



Province of the
EASTERN CAPE
EDUCATION

Iphondo leMpuma Kapa: Isebe leMfundo
Provinsie van die Oos Kaap: Departement van Onderwys
Porafensie Ya Kapa Botjhabela: Lefapha la Thuto

NATIONAL SENIOR CERTIFICATE

GRADE 11

NOVEMBER 2025

AGRICULTURAL SCIENCES P1

MARKS: 150

TIME: 2½ hours

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.

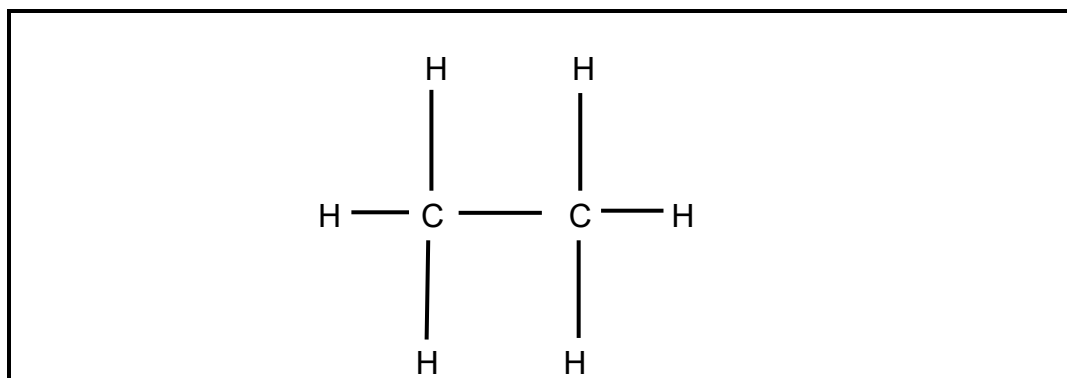
SECTION A**QUESTION 1**

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 numbers (1.1.1 to 1.1.10) in the ANSWER BOOK, for example 1.1.11 D.

1.1.1 Different forms of the same element that have the same number of protons but a different number of neutrons.

- A Proton
- B Isomers
- C Isotopes
- D Electron

1.1.2 The end product formed when an H in the diagram below is replaced by OH.



- A Ethanol
- B Ethane
- C Methanol
- D Propanol

1.1.3 An element found in proteins but not in lipids.

- A Oxygen
- B Potassium
- C Carbon
- D Nitrogen

1.1.4 Characteristics of an acid:

- (i) Tastes sour
- (ii) Gives off hydrogen ions
- (iii) Tastes bitter
- (iv) Has a pH of 0–6

Choose the CORRECT combination:

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

1.1.5 The following statements refer to soil bulk density:

- (i) It is the mass of dry soil per unit of bulk volume
- (ii) Bulk density is higher in soils with high porosity
- (iii) Incorporation of large amounts of organic matter into the soil will lower the bulk density
- (iv) Processes that compact the soil will increase bulk 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)

1.1.6 The arrangement of individual soil particles into aggregates or peds, which vary in size and shape.

- A Soil texture
- B Soil structure
- C Soil porosity
- D Soil moisture

1.1.7 ... is important for plant root respiration.

- A Oxygen
- B Nitrogen
- C Carbon dioxide
- D Water vapour

1.1.8 The condition where all the pore spaces in the soil are filled with water.

- A Permanent wilting point
- B Field water capacity
- C Temporal wilting point
- D Saturation point

1.1.9 Which of the following factors does NOT affect soil organic matter gains.

- A Climate
- B Soil management practices
- C Soil sampling method
- D Vegetation

1.1.10 Fungi that forms a symbiotic relationship with plant roots enabling plants to absorb more phosphorus is ...

- A actinomycetes
- B mycorrhiza
- C centipedes
- D rhizobium

(10 x 2) (20)

1.2 Indicate whether each of the descriptions in COLUMN B applies to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in COLUMN A. Write **A only**, **B only**, **both A and B** or **none** next to question numbers (1.2.1 to 1.2.5) in the ANSWER BOOK, for example 1.2.6 B only.

