



Province of the  
**EASTERN CAPE**  
EDUCATION

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 11**

**NOVEMBER 2019**

**AGRICULTURAL SCIENCES P1**

**MARKS: 150**

**TIME: 2½ hours**



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This question paper consists of 15 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. 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 the ANSWER BOOK, for example 1.1.11 A.

1.1.1 The number of protons in the nucleus of an atom is indicated by a(n) ... number.

- A mass
- B atomic
- C neutron
- D electron

1.1.2 TWO or more forms of the same element that contain an equal number of protons but different numbers of neutrons.

- A Polymers
- B Isomers
- C Valence
- D Isotopes

1.1.3 Compounds differ from mixtures because:

- (i) Substances in a compound can be separated by filtration
- (ii) Composition of a compound is fixed and invariable
- (iii) Looks and behaves differently to the elements of which it is comprised
- (iv) Compounds are made up of different molecules bound together

Choose the CORRECT combination:

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

1.1.4 The relative proportion of sand, silt and clay in a given soil sample.

- A Structure
- B Density
- C Volume
- D Texture

1.1.5 Light or whitish colour in the soil is an indication of ...

- A oxidised iron mineral like red haematite.
- B presence of carbonates in the soil.
- C less oxidation due to the lack of oxygen.
- D the presence of organic matter.

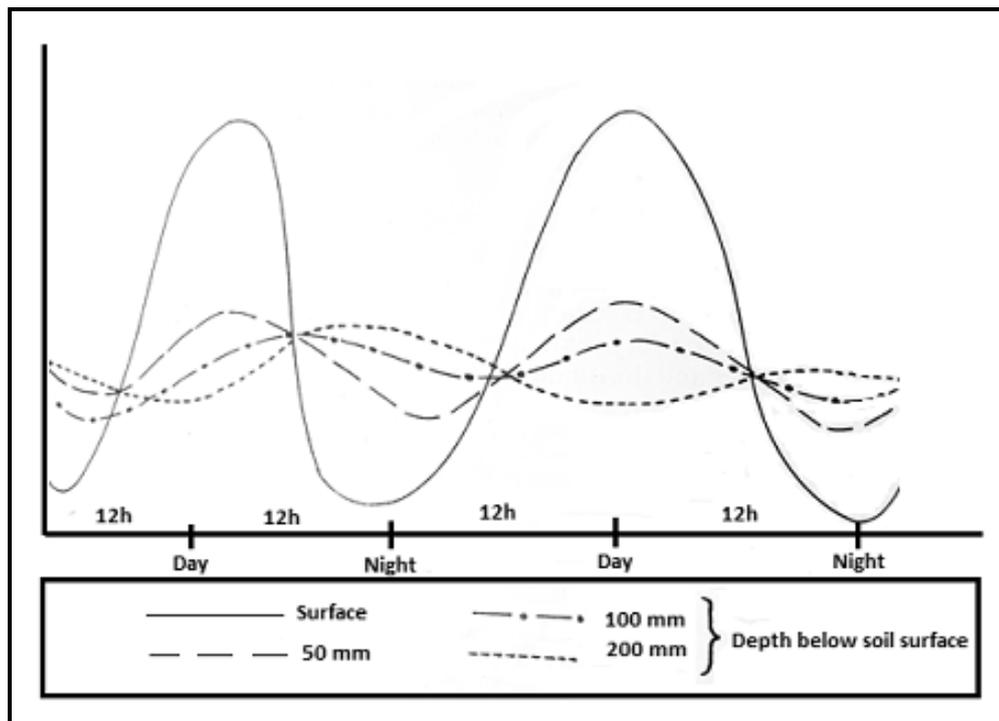
1.1.6 The following statements are TRUE about the bulk density of soil:

- (i) It is inversely related to the porosity of soil.
- (ii) Organic soils have a lower bulk density.
- (iii) The lesser the pore space in soil, the lower the bulk density.
- (iv) The more the pore space in soil, the lower the bulk density.

Choose the CORRECT combination:

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

1.1.7 The diagram below indicates that temperature variation ...



- A increases with increase in soil depth.
- B is more at a depth of 200 mm.
- C is less on the surface.
- D decreases with increase in depth.

