



Province of the
EASTERN CAPE
EDUCATION

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NATIONAL SENIOR CERTIFICATE

GRADE 11

NOVEMBER 2024

AGRICULTURAL SCIENCES P1 MARKING GUIDELINE

MARKS: 150

This marking guideline consists of 10 pages.

SECTION A**QUESTION 1**

1.1	1.1.1	B ✓✓		
	1.1.2	D ✓✓		
	1.1.3	B ✓✓		
	1.1.4	C ✓✓		
	1.1.5	A ✓✓		
	1.1.6	A ✓✓		
	1.1.7	D ✓✓		
	1.1.8	A ✓✓		
	1.1.9	A ✓✓		
	1.1.10	C ✓✓	(10 x 2)	(20)
1.2	1.2.1	B only ✓✓		
	1.2.2	A only ✓✓		
	1.2.3	B only ✓✓		
	1.2.4	Both A and B ✓✓		
	1.2.5	None ✓✓	(5 x 2)	(10)
1.3	1.3.1	Carboxyl ✓✓		
	1.3.2	Oxygen ✓✓		
	1.3.3	Humus ✓✓		
	1.3.4	Illuviation ✓✓		
	1.3.5	Colloid ✓✓	(5 x 2)	(10)
1.4	1.4.1	Base ✓		
	1.4.2	Temporary ✓		
	1.4.3	Mineralisation ✓		
	1.4.4	Clay ✓		
	1.4.5	Nitrifying ✓	(5 x 1)	(5)
TOTAL SECTION A:				45

SECTION B

QUESTION 2: BASIC AGRICULTURAL CHEMISTRY

- 2.1 2.1.1 **Identification of the diagram**
Periodic table ✓ (1)
- 2.1.2 **Criteria into which elements in the diagram are arranged.**
 • In order of increasing atomic number ✓
 • Valency ✓
 • Atomic orbitals ✓ (Any 1 x 1) (1)
- 2.1.3 **Differentiation between *ionic* and *covalent* bonding**
 Ionic bonding – involves transfer of electrons from one atom to another, ✓ while covalent bonding – involves sharing of electrons ✓ (2)
- 2.1.4 **Type of bond that will be formed between the following elements**
- (a) Ionic bond ✓ (1)
- (c) Covalent bond ✓ (1)
- 2.1.5 **Lewis Dot Structure of the following compounds:**
- (a) Water
 ✓
 ✓ xx
 H • x O x • H ✓
 xx
 (3)
- (b) Sodium chloride
 ✓
 ✓ xx
 Na • x Cl xx ✓
 xx
 (3)
- 2.1.6 **TWO examples of particles of an atom**
 • Proton ✓
 • Electron ✓
 • Neutron ✓ (Any 2 x 1) (2)
- 2.2 2.2.1 **Instrument used to determine the Ph value of a substance**
 pH scale / meter ✓ (1)
- 2.2.2 **Name given to reactions between substances like vinegar and bleach that are found at opposite ends of the pH scale**
 Neutralisation reaction ✓ (1)
- 2.2.3 **Products of a neutralisation reaction**
 Salt ✓
 Water ✓ (2)

- 2.3 2.3.1 **Compounds in (a) and (c).**
 (a) – Carbon dioxide ✓ (1)
- (c) – Ethane ✓ (1)
- 2.3.2 **Chemical formula in (b).**
 (d) NH_3 ✓ (1)
- 2.3.3 **Structural formula of (d):**
- $$\begin{array}{c}
 \checkmark \\
 \text{H} \quad \text{H} \\
 | \quad | \\
 \checkmark \quad \text{H} - \text{C} - \text{C} - \text{H} \quad \checkmark \\
 | \quad | \\
 \text{H} \quad \text{H}
 \end{array}$$
- (3)
- 2.3.4 **Important role of compound (a) in plants.**
 Plays a vital role during the process of photosynthesis ✓ (1)
- 2.3.5 **Classify the compound in (c)**
 Organic compounds ✓ (1)
- 2.4 2.4.1 **Importance of methane for human use**
- A relative abundance of methane makes it a useful fuel ✓
 - Main component of a natural gas ✓ (Any 1 x 1) (1)
- 2.4.2 **Identification of an alcohol and an alkane**
- Alcohol – Ethanol ✓
 - Alkane – Methane ✓ (2)
- 2.5 2.5.1 **Group of organic compounds to which the compounds in the pictures belong**
 Lipids ✓ (1)
- 2.5.2 **Differentiation between the two organic compounds above based on double bonds in their hydrocarbon chains**
A – does not have double bonds in the hydrocarbon chain ✓ while **B** – has some double bonds in the hydrocarbon chain ✓ (2)
- 2.5.3 **TWO functions of the compounds in living organisms**
- Insulation ✓
 - Protection ✓
 - Absorption ✓
 - Waterproofing ✓
 - Energy reserves ✓
 - Storage ✓
 - Source of water ✓ (Any 2 x 1) (2)