COLUMN A		COLUMN B
1.2.1	A Lewis structure B Reactivity series	Shows the arrangement of valence electrons in atoms and how they form covalent bonds in a molecule
1.2.2	A Water B Carbon dioxide	$ \begin{array}{c} \text{H} \\ \\ \text{N} - \text{H} \\ \\ \text{H} \end{array} $
1.2.3	A E horizon B R horizon	Strictly not a soil horizon
1.2.4	A Soil classification B Soil mapping	Systematic grouping of soils with similar properties into units to enable their mapping
1.2.5	A Improved soil structure B Increased water retention	Effects of organic matter in the soil

(5 x 2) (10)

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

1.3.1 Indicates how strong or weak an acid or a base is

1.3.2 A gas that dilutes oxygen in the soil, slowing down oxidation

1.3.3 The conversion of plant-available, inorganic nutrients into less available, organic forms by micro-organisms or plants

1.3.4 The process where positively charged ions are attracted to and held by the negatively charged surfaces of soil particles

1.3.5 The dark-coloured, nutrient-rich organic material that forms in soil from the decomposition of plant and animal matter by micro-organisms

(5 x 2) (10)

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

1.4.1 A collection of two or more atoms (the same or different) linked by chemical bonds is called a compound.

1.4.2 Hygroscopic water is the water that remains in the soil after gravitational water is drained out.

1.4.3 Scrapping is primarily used to reclaim acidic soils.

1.4.4 Plants absorb carbon dioxide from the atmosphere, water from soil and radiant energy from the sun to produce an energy rich substance, protein.

1.4.5 Nitrification is the microbial conversion of organic matter to an inorganic state, with the production of carbon dioxide and water.

(5 x 1) (5)

TOTAL SECTION A: 45

SECTION B

QUESTION 2: BASIC AGRICULTURAL CHEMISTRY

Start this question on a NEW page.

2.1 Study the illustration below and answer the questions that follow.

1A																2A																3A																4A																5A																6A																7A																8A																																																																																																																																																																															
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2.1.1 Identify the illustration above. (1)

2.1.2 Indicate the names of elements with atomic numbers 1 and 20. (2)

2.1.3 Mention TWO ways in which elements are arranged in the illustration above. (2)

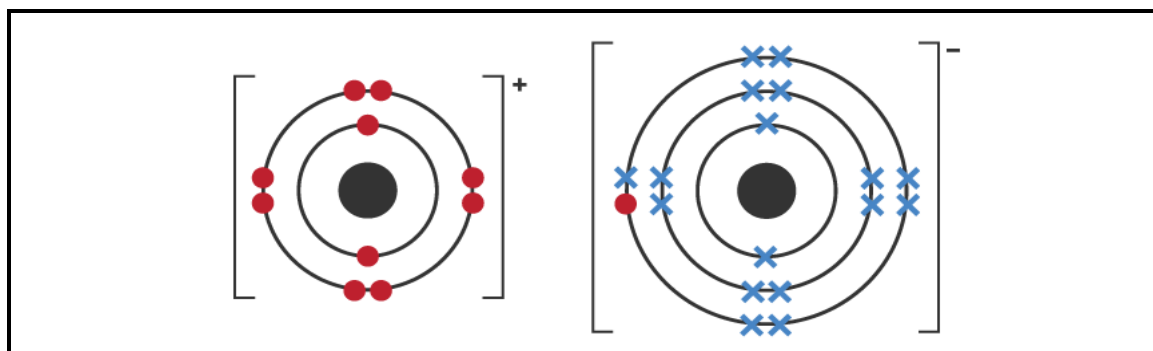
2.1.4 Give TWO similarities between the elements He, Ne and Ar. (2)

2.1.5 Determine the valency of the elements:

(a) Be (1)

(b) O (1)

