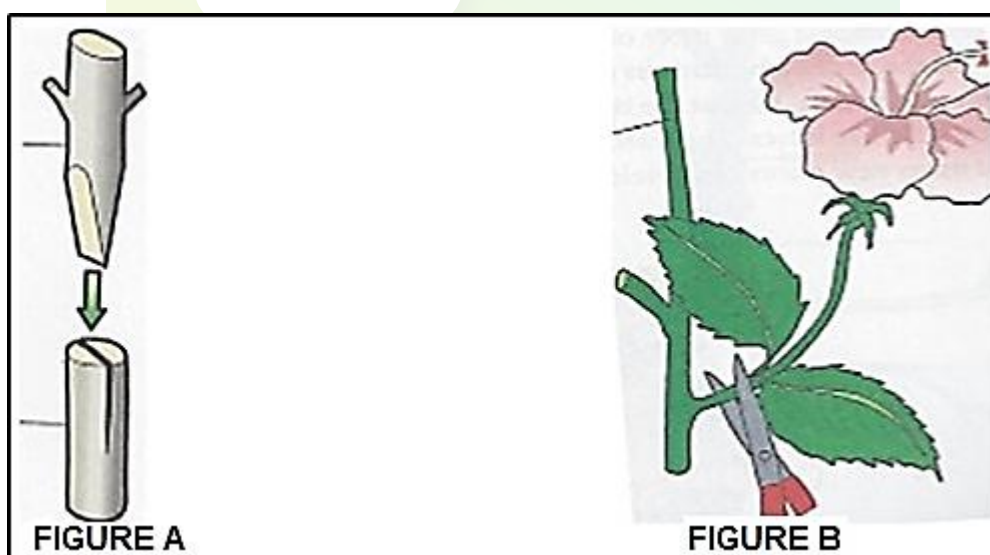


3.2.1 Identify the parts labelled **9**, **3** and **4**. (3)

3.2.2 Describe the major function of the part numbered **5**. (1)

3.2.3 Predict **THREE** climatic conditions that could lead to the shedding of flowers from a fruit tree. (3)

3.3 Farmers use different methods of plant propagation on their farms. Two of the propagation methods are shown in the illustrations below.



3.3.1 Identify the propagation methods in FIGURE A and FIGURE B. (2)

3.3.2 Recommend **THREE** reasons to convince emerging farmers to practice the methods in QUESTION 3.3. (3)

3.4 The information in the table below indicates disease-causing organisms.

	Bacteria
	Fungi
	Viruses
	Vectors

Select the micro-organism that best match with the information with the descriptions in QUESTION 3.4.1.

- 3.4.1 (a) The smallest infectious organisms that cause diseases
 (b) Sap sucking insects
 (c) It causes abnormal growth such as galls
 (d) Cause most plant diseases (4)

3.4.2 Recommend THREE measures to prevent the spread of the organisms in QUESTION 3.4.1 in plants. (3)

3.5 Plant breeding involves the development of new plant varieties for cultivation and use by humans. This is done through the genetic variation of plants which may be done naturally, or artificially. Some of the methods include selection, hybridisation, gene mutations or through genetic modification of plants. Genetic modification has resulted in the production of BT (*Bacillus thuringiensis*) crops to boost export.

