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**NATIONAL
SENIOR CERTIFICATE**

GRADE 11

NOVEMBER 2022

AGRICULTURAL SCIENCES P2

MARKS: 150

TIME: 2½ hours

This question paper consists of 12 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 numbers (1.1.1 to 1.1.10) in the ANSWER BOOK, for example 1.1.11 D.

1.1.1 Root hair cells absorb water through ...

- A osmosis.
- B diffusion.
- C active uptake.
- D guttation.

1.1.2 ... is the even distribution of a fertiliser over the surface of a field.

- A Band placing
- B Broadcasting
- C Fertigation
- D Aerial application

1.1.3 A farmer buys a fertiliser with the inscription 3 : 2 : 1 (28) on it. This means the fertiliser contains ...

- A 28% N.
- B 14% N.
- C 50% N.
- D 9,3% N.

1.1.4 ... is NOT an example of a stored grain pest.

- A A rice weevil
- B A flour moth
- C A grain beetle
- D A maize stalk borer

1.1.5 ... is an example of mechanical weed control.

- A Crop rotation
- B Introduction of natural enemies
- C Use of fire
- D Use of herbicides

1.1.6 The state plays the following roles in plant protection.

- (i) Drafts legislation
- (ii) Provides quarantine services
- (iii) Apply pesticides on behalf of farmers
- (iv) Carries out research

Choose the CORRECT combination:

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

1.1.7 Which ONE of the following is NOT a disadvantage of monoculture?

- A Provides an ideal environment for spread of diseases
- B Large amounts of pesticides are required
- C High chances of total crop failure
- D Only one type of machinery, knowledge and inputs are required

1.1.8 The ... is the most appropriate drainage system on a piece of land that has a clear depression down the middle.

- A natural system
- B herringbone
- C grid system
- D parallel system

1.1.9 Data from a soil survey is used for the following, except for ...

- A farm planning.
- B regional planning.
- C household planning.
- D property valuations.

1.1.10 Which ONE of the following systems, is most water efficient?

- A Flood irrigation
- B Drip irrigation
- C Sprinkler irrigation
- D Micro-spray system

(10 x 2) (20)

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

COLUMN A		COLUMN B	
1.2.1	Attraction force between different molecules	A	Turgid
1.2.2	Soft, weak, flabby cells caused by the loss of water	B	Ablactation
1.2.3	A process during which a fruit tree sheds many young flowers and fruits to reduce the amount of fruit set	C	Hydroponics
1.2.4	The production of fruit without fertilisation of ovules	D	Adhesion
1.2.5	Growing plants without soil, by using mineral nutrient solutions	E	Parthenocarpy
		F	Cohesion
		G	Flaccid
		H	Bonding

(5 x 2) (10)

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

- 1.3.1 Substances that are added to soil to improve the nutritional status of soil.
- 1.3.2 A white or grey material that consists of hydrated calcium sulphate ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$).
- 1.3.3 The fusion of male and female gametes.
- 1.3.4 The manipulation of living things to make useful products.
- 1.3.5 The controlled process of cultivating aquatic organisms, especially for human consumption.

(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 numbers (1.4.1 to 1.4.5) in the ANSWER BOOK.

1.4.1 Necrosis is the yellowing of plant leaves due to the non-production of chlorophyll in plants.

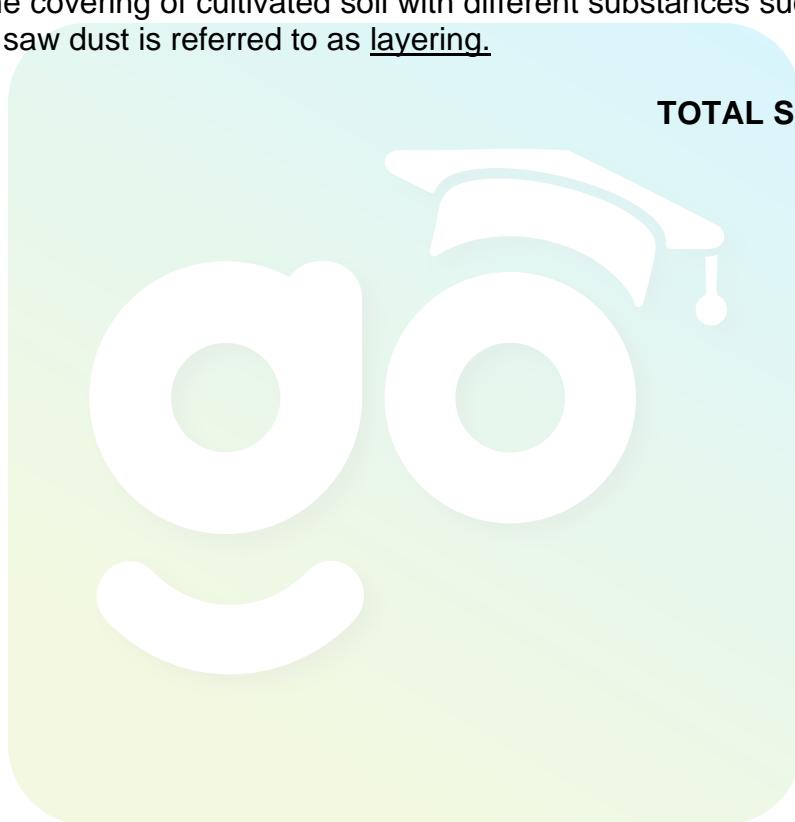
1.4.2 Chemicals used to control fungi are called herbicides.