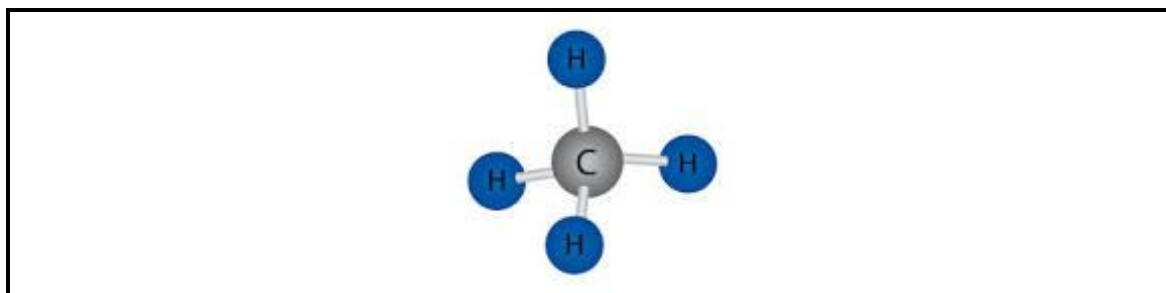
2.2 The diagram below shows a compound.



2.2.1 Classify the compound in the illustration above as organic or inorganic. (1)

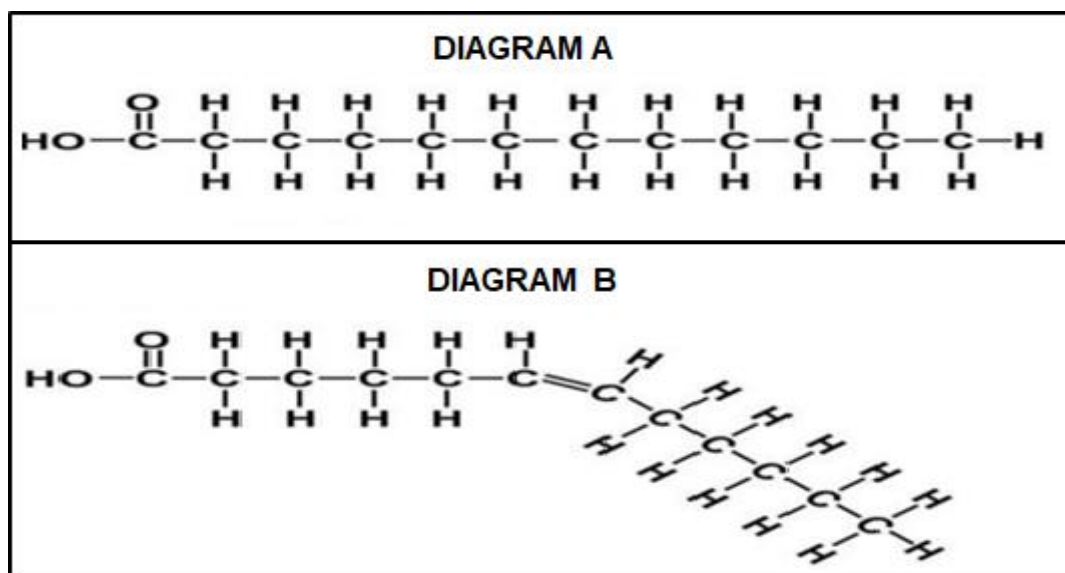
- 2.2.2 Name the compound in QUESTION 2.2.1. (1)
- 2.2.3 Predict the type of chemical bonding involved in the formation of the compound in QUESTION 2.2.2. (1)
- 2.2.4 Justify the answer in QUESTION 2.2.3. (2)
- 2.2.5 Indicate the molecular formula of the illustrated compound. (2)

2.3 Study the structural formula below and answer the questions that follow.



- 2.3.1 Identify the compound above. (1)
- 2.3.2 Name the group of organic compounds to which the compound above belongs. (1)
- 2.3.3 Give TWO characteristics of the compound above. (2)
- 2.3.4 Describe TWO properties of carbon that allow it to form compounds like the one shown above. (2)

2.4 Study the diagrams below and answer the questions that follow:



- 2.4.1 Classify the chemical structures in diagram **A** and **B** as saturated or unsaturated. (2)
- 2.4.2 Motivate your answers to QUESTION 2.4.1 above. (2)

2.4.3 Indicate the TWO basic components of lipids. (2)

2.4.4 Give TWO roles of lipids in living organisms. (2)

2.5 Carbohydrates are commonly found in plants and plant products. They consist of the elements carbon, hydrogen and oxygen.