1.1.8 The following is NOT a factor causing brackishness in soil.

- A Use of fertiliser containing sulphur
- B The use of ground water for irrigation
- C Presence of sodium carbonates
- D Poor soil drainage

1.1.9 The importance of nitrogen in soil includes the ...

- A reduction of poisonous substances in soil.
- B slowing down of the oxidation process.
- C germination of seeds.
- D reaction with inaccessible compounds in soil.

1.1.10 ... are examples of macro-organisms in the soil.

- A Bacteria
- B Protozoa
- C Moles
- D Penicillium

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

| COLUMN A |    |                        | COLUMN B   |
|----------|----|------------------------|--|
| 1.2.1    | A: | Hydroxyl               | Group made up of a carbon atom joined to an oxygen atom by a double bond         |
|          | B: | Carboxyl               |  |
| 1.2.2    | A: | Polyunsaturated        | Fatty acids commonly found in animals and have single bonds between carbon atoms |
|          | B: | Monounsaturated        |  |
| 1.2.3    | A: | Fine texture           | High degree of cohesion and low erodability                                      |
|          | B: | Course texture         |  |
| 1.2.4    | A: | Soil depth             | Influences the storage and the movement of soil air                              |
|          | B: | Pore size distribution |  |
| 1.2.5    | A: | Reserve acidity        | Hydrogen ions bound onto soil particles and not readily exchanged                |
|          | B: | Active acidity         |  |

(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 (1.3.1–1.3.5) in the ANSWER BOOK.

1.3.1 The amino acids which can be synthesised by the body

1.3.2 The disaccharide formed from glucose and galactose molecules

1.3.3 The process whereby molecules of a substance collect on the surface of another substance

1.3.4 The point where plants fail to recover regardless of being watered

1.3.5 The removal of the salts from the soil surface by physical/mechanical means

(5 x 2) (10)

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

1.4.1 A chemical formula is a graphical representation showing how the atoms are arranged.

1.4.2 G-horizon is characterised by the absence of organic matter due to a high degree of leaching.

1.4.3 Salt decline is a situation in soil where the concentration of nutrients is present in parts of soil and absent in some parts.

1.4.4 The product formed when plant and animal residues are decomposed by soil micro-organisms is organic matter.

1.4.5 A soil form system is used in South Africa to classify the soil.

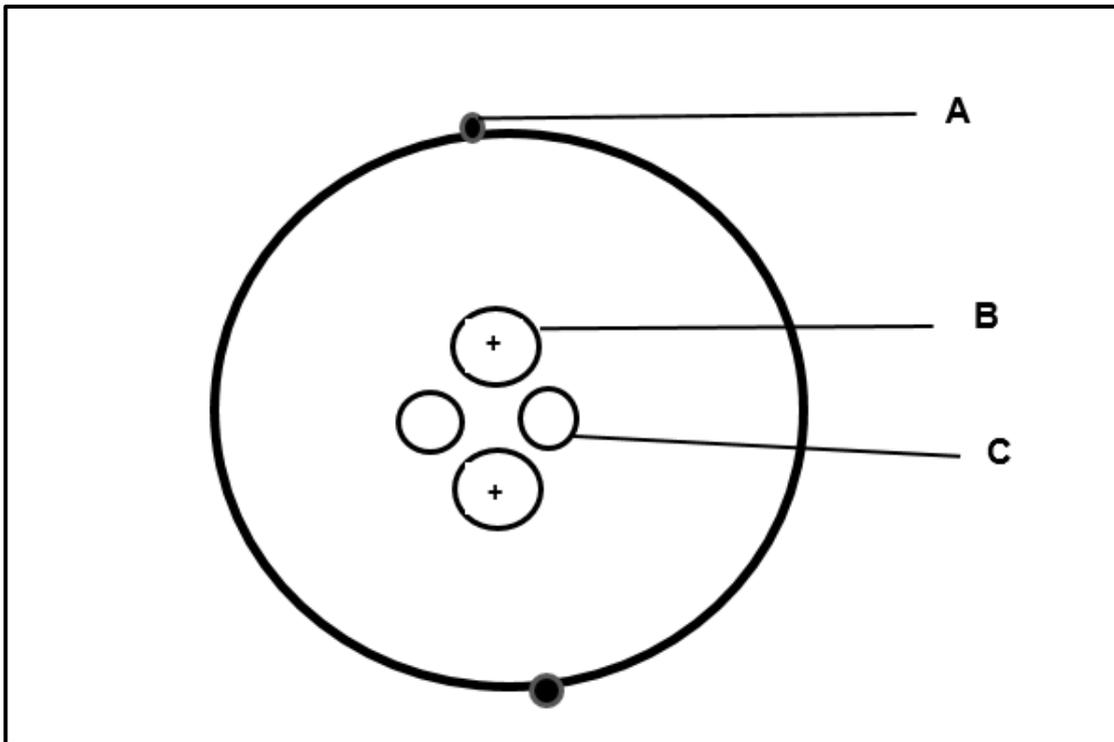
(5 x 1) (5)