1.4.3 An evaporation pan is used to measure soil moisture tension in the soil.

1.4.4 Conventional tillage is an agricultural technique for growing crops or pasture without disturbing the soil through tillage.

1.4.5 The covering of cultivated soil with different substances such as grass or saw dust is referred to as layering. (5 x 1) (5)

TOTAL SECTION A: 45



SECTION B**QUESTION 2: PLANT STUDIES (NUTRITION)**

Start this question on a NEW page.

- 2.1 Plants are referred to as autotrophic organisms due to their ability to manufacture food for themselves.

2.1.1 Give TWO organs where the products of photosynthesis are stored. (2)

2.1.2 Briefly describe how climate change might affect photosynthetic rates in plants. (2)

- 2.2 Grade 11 learners conducted an experiment to determine the effect of temperature on the rate of photosynthesis. The effect of temperature on the rate of photosynthesis is determined by the number of oxygen bubbles evolved. The learners summarised their results in the table below.

TEMPERATURE (°C)	NUMBER OF BUBBLES
15	21
20	25
25	30
30	33
35	35
40	40

2.2.1 Translate the information in the table above into a line graph. (6)

2.2.2 Describe the trend shown in the graph you have drawn in QUESTION 2.2.1. (2)

2.2.3 Suggest TWO methods farmers can employ to manipulate the factor shown on the graph for maximum photosynthesis. (2)

- 2.3 The cell membrane consists of a phospholipid bilayer with various proteins embedded in it. This structure enables different substances to travel through the membrane by either simple diffusion, facilitated diffusion or active transport.

2.3.1 Name the method in the extract above that is appropriate for each of the circumstances given below.

(a) Requires energy in the form of ATP to occur. (1)

(b) Moving nutrients down their concentration gradient (1)

(c) Takes place with the aid of transmembrane proteins. (1)

2.3.2 Differentiate between *osmosis* and *diffusion*. (2)

2.3.3 Describe TWO important functions of water in plants. (2)

2.4 The table below shows some important plant minerals:

MINERAL	DEFICIENCY SYMPTOM	MICRO/MACRO
A	Older leaves appear purple in colour	Macro
B	Leaf margins and ends become brown and necrotic	Macro
Molybdenum	Stunted growth	C
Nitrogen	D	Macro

2.4.1 Supply labels **(A–D)** to make the table complete. (4)

2.4.2 Suggest TWO methods farmers can use to determine the nutrient status of their soils. (2)

2.4.3 State TWO factors that could influence the availability of the nutrients in the table above to plants. (2)

2.5 Animal manure is a valuable soil fertiliser for home gardens. It supplies primary nutrients and micronutrients for plant growth, and also serves as a source of organic matter. Increasing soil organic matter improves soil structure, increases water holding capacity of sandy soils and improves drainage of clay soils.

2.5.1 Classify the fertiliser described in the passage above. (1)

2.5.2 Identify TWO physical benefits of animal manure that are mentioned in the passage above. (2)

2.5.3 Highlight TWO potential dangers associated with the use of animal manure. (2)

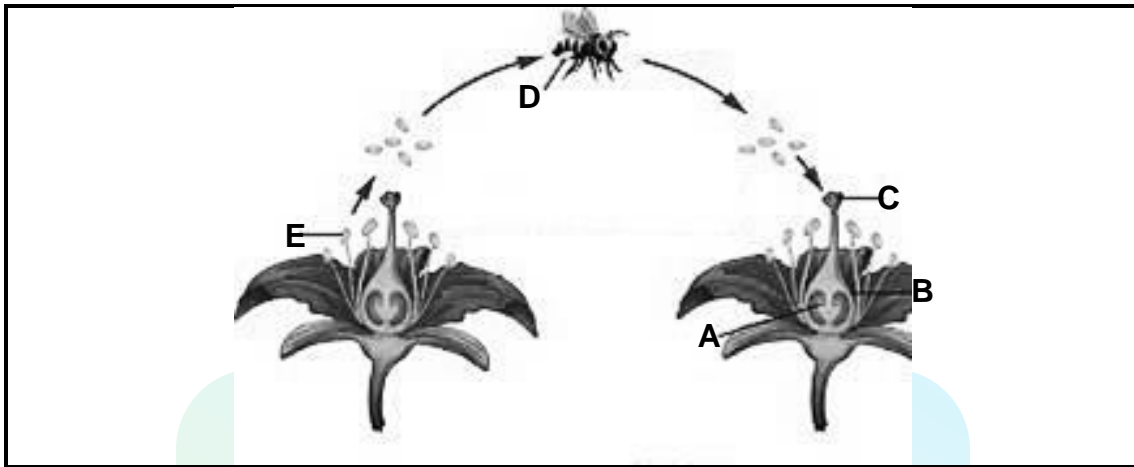
2.5.4 Name the other type of manure that is not in the passage. (1)

