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**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 11**

**NOVEMBER 2016**

**AGRICULTURAL SCIENCES P1  
MEMORANDUM**

**MARKS: 150**

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This memorandum consists of 9 pages.

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**SECTION A****QUESTION 1**

- |     |        |                        |          |      |
|-----|--------|------------------------|----------|------|
| 1.1 | 1.1.1  | C ✓✓                   |          |      |
|     | 1.1.2  | D ✓✓                   |          |      |
|     | 1.1.3  | C ✓✓                   |          |      |
|     | 1.1.4  | A ✓✓                   |          |      |
|     | 1.1.5  | B ✓✓                   |          |      |
|     | 1.1.6  | B ✓✓                   |          |      |
|     | 1.1.7  | D ✓✓                   |          |      |
|     | 1.1.8  | A ✓✓                   |          |      |
|     | 1.1.9  | D ✓✓                   |          |      |
|     | 1.1.10 | C ✓✓                   | (10 x 2) | (20) |
| 1.2 | 1.2.1  | A only ✓✓              |          |      |
|     | 1.2.2  | B only ✓✓              |          |      |
|     | 1.2.3  | B only ✓✓              |          |      |
|     | 1.2.4  | None ✓✓                |          |      |
|     | 1.2.5  | Both A and B ✓✓        | (5 x 2)  | (10) |
| 1.3 | 1.3.1  | Sucrose ✓✓             |          |      |
|     | 1.3.2  | Periodic table ✓✓      |          |      |
|     | 1.3.3  | Bulk density ✓✓        |          |      |
|     | 1.3.4  | Mottled ✓✓             |          |      |
|     | 1.3.5  | Alkalinity ✓✓          | (5 x 2)  | (10) |
| 1.4 | 1.4.1  | Covalent bonding ✓     |          |      |
|     | 1.4.2  | Field water capacity ✓ |          |      |
|     | 1.4.3  | G-horizon ✓            |          |      |
|     | 1.4.4  | Immobilisation ✓       |          |      |
|     | 1.4.5  | Acidity ✓              | (5 x 2)  | (10) |

**TOTAL SECTION A: 45**

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

- 2.1     2.1.1     **Identification of compound**  
Sodium chloride ✓ (1)
- 2.1.2     **Indication of health benefit of sodium chloride**  
It inhibits the growth of bacteria ✓ (1)
- 2.1.3     **Naming of the parts**  
A – Nucleus ✓  
B – Shell/orbit/energy level ✓  
C – Electron ✓ (3)
- 2.1.4     **Indication of the group of the elements**  
Na – Alkali metals/group 1 ✓  
Cl – Halogens/group V11 ✓ (2)
- 2.1.5     **TWO common characteristics of elements in group 17**  
  - They are electron acceptors. ✓
  - They are chemically reactive ✓
  - Usually poisonous ✓
(Any 2 x 1) (2)
- 2.2     **Carbohydrates**
- 2.2.1     **Disaccharide formed from glucose and fructose**  
Sucrose ✓ (1)
- 2.2.2     **Disaccharide formed from glucose and galactose**  
Lactose ✓ (1)
- 2.2.3     **Chemical formula for sucrose and lactose**  
 $C_{12}H_{22}O_{11}$  ✓✓ (2)
- 2.2.4     **Importance of starch:**  
(a) Racing – It provides energy to animals. ✓  
(b) Selling – It fattens animals. ✓ (2)
- 2.3     **Compounds in agriculture**
- 2.3.1     **Classification of compounds A and C**  
A – Organic compound ✓  
C – Inorganic compound ✓ (2)
- 2.3.2     **Name of the fatty acid A and B**  
A – Unsaturated fatty acid ✓  
B – Saturated fatty acid ✓ (2)
- 2.3.3     **Letter representing a fatty acid**  
(a) B ✓  
(b) A ✓ (2)

2.3.4 **TWO importance of compound C**

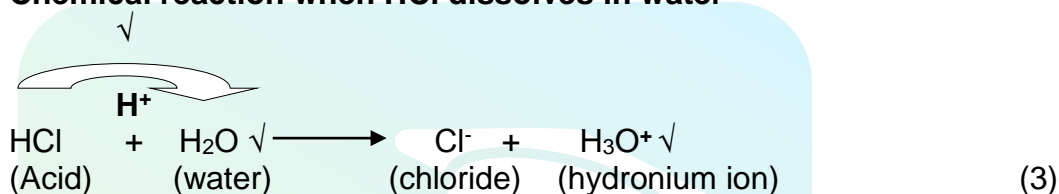
- Acts as a solvent. ✓
- Facilitates chemical reactions. ✓
- Acts as a transport medium. ✓
- It regulates temperature. ✓
- Main source of hydrogen and oxygen. ✓
- 80–90% of all living material consists of water. ✓ (Any 2 x 1) (2)