**TOTAL SECTION A: 45**

**SECTION B****QUESTION 2: BASIC AGRICULTURAL CHEMISTRY**

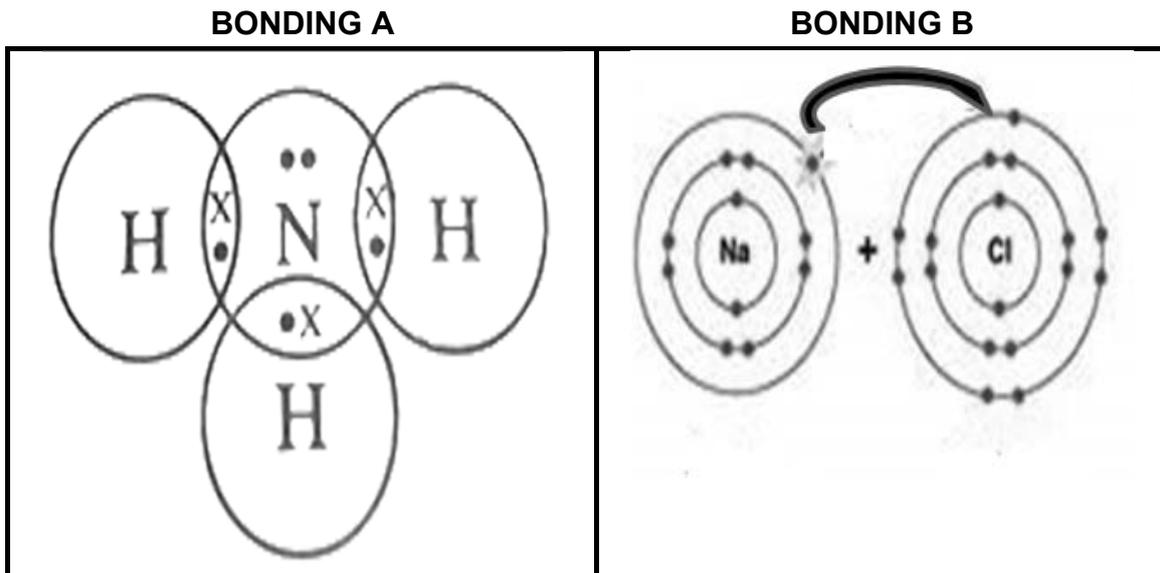
Start this question on a NEW page.

2.1 The diagram below shows the structure of a substance that is important in agriculture.



- 2.1.1 Identify the structure above. (1)
- 2.1.2 Give THREE reasons visible in the diagram to support the answer in QUESTION 2.1.1. (3)
- 2.1.3 Indicate the charge of the parts labelled **A** and **C**. (2)
- 2.1.4 Name the type of ion that will be formed when the following occurs:
- (a) Part labelled **A** is removed and only one remains (1)
  - (b) One more part labelled **A** is added to make three (1)