3.5.1 Explain the underline concept in QUESTION 3.5. (2)

3.5.2 State THREE advantages of gene mutation in plant breeding. (3)

3.5.3 Mention TWO important Bt (*Bacillus thuringiensis*) crops in South Africa. (2)

3.5.4 Identify a breeding system in the scenario that can be both natural and artificial. (1)

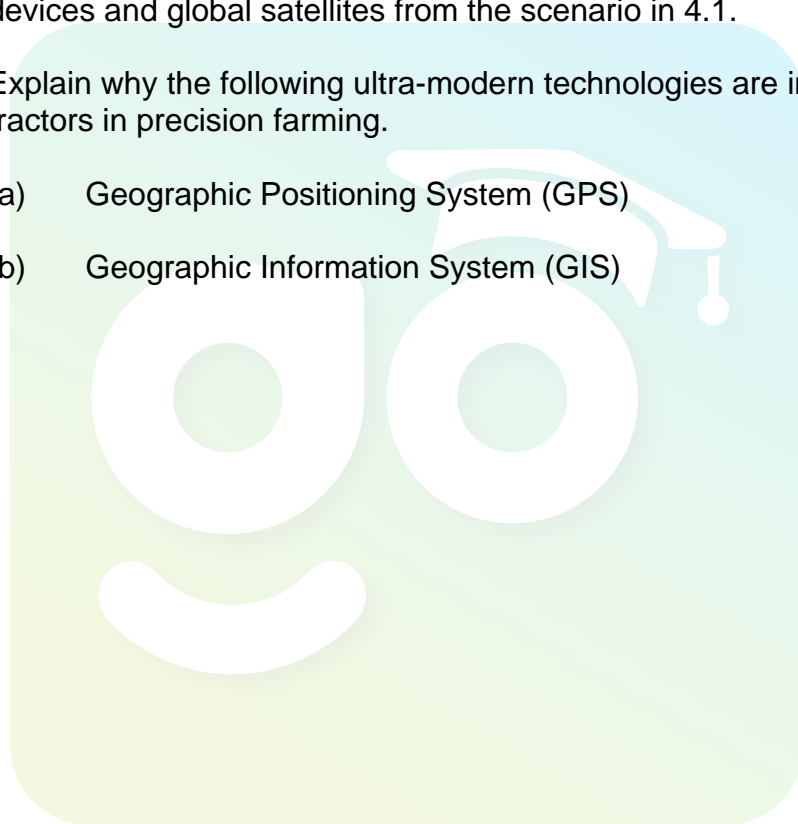
3.6 Formulate THREE reasons why farmers should control weeds on their farms. (3)
[35]

Start this question on a NEW page.

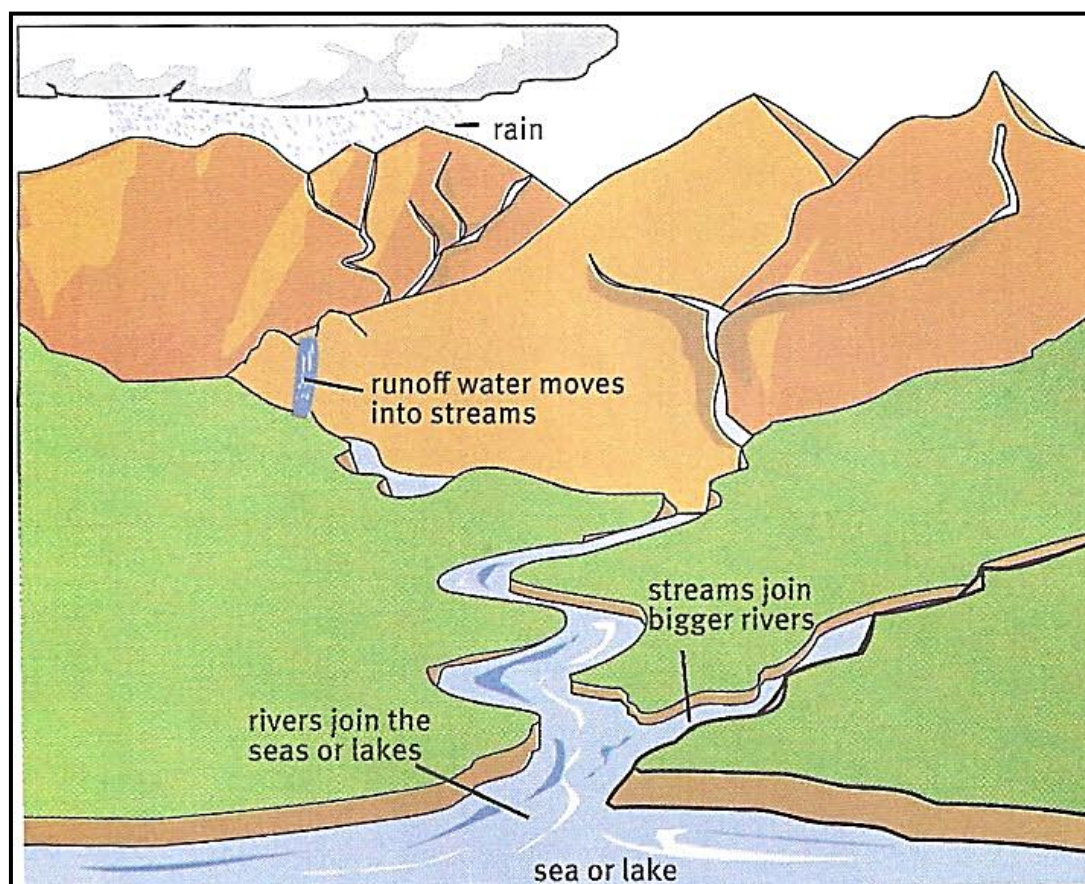
QUESTION 4: OPTIMAL RESOURCES

- 4.1 A modern farming system makes use of computers, global satellite positioning systems and remote sensing devices to measure the correct environmental conditions and to determine if crops are growing at maximum efficiency. The farming system also uses hi-tech applications such as GPS (Geographic Positioning System) and GIS (Geographic Information System) to identify all possible factors that could have influence on production.