2.5.1 Indicate the general formula of carbohydrates. (1)

2.5.2 Name the bond that links the monomers of carbohydrates. (1)

2.5.3 Name the disaccharide that is found in milk. (1)

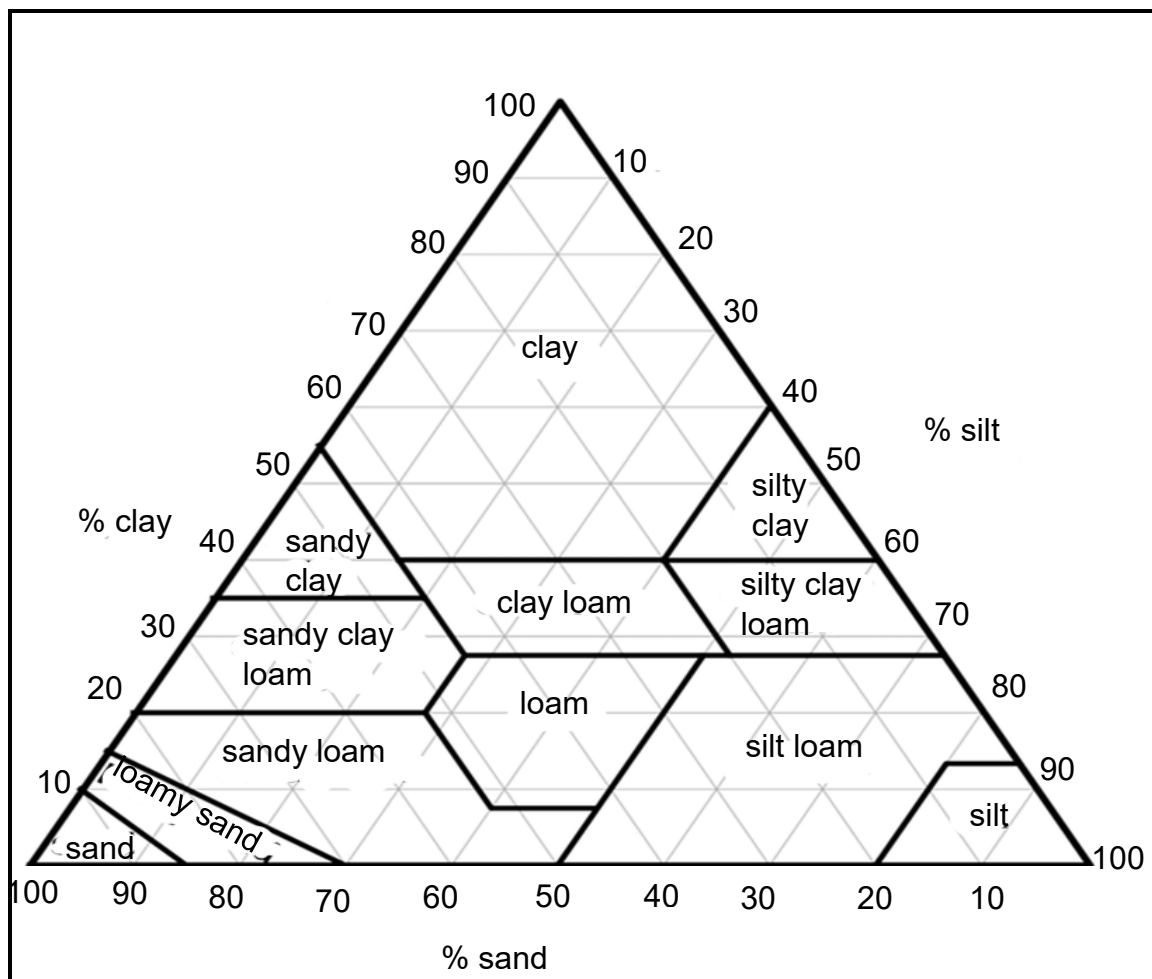
2.5.4 Give TWO examples of carbohydrate polymers that are formed through the bond mentioned in QUESTION 2.5.2. (2)

[35]

QUESTION 3: SOIL SCIENCE

Start this question on a NEW page.