2.4 **Chemical formula of substances**2.4.1 **Identification of chemical formula**

(a) Alkali – NaOH ✓

(b) Acid – HCl ✓

(2)

2.4.2 **Chemical reaction when HCl dissolves in water**2.5 **Products displayed**2.5.1 **Identification of the functional group of products A and B.**

Product A and B – Hydroxyl group/OH ✓

(1)

2.5.2 **Scientific name of both products**

Product A – Ethanol ✓

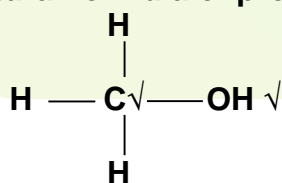
Product B – Methanol ✓

(2)

2.5.3 **Identification of product ideal for heating**

Product B ✓

(1)

2.5.4 **Structural formula of product B**2.5.5 **Scientific name of an oxidised ethanol**

Ethanoic acid ✓

(1)

**[35]**

**QUESTION 3: SOIL SCIENCE****3.1 Soil structure****3.1.1 Identification of the structure**

A – Prism-like structure ✓

D – Platy structure ✓

(2)

**3.1.2 Indication of the letter representing the structure**

(a) C ✓

(b) D ✓

(2)

**3.1.3 Structure recommended for crop production**

B ✓

(1)

**3.1.4 THREE reasons for structure recommended**

- Improved root penetration ✓
- Greater water infiltration/retention and availability ✓
- Improved biological activity ✓
- Improved organic matter content ✓
- Improved emergence of seedlings ✓
- Reduced soil crusting ✓
- Reduced erosion ✓

(Any 3 x 1) (3)

**3.2 Soil texture****3.2.1 Identification of soil texture**

Sample A – Sandy soil ✓

Sample C – Clay soil ✓

(2)

**3.2.2 ONE reason for each structure identified**Sample A – Sandy

- More macro-pores ✓
- Less micro-pores ✓
- High drainage and percolation ✓

(Any 1 x 1) (1)

Sample C – Clay

- Less macro-pore ✓
- More micro-pores ✓
- No drainage and percolation ✓

(Any 1 x 1) (1)

**3.2.3 Letter representing the sample influencing soil characteristics.**

(a) Sample C ✓

(b) Sample A ✓

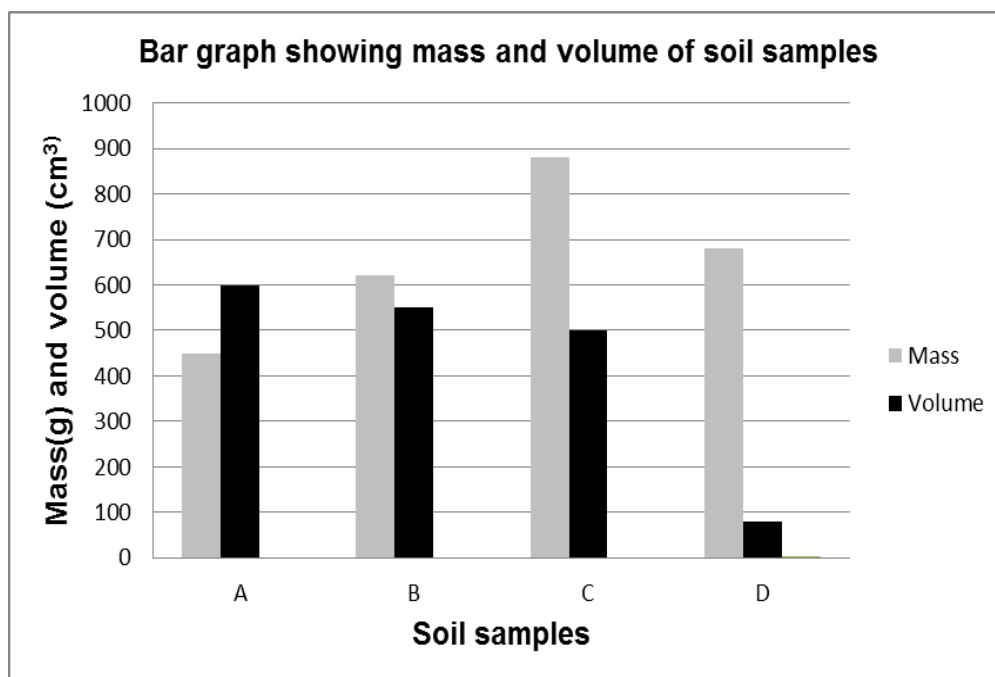
(c) Sample C ✓

(d) Sample A ✓

(4)