2.2 The diagrams below illustrate the chemical bonding between atoms.



2.2.1 Identify the chemical bondings illustrated in **A** and **B** above. (2)

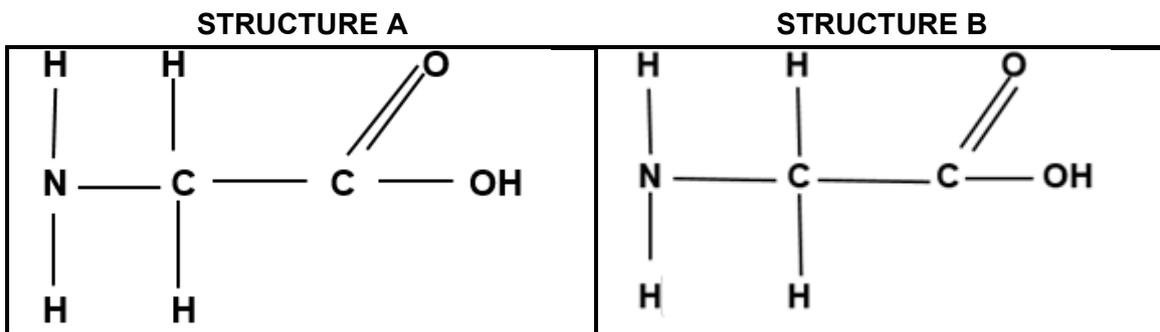
2.2.2 Give a reason for each of the bondings identified in QUESTION 2.2.1. (2)

2.2.3 Indicate the importance of compound in bonding **A** for the following:

(a) Agricultural industry (1)

(b) Household use (1)

2.3 The structures below are small units which when joined together form a very complex organic compound.



2.3.1 Give the name of the structures illustrated above. (1)

2.3.2 Name the bond that links structures **A** and **B**. (1)

2.3.3 When structure **A** joins structure **B** a water molecule is removed. Give the name of this reaction. (1)

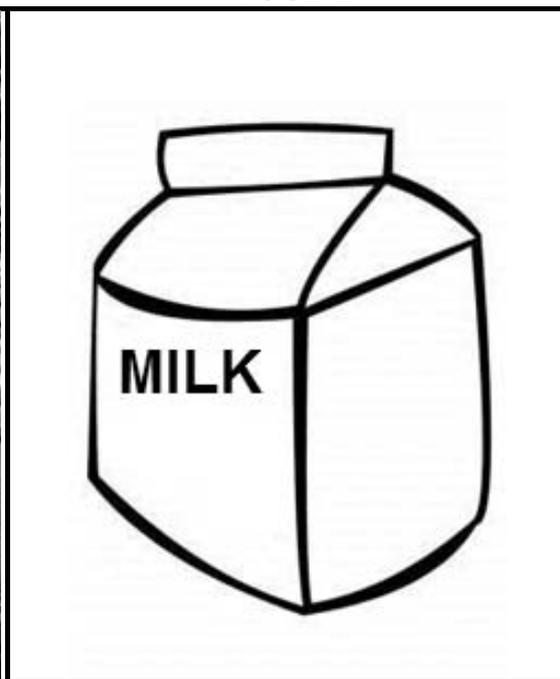
- 2.3.4 Identify TWO groups that make up both structures **A** and **B**. (2)
- 2.3.5 A large number of the structures illustrated in QUESTION 2.3 can be joined together to form a complex organic compound.  
Name the compound. (2)
- 2.3.6 Name THREE reasons why the compound in QUESTION 2.3.5 is important for living organisms. (3)