3.1 Study the diagram below and answer the questions that follow.



3.1.1 Identify the diagram above. (1)

3.1.2 Use the diagram above to determine the textural class of soil samples below.

(a) 50% clay; 20% sand and 30% silt. (1)

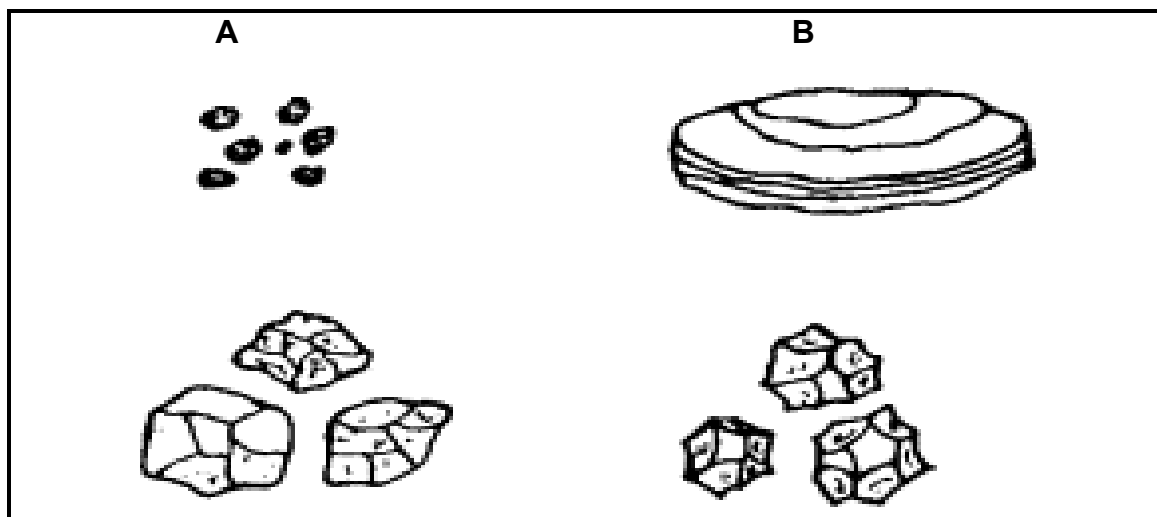
(b) 20% clay; 40% sand and 40% silt. (1)

(c) 10% clay; 60% sand and 30% silt (1)

3.1.3 Recommend the soil sample that is most suitable for crop production from the samples in QUESTION 3.1.2. (1)

3.1.4 Motivate the answer in QUESTION 3.1.3 by giving THREE reasons. (3)

3.2 The diagrams below show examples of soil structures.



3.2.1 Identify the soil structures **A** and **B** above. (2)

3.2.2 Suggest to the farmer the soil structure, from the diagrams above, that can be best utilised for maize crops. (1)

3.2.3 Indicate TWO factors influencing the development and stability of soil structure. (2)

3.2.4 Describe TWO advantages of a good soil structure. (2)

3.3 The table below shows readings of soil temperature at different soil depths.

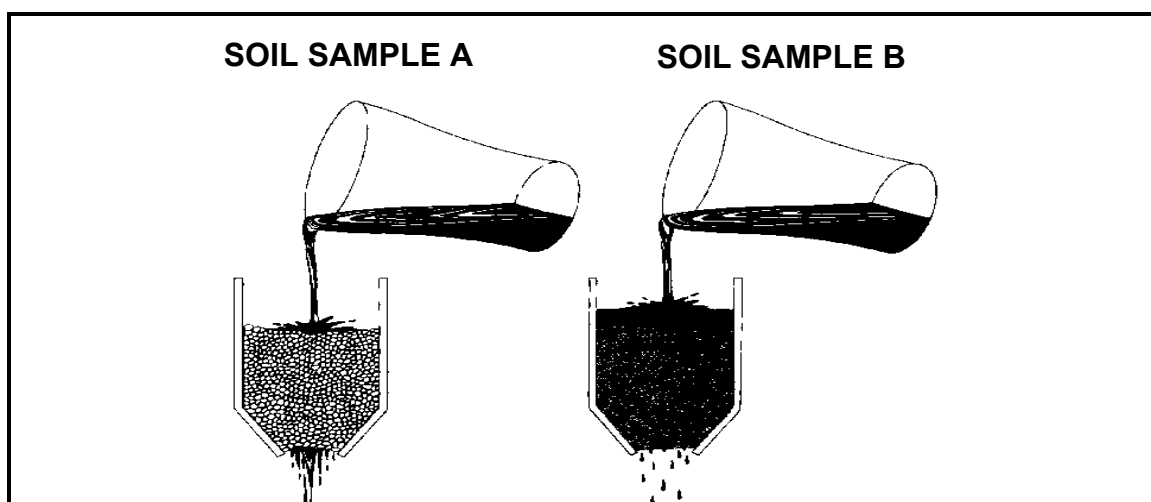
TIME	TEMPERATURES (°C) AT 20 CM DEEP	TEMPERATURES (°C) AT 1 CM DEEP
6:00	4	7
8:00	4	9
10:00	5	12
12:00	12	19
14:00	16	25
16:00	18	22