- 4.1.1 Identify the farming system in the scenario in 4.1. (1)
- 4.1.2 Justify with TWO reasons the use of computers, remote sensing devices and global satellites from the scenario in 4.1. (2)
- 4.1.3 Explain why the following ultra-modern technologies are installed on tractors in precision farming.
- (a) Geographic Positioning System (GPS) (1)
 - (b) Geographic Information System (GIS) (1)

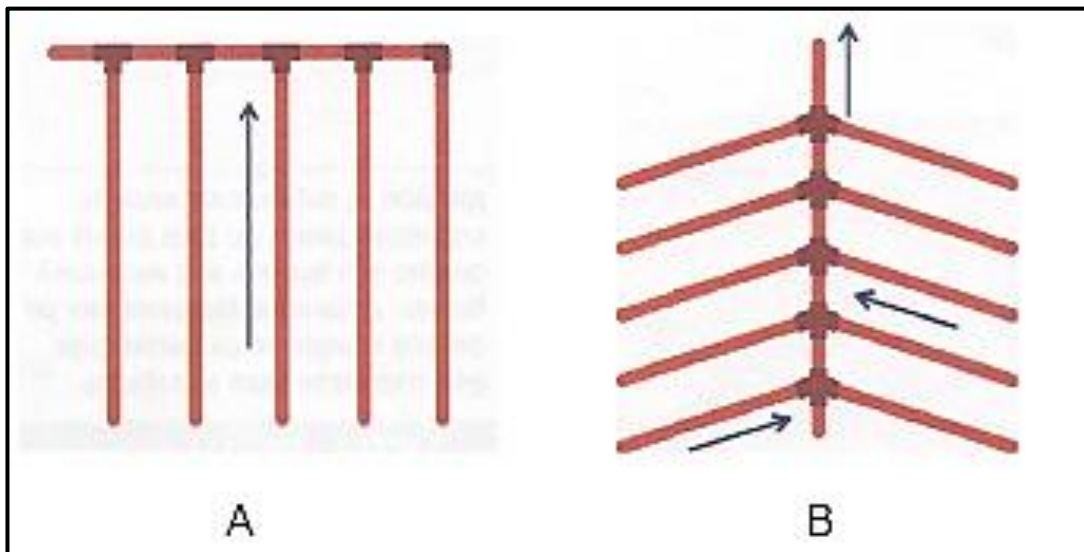


- 4.2 In the diagram below, rain water forms runoff that moves into streams. The streams join bigger rivers and the bigger rivers join the seas or lakes. Farmers could dam some of the water sources for flood irrigation.



- 4.2.1 Determine the best water source for sustainable irrigation from the illustration in 4.2. (1)
- 4.2.2 Identify ONE water source that is not good for irrigation. (1)
- 4.2.3 Give TWO criteria to determine water quality for irrigation. (2)
- 4.2.4 Mention ONE example of flood irrigation. (1)

- 4.3 Some local farmers use open drains to reclaim agricultural land. Commercial farmers often use other drainage systems on their land. The sketches below represent drainage systems used by some farmers to reclaim agricultural land.



4.3.1 Identify the drainage layouts labelled **A** and **B** in QUESTION 4.3. (2)

4.3.2 Recommend TWO factors to consider before installing a pipe drain system. (2)

4.3.2 List TWO disadvantages of open drains on a farm. (2)

- 4.4 Plant nutrient uptake and disease control in monoculture and crop rotation are not the same. Supply the most appropriate differences to complete the table in QUESTION 4.4.1.

4.4.1

Aspect	Differences	
	Monoculture	Crop rotation
Plant nutrient uptake	(a)	(b)
Diseases control	(c)	(d)

(4)

4.5 Differentiate between *primary* and *secondary* soil cultivation/tillage. (4)

4.6 Aquaculture is the controlled production of aquatic living organisms. It may be practiced in the sea or in fresh water. Regular stocking, feeding and protection from predators, forms part of the good management practices to increase production.

4.6.1 Identify TWO aquaculture management practices from the scenario that could increase production in aquaculture industry. (2)

4.6.2 List TWO common species of aquaculture breeds stocked in South Africa. (2)

4.6.3 Describe the open-through flow system of aquaculture to a prospective farmer. (2)

4.7



4.7.1 Identify the structure in QUESTION 4.7. (1)

4.7.2 Recommend TWO environmental factors to consider when selecting an area to erect the structure in 4.7 for production. (2)

4.7.3 Suggest TWO materials that can be used for the outer covering of a greenhouse in 4.7. (2)

[35]

TOTAL SECTION B: 105
GRAND TOTAL: 150