2.4 The pictures below are the examples of food rich in carbohydrates.

**FOOD A**



**FOOD B**



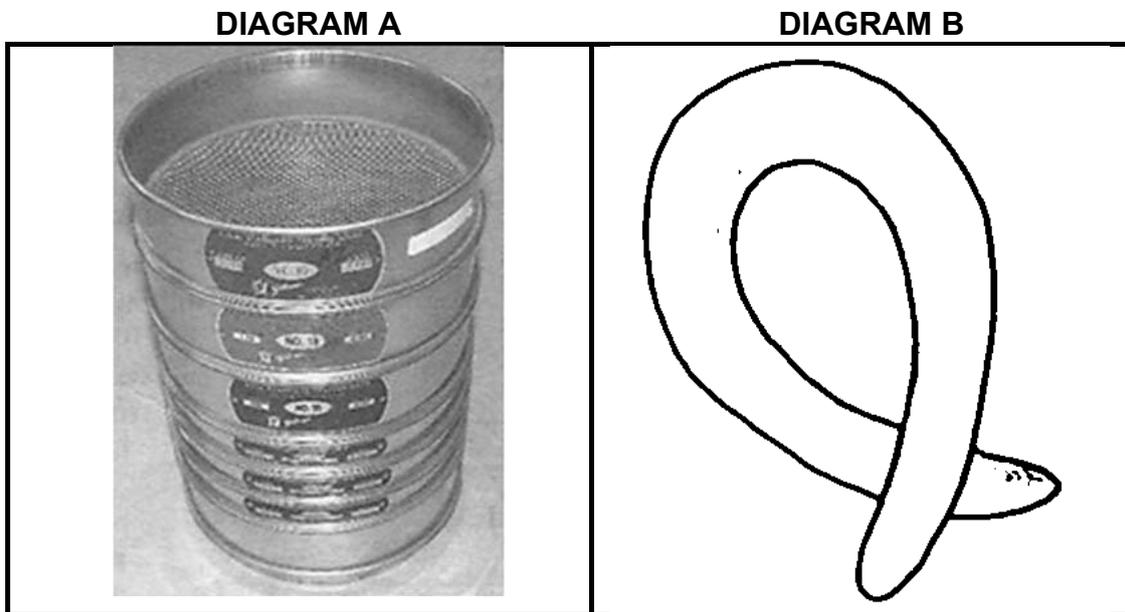
- 2.4.1 Classify each of the food in the pictures above into different types of carbohydrates. (2)
- 2.4.2 Write the chemical formula of the class into which food **B** belongs. (2)
- 2.4.3 Outline THREE functions of carbohydrates in animals. (3)
- 2.5 Fats and oils are collectively referred to as lipids.  
Tabulate TWO differences between fats and oils. (4)

**[35]**

**QUESTION 3: SOIL SCIENCE**

Start this question on a NEW page.

- 3.1 The diagrams below show different methods that can be used by a farmer to determine the texture of the soil.