### 3.3 Bulk density of soil samples

#### 3.3.1 Bar graph



Marking graph with the following checklist

	Criteria	Yes: 1 mark	No: 0 mark
1.	Bar graph	1	0
2.	Y-axis labelled	1	0
3.	X-axis labelled	1	0
4.	Points correctly plotted	1	0
5.	Correct heading	1	0
6.	Units	1	0

(6)

#### 3.3.2 Identification of undisturbed soil

Soil A ✓

(1)

#### 3.3.3 TWO reasons

- Has a lower bulk density ✓
- Has a higher percentage of pore space ✓

(2)

#### 3.3.4 Calculation of bulk density

$$\text{Bulk density} = \frac{\text{Mass (g)}}{\text{Volume (cm}^3\text{)}} \quad \checkmark$$

$$= \frac{880 \text{ g}}{500 \text{ cm}^3} \quad \checkmark$$

$$= 1,76 \text{ g/cm}^3 \quad \checkmark$$

(3)

## 3.4 Soil gases

3.4.1 Carbon dioxide ✓ (1)

3.4.2 Nitrogen ✓ (1)

3.4.3 Oxygen ✓ (1)

## 3.5 Indication of plant response to different soil water conditions

3.5.1 Plants will die ✓ (1)

3.5.2 Plants will grow optimally ✓ (1)

3.5.3 Plants will wither ✓ (1)

3.5.4 Plants will die ✓ (1)

**[35]**





**QUESTION 4: SOIL SCIENCE****4.1 Soil morphology****4.1.1 Determination of age of the soil**

Matured/old soil ✓

(1)

**4.1.2 Reason**

- Horizons are clearly differentiated. ✓✓
- Significantly developed soil profile. ✓✓

(Any 1 x 2) (2)

**4.1.3 Soil profile**

O		O
A		A
B	OR	B
C		C

✓✓

(2)

**4.1.4 Indication of the letter representing a horizon**

(a) C ✓

(1)

(b) B ✓

(1)

**4.1.5 TWO diagnostic horizons of the horizon labelled B**

- Humic ✓
- Vertic ✓
- Melanic ✓
- Orthic ✓

(Any 2 x 1) (2)

**4.2 Cation adsorption****4.2.1 Identification of the form of acidity**

Labelled A – Reserve acidity ✓

Labelled B – Active acidity ✓

(2)

**4.2.2 Justification**

Reserve acidity – Hydrogen ions are bound onto soil colloid. ✓

Active acidity – Hydrogen ions are concentrated on soil solution. ✓

(2)

**4.2.3 Indication of the letter representing acidity that have an effect on plant**

B ✓

(1)

**4.2.4 Reason**

Plants use plant nutrients dissolved in soil solution. ✓

(1)

**4.2.5 Appropriate term for ability of soil to exchange cations**

Cation exchange capacity ✓

(1)

## 4.3 Sodic and saline soils

## Comparing sodic and saline soils

		SODIC SOIL	SALINE SOIL	
4.3.1	(a)	Dominant salts	Sodium carbonates✓	Chloride and sulphates of sodium, calcium, magnesium ✓ (2)
	(b)	Colour	Black ✓	White ✓ (2)

## 4.3.2 Exchange reaction of sodic soils ✓



## 4.4 TWO ways the soil benefit from breaking down of plant and animal residue

- The decay process ✓ releases nutrients to the soil. ✓
- Formation of humus ✓ leads to improved soil structure. ✓ (4)

## 4.5 Processes during nitrogen cycle

## 4.5.1 Identification of the processes

- A Assimilation ✓
- B Denitrification ✓
- C Nitrification ✓
- D Mineralisation ✓ (4)

## 4.5.2 Soil conditions favouring denitrification

Wet conditions ✓ (1)

## 4.6 Organic matter

## 4.6.1 THREE practices leading to the decline of organic matter

- Intensive tillage ✓
- Monoculture ✓
- Use of artificial fertilisers ✓
- Poor veld management and burning ✓
- Waterlogged soil conditions ✓
- Overgrazing ✓
- Removal of crop residue from the field ✓ (Any 3 x 1) (3)

[35]

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