3.3.1 Draw a line graph comparing the soil temperature readings at different soil depths at different times. (6)

3.3.2 Compare the soil temperature at the two soil depths. (2)

3.3.3 Suggest TWO ways to minimise soil temperature variations. (2)

- 3.4 The illustration below shows an experiment conducted to compare water movement through two soil samples of different textures.



- 3.4.1 Formulate a hypothesis for the experiment conducted in the illustration above. (2)
- 3.4.2 Identify the type of pores shown in SOIL SAMPLE A and B respectively. (2)
- 3.4.3 Identify the soil sample representing:
- (a) Clay soil (1)
- (b) Sandy soil (1)

- 3.5 Soil colour is a significant indicator of the physical, chemical and biological properties of the soil. It is also a useful factor used by the farmer to determine a soil's fertility.

Match the soil properties **A–D** below with the soil colours in QUESTION 3.5.1 to QUESTION 3.5.4. Write only the LETTER corresponding to the correct description:

- A Indicates a badly waterlogged condition in the soil
- B Very fertile and suitable for any crop cultivation
- C No drainage necessary
- D Iron has changed in the presence of much moisture and a shortage of oxygen

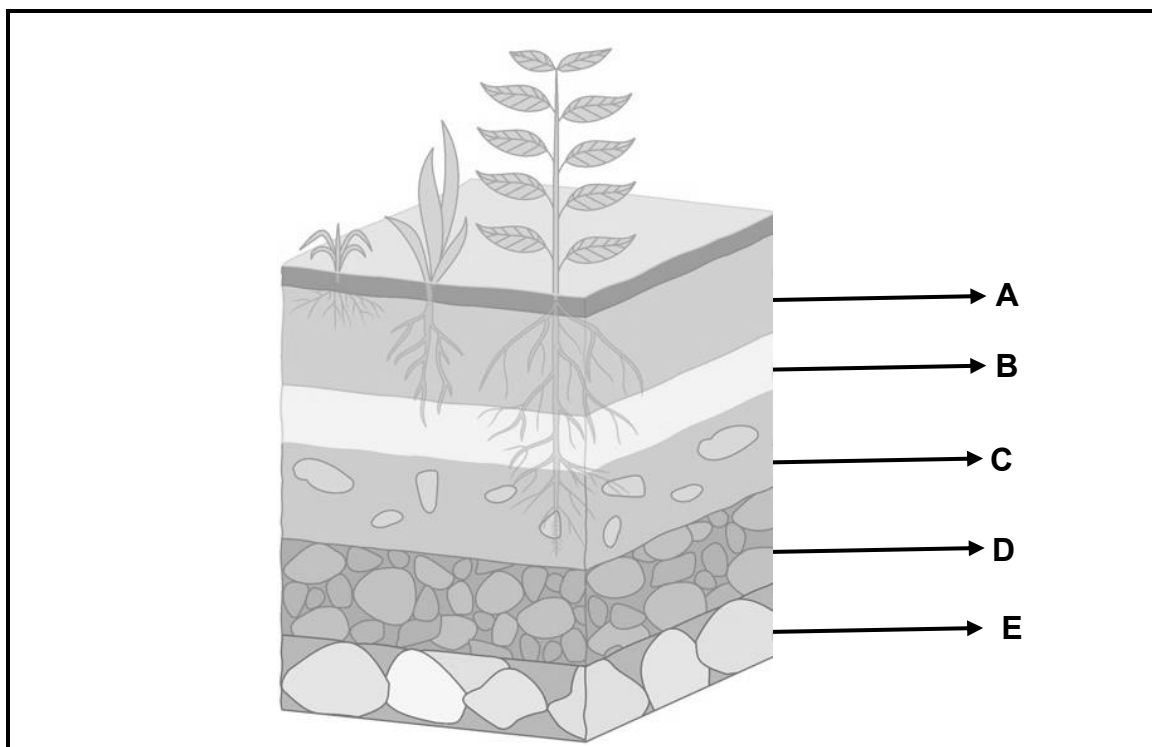
- 3.5.1 Light colour (1)
- 3.5.2 Grey colour (1)
- 3.5.3 Yellow colour (1)
- 3.5.4 Dark colour (1)