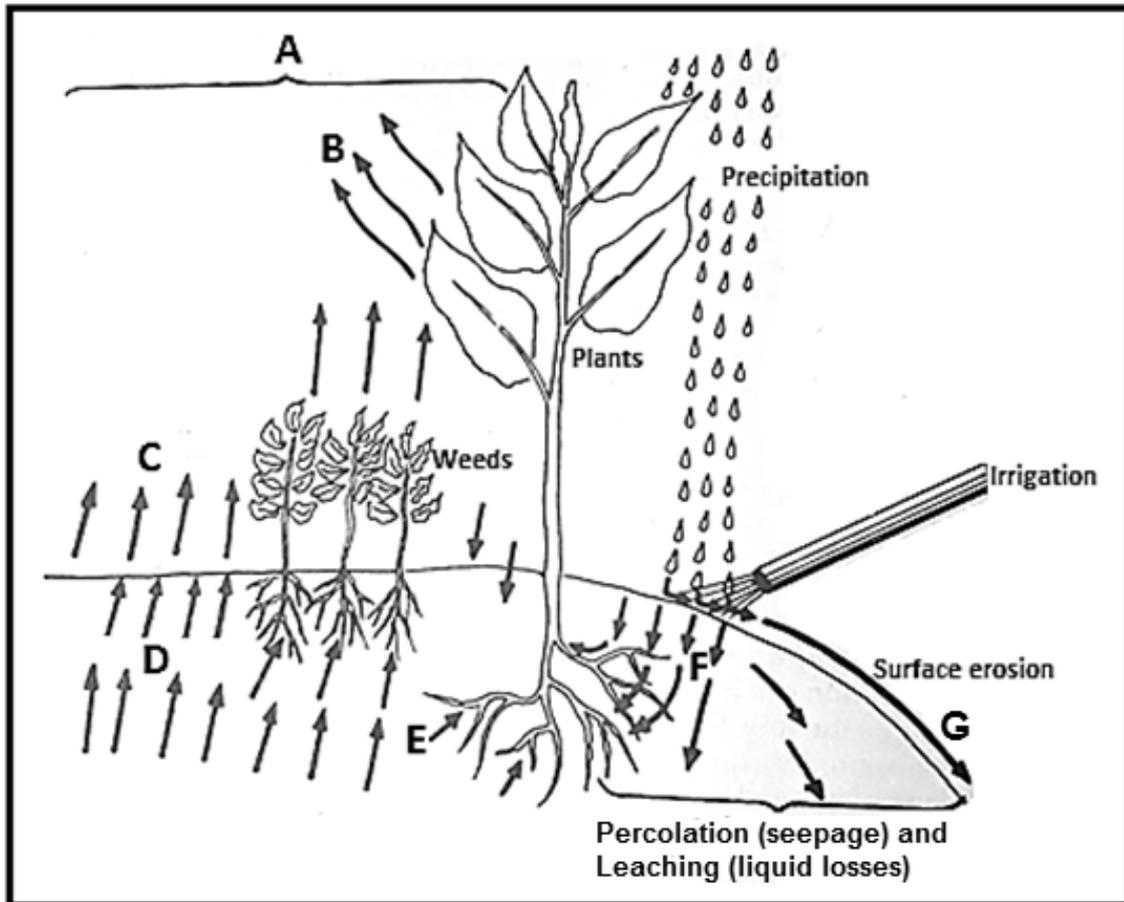
- 3.1.1 Identify the methods of determining the texture as illustrated in Diagrams **A** and **B**. (2)
- 3.1.2 Predict the texture that will remain on top of the sieve if the method in Diagram **A** is used. (1)
- 3.1.3 Suggest the texture illustrated in Diagram **B**. (1)
- 3.1.4 Give a reason for your answer in QUESTION 3.1.3. (2)
- 3.1.5 Suppose the farmer has used the method in Diagram **A** and after weighing the amount of soil in each sieve, the results were as follows:
- Sieve A – 50 g  
Sieve B – 30 g  
Sieve C – 20 g
- Plot the results obtained by the farmer on a bar graph. (6)

3.2 Soil structure describes the way the soil particles bind together into aggregates. Different structures are formed depending on the way in which the soil particles bind together.

3.2.1 Name TWO factors influencing the aggregation of particles into a particular structure. (2)

3.2.2 State TWO methods a farmer can apply to improve poor soil structure. (2)

3.3 The picture below shows different ways in which moisture can be lost from soil.



3.3.1 Identify the water loss labelled **B**, **C** and **G**. (3)

3.3.2 Water loss in **B** can be prevented by minimising the use of nitrogen fertiliser. Justify this statement. (2)

3.3.3 Indicate the letter representing the water loss that can be prevented by each of the following measures:

(a) Contour walls (1)

(b) Planting wind breaks (1)

3.3.4 Identify the movement of water labelled **D**. (1)

3.3.5 Give a reason for the answer in QUESTION 3.3.4. (1)

3.4 The colour of soil gives much information to the farmer or soil scientist provided it is correctly interpreted.

Indicate the factor that might have led to each of the following soil colours:

(a) Red (1)

(b) Black/dark (1)

(c) Yellow (1)

(d) Mottled (1)

3.5 Soil temperature has an effect on physical, biological and chemical processes taking place in soil.

Indicate whether each of the following process listed below is a physical, chemical or biological effect of soil temperature:

3.5.1 Faster chemical reactions due to warm temperatures (1)

3.5.2 Micro-organisms are more active at temperatures between 15 °C to 35 °C (1)

3.5.3 At high temperatures rocks break up to form soil particles (1)

3.6 375 g of soil occupies a space of 250 m<sup>3</sup>.