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QUESTION 3: PLANT REPRODUCTION AND PROTECTION

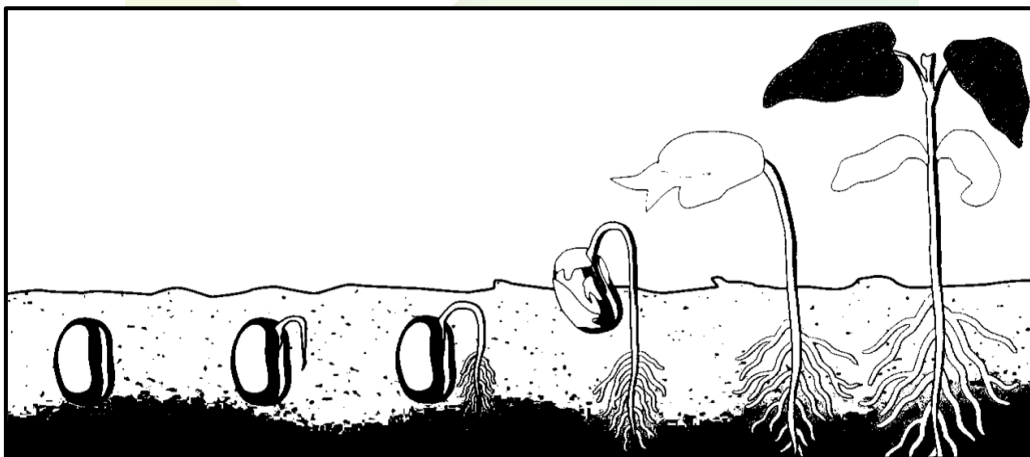
Start this question on a NEW page.

3.1 Analyse the diagram below and answer the questions which follow.



- 3.1.1 Identify the pollination type depicted above. (1)
- 3.1.2 Name the pollinating agent in the diagram above. (1)
- 3.1.3 Identify TWO non-sexual parts of the flowers shown above. (2)
- 3.1.4 Give the collective name of the structures **C** and **B**. (1)
- 3.1.5 Name the structure **E** in the diagram above and state its function. (2)
- 3.1.6 Describe TWO adaptations of the flowers in the diagram above for the type of pollination mentioned in QUESTION 3.1.1. (2)

3.2 The diagram below shows an important stage in plant reproduction.



- 3.2.1 Identify the process shown in the diagram above. (1)
- 3.2.2 List TWO basic requirements for the process shown above to be successful. (2)
- 3.2.3 Suggest TWO methods that can be employed by farmers to speed up the process depicted above. (2)

- 3.3 Below are examples of plants that can be propagated through asexual reproduction.

onions; potatoes; strawberries; roses

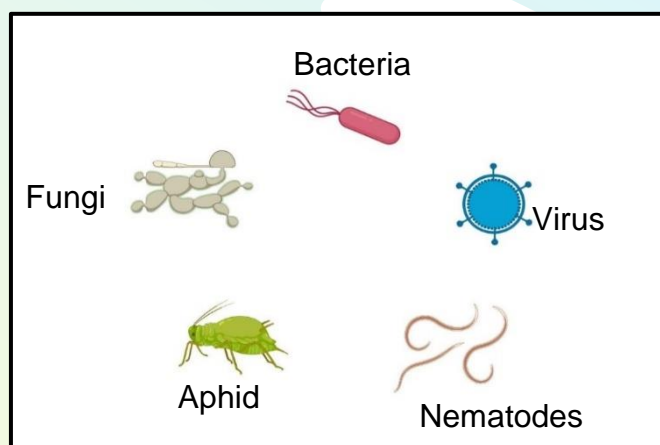
- 3.3.1 Identify an example of a plant from the box above that is propagated using each of the methods below.