[35]

QUESTION 4: SOIL SCIENCES

Start this question on a NEW page.

4.1 Study the diagram below and answer the questions that follow.



4.1.1 Identify soil horizons **A** and **B**. (2)

4.1.2 Indicate with a LETTER the horizons that are described below:

(a) Illuvial horizon (1)

(b) Soft material and weathered rock (1)

4.1.3 Schematically draw a profile that is waterlogged. (2)

4.1.4 Define the structure in the diagram above. (2)

4.2 There is a practical need for agriculturalists to classify the soils, plants and animals. By classifying them they can organise knowledge of them in a useful way.

4.2.1 Identify TWO reasons why soils are classified. (2)

4.2.2 Indicate the regions where the following topsoil diagnostic horizons are found.

(a) Organic O-horizon (1)

(b) Humic A-horizon (1)

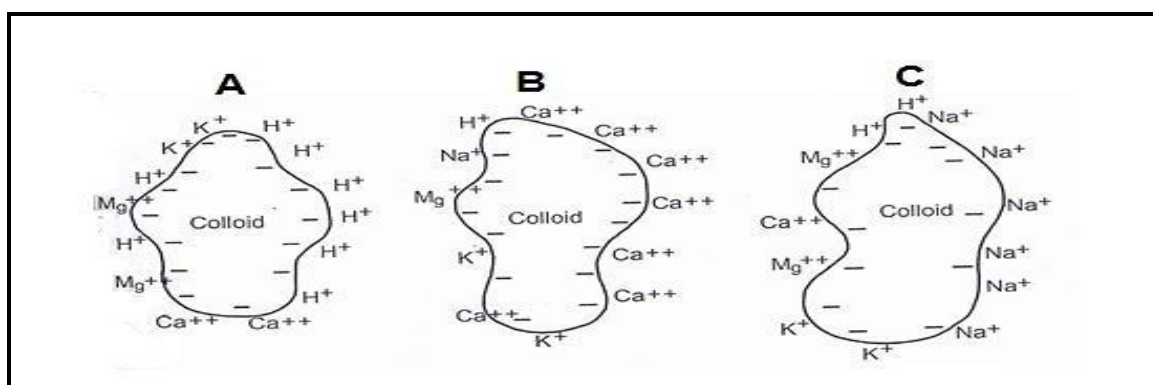
4.2.3 The procedure below is followed when identifying and classifying the soil by the binomial system as used in South Africa.

- A Determine the soil family
- B Identifying diagnostic horizon
- C Demarcating master horizon in the profile
- D Identify the family characteristics
- E Establishing the soil form

Re-arrange the procedure from the start to the end by writing only the LETTERS corresponding to the answer.