Calculate the bulk density of this soil. (3)

**[35]**

**QUESTION 4: SOIL SCIENCE**

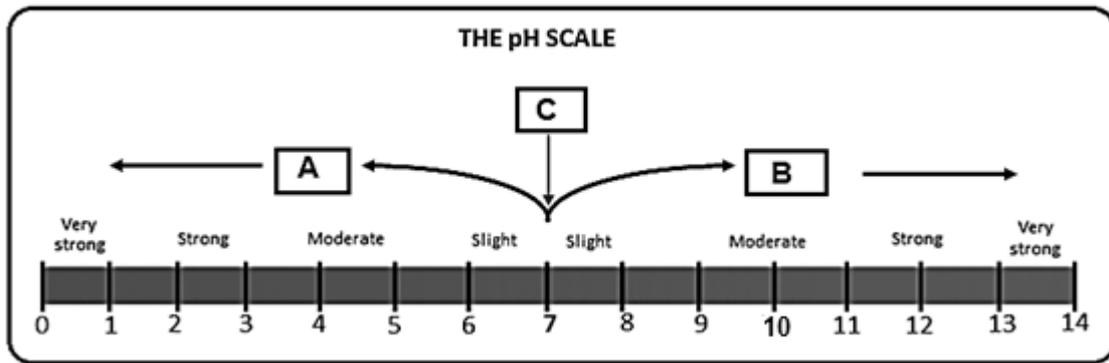
Start this question on a NEW page.

- 4.1 The table below shows master horizons, diagnostic horizons and the characteristics of these horizons.

| Master horizons | Diagnostic horizons | Characteristics  |
|-----------------|---------------------|--|
| 1               | 2                   | Occurs in cool and moist conditions and has a high humus content |
| C-horizon       |                     | 3  |
| 4               |                     | An original source of soil and not regarded as a horizon         |
| 5               | Gleycutanic         | Grey colour interspersed with mottles                            |
| 6               |                     | Organic debris   |

- 4.1.1 Identify labels **1–5**. (5)
- 4.1.2 Indicate the label representing the horizon that is enriched with eluvial material. (1)
- 4.1.3 The development of horizons occurs in a sequence where one horizon develops from another. Indicate the labels from the table that represent the TWO horizons that were the last to develop. (2)
- 4.2 Soil classification is the systematic arrangement of soil into classes based on properties. (5)
- Outline the procedure when soil classification is done in sequence. (5)

4.3 Below is a pH scale showing the degree ranges of acidity and alkalinity in soil.



4.3.1 Indicate the cation that are predominant in soils with a pH in **A** and **B**. (2)

4.3.2 Name the TWO factors that are influencing the condition of soil in **B**. (2)

4.3.3 State THREE effects of the soil condition in **A** on plant growth. (3)

4.3.4 The soil conditions above can be corrected by adding **CaCO<sub>3</sub>** and **NaSO<sub>4</sub>** to the soil.

Choose from the substances mentioned above that can be used to correct the following:

(a) Soil condition in **A** (1)

(b) Soil condition in **B** (1)

4.4 Grade 11 learners conducted an experiment to see if a pea plant inoculated with bacteria will grow and produce more than a pea plant grown under normal conditions. After 10 weeks the learners recorded the following results:

| Aspects measured           | Pea plant inoculated with bacteria | Pea plant grown under normal conditions |
|----------------------------|------------------------------------|---|
| Width of leaves (cm)       | 7                                  | 3                                       |
| Stem diameter (cm)         | 2                                  | 1                                       |
| Plant height (cm)          | 15                                 | 7                                       |
| Number of leaves per plant | 8                                  | 5                                       |

4.4.1 Name the bacteria that could have been used by the learners when conducting the experiment. (1)

4.4.2 Provide a reason for your answer in QUESTION 4.4.1. (2)

- 4.4.3 Indicate the nutrient that is circulated during the experiment. (1)
- 4.4.4 State TWO requirements of the bacteria in QUESTION 4.4.1. (2)
- 4.4.5 Based on the results, comment on the effect of the bacteria on the pea plant. (2)
- 4.5 Plants and animals play an important role in the development of soil through the addition of organic matter.
  - 4.5.1 State TWO chemical effects of organic matter on soil. (2)
  - 4.5.2 Name THREE factors affecting the balance between gains and losses of organic matter in soils. (3)

**[35]**

**TOTAL SECTION B: 105**  
**GRAND TOTAL: 150**