- (a) Cuttings (1)
- (b) Bulbs (1)
- (c) Tubers (1)
- (d) Runners (1)

- 3.3.2 Define *asexual reproduction*. (2)

- 3.3.3 Give TWO disadvantages of asexual reproduction methods of plant propagation. (2)

- 3.4 The diagram below shows organisms that attack crops on farms.



- 3.4.1 Identify TWO micro-organisms from the diagram above. (2)

- 3.4.2 Identify ONE pathogen and its vector in the diagram above. (2)

- 3.4.3 Give TWO modes of transmission of the micro-organisms mentioned in QUESTION 3.4.1. (2)

- 3.4.4 Recommend TWO measures farmers take to prevent the spread of diseases on their farms. (2)

- 3.5 The flow chart diagram below shows the steps a farmer takes in protecting crops on the farm.

Preventative measures	→	Monitoring	→	Mechanical control	→	Biological control	→	Responsible pesticide use
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- 3.5.1 Name the pest control method shown above. (1)

- 3.5.2 Describe TWO benefits of using the method above. (2)

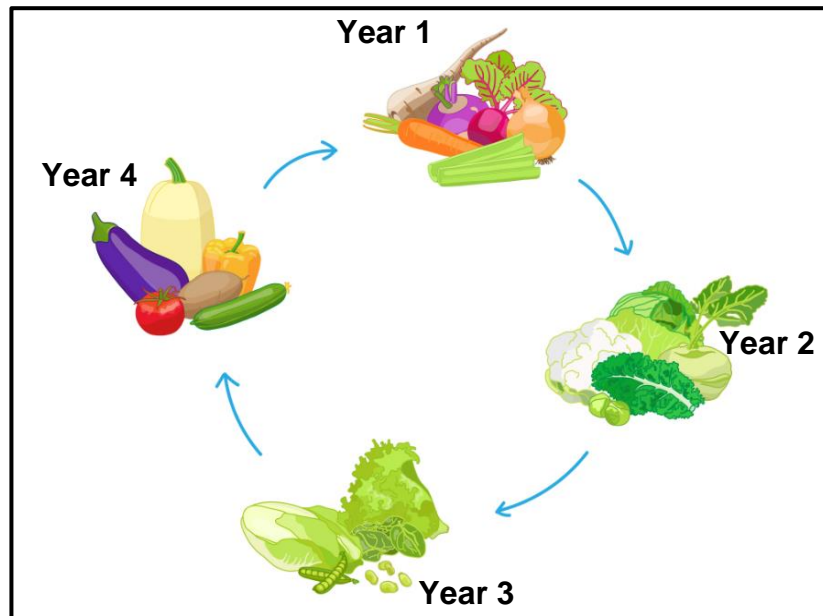
- 3.5.3 Suggest TWO challenges that rural farmers might face in implementing the strategy named in QUESTION 3.4.1. (2)

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QUESTION 4: OPTIMAL RESOURCE UTILISATION

Start this question on a NEW page.

- 4.1 The diagram below illustrates a cropping system popular with South African farmers.



- 4.1.1 Identify the cropping system shown above. (1)
- 4.1.2 Give TWO reasons why farmers are encouraged to use the cropping system shown above. (2)
- 4.1.3 Describe THREE principles that were applied when designing the cropping system shown above. (3)
- 4.1.4 The crops in YEAR 3 include beans and peas. Supply the common name given to these crops. (1)
- 4.1.5 Explain the role of the crops planted in YEAR 3 in the rotation programme. (2)
- 4.2 Tillage is the agricultural preparation of soil by mechanical agitation of various types, such as digging, stirring, and overturning. It can be human-powered, draft-animal-powered or mechanised.
- 4.2.1 Identify the TWO methods from the passage, that resource-poor farmers are more likely to use to power tillage on their farms. (2)
- 4.2.2 Give TWO examples of tools that can be used during human-powered soil tillage. (2)
- 4.2.3 State THREE functions of soil tillage. (3)
- 4.2.4 Distinguish between *primary tillage* and *secondary tillage*. (4)

4.3 The structure below is common on South African farms.



4.3.1 Identify the structure in the picture above. (1)

4.3.2 Outline TWO advantages of using such structures in agriculture. (2)

4.3.3 State THREE environmental conditions to be considered when selecting the location of the structure mentioned in QUESTION 4.3.1. (3)

4.4 The image below shows an activity that takes place on farms.



4.4.1 Name the process shown in the picture above. (1)

4.4.2 Name TWO sources of water used for the process shown above. (2)

4.4.3 Describe TWO benefits of the process mentioned in QUESTION 4.4.1. (2)

4.4.4 Identify TWO signs of poor-quality water. (2)

4.4.5 Mention TWO consequences of using poor quality water in the process shown above. (2)

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TOTAL SECTION B: 105
GRAND TOTAL: 150