(5)

4.3 The diagrams below show the cation adsorption on soil colloids.



4.3.1 Identify the colloid that represents the following:

- (a) Brackish condition (1)
- (b) Acidic condition (1)

4.3.2 Motivate each answer in QUESTION 4.3.1 respectively. (2)

4.3.3 Suggest a method that can be used to reclaim a soil with the colloidal condition in **A**. (1)

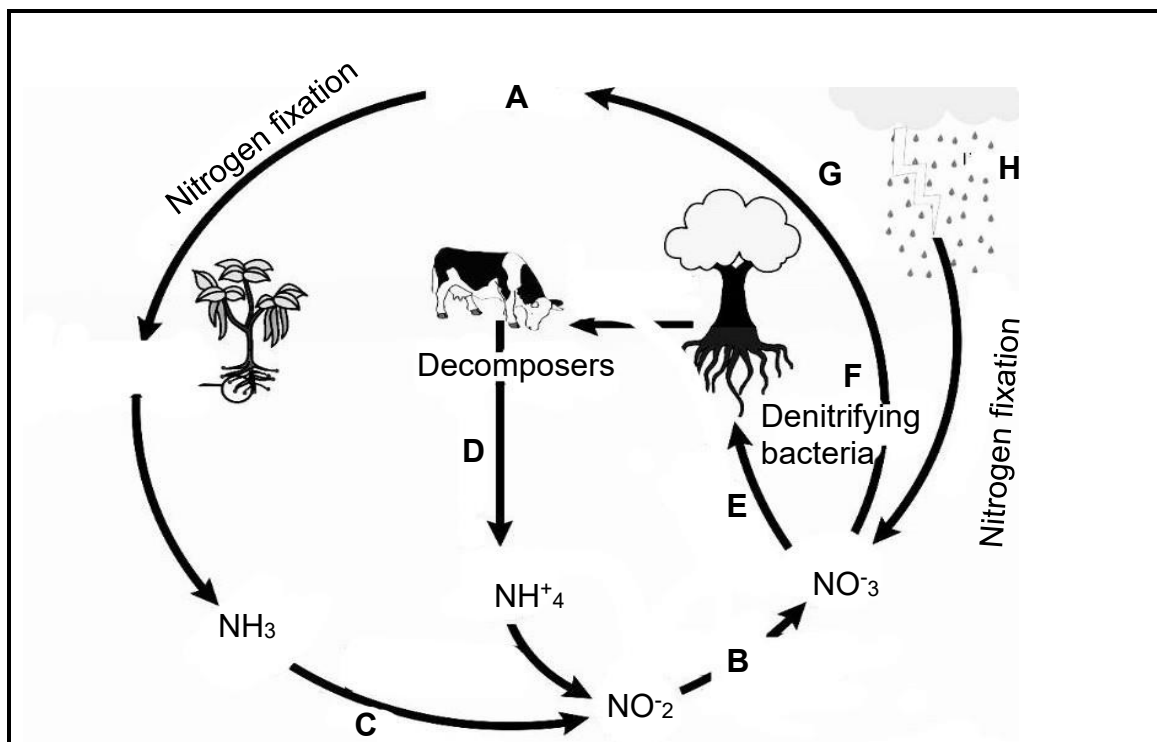
4.3.4 Differentiate between *active* and *reserve* acidity. (2)

4.4 The environment in which soil micro-organisms find themselves is determined by the physical and chemical properties of a soil. Soil is the growth medium for soil micro-organisms, supplies their living requirements and protects the micro-organisms against drastic temperature changes and other unfavourable conditions.

4.4.1 Identify TWO examples of micro-organisms found in the soil. (2)

4.4.2 Indicate TWO roles of soil micro- and macro-organisms. (2)

4.5 The illustration below shows a nutrient cycle.



4.5.1 Identify the nutrient cycle illustrated above. (1)

4.5.2 Label the parts **A** and **B** of the diagram above. (2)

4.5.3 Match the description below with the processes in the illustration above. Write only the LETTER.

- (a) Organic nitrogen compounds are converted into ammonia (NH_3) or ammonium (NH_4^+). (1)
- (b) Bacteria converts ammonia (NH_3) or ammonium (NH_4^+) into nitrite (NO_2^-) and then nitrate NO_3^- . (1)
- (c) Absorbed nutrients are utilised by the plant cells for various functions. (1)
- (d) Nitrates or nitrites are converted into nitrogen gas N_2 by bacteria. (1)

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TOTAL SECTION B: 105
GRAND TOTAL: 150