2.5.4 The process during which manufacturers add hydrogen to compounds like those in PICTURE B

Hydrogenation

(1)
[35]

QUESTION 3: SOIL SCIENCE

- 3.1 3.1.1 **Method used in the pictures to determine the soil texture class**
Sausage method / Fielding method ✓ (1)
- 3.1.2 **Texture of soil in PICTURES A and E based on their shapes.**
PICTURE A – Sand ✓
PICTURE E – Clay ✓ (2)
- 3.1.3 **TWO methods to determine the soil texture**
Sieve method ✓
Hydrometer method ✓ (2)
- 3.1.4 **THREE reasons why farmers need to know the textural classes of soil on their farms.**
 - To know the type of crops to plant ✓
 - To know the type of irrigation to install ✓
 - To know the type of drainage to use ✓
 - To determine the fertiliser application strategy ✓ (Any 3 x 1) (3)
- 3.2 3.2.1 **Identification of soil structures**
B – Blocky ✓
C – Prismatic ✓ (2)
- 3.2.2 **THREE malpractices that lead to soil structure destruction**
 - Conventional / bare cultivation ✓
 - Flood irrigation ✓
 - Tilling the soils when too wet or too dry. ✓ (3)
- 3.2.3 **Soil structure recommended for cropping.**
A ✓ (1)
- 3.3 3.3.1 **Hypothesis formulation**
In clay soil water moves slowly ✓ to reach the greatest height ✓
OR
Sandy soil has a little/ low capillarity ✓ than clay/ vice versa ✓ (2)
- 3.3.2 **Process illustrated in the diagram**
Capillarity / Capillary action ✓ (1)
- 3.3.3 **Identification of the soil texture in TEST TUBE B**
Clay ✓ (1)
- 3.3.4 **Motivation to the answer in QUESTION 3.3.3**
Particles are closer together ✓ and capillary forces are strongest. ✓ (2)
- 3.3.5 **Force of nature that is responsible for the movement of water in the experiment.**
Cohesion forces ✓
Adhesion forces ✓ (Any 1 x 1) (1)
- 3.3.6 **The force of nature that opposes water movement in QUESTION 3.3.2.**
Gravity ✓ (1)

3.4 Factors that influence the following soil colours:**3.4.1 (a) Yellow**

- Iron ✓ changing in the presence of much moisture of and less oxygen ✓
- Presence of limonite in the soil ✓✓
- Degree of water saturation in the soil which occurs only during the wet season ✓✓ (2)

(b) Light

- Soils formed out of sandstone ✓ with very little iron ✓
- Soils has never been saturated with water ✓✓
- Severe leaching/ presence of salts ✓✓ (2)

3.4.2 Differentiate between *homogeneous* and *non-homogeneous* soil colour.

Homogeneous soil colour is a single dominant colour in the soil, ✓ whereas non-homogeneous soil colour is a mixture of colours in the soil/ mottled soil colour. ✓ (2)

3.5 3.5.1 Bulk density calculation

$$\begin{aligned} \text{BD} &= \frac{\text{Mass}}{\text{Volume}} \quad \checkmark \\ &= \frac{750 \text{ g}}{500 \text{ cm}^3} \quad \checkmark = 1,5 \text{ g/ cm}^3 \quad \checkmark \end{aligned} \quad (3)$$

3.5.2 Comment on the suitability of soil for cultivation

Soil is suitable for cultivation ✓ since its bulk density is less than 1,6 g/ cm³ ✓ (2)

3.5.3 Definition of *porosity*

Porosity is the total volume occupied by pores ✓ per unit volume of soil. ✓ (2)

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QUESTION 4: SOIL SCIENCE**4.1 4.1.1 Identification of the structure in the diagram**

Soil profile ✓

(1)

4.1.2 Matching of horizons with the descriptions:

(a) E horizon ✓

(1)

(b) B horizon ✓

(1)

(c) A horizon ✓

(1)

(d) C horizon ✓

(1)

(e) O horizon ✓

(1)

4.1.3 Schematic representation master horizons(a) **Eroded soil** $\frac{B}{C}$ ✓

(1)

(b) **Water-logged soil** $\frac{O}{G}$, $\frac{A}{G}$ OR $\frac{A}{E}$ ✓
 $\frac{E}{G}$

(Any 1 x 1) (1)

(c) **Young soil** $\frac{A}{C}$ OR $\frac{A}{R}$ ✓

(Any 1 x 1) (1)

4.2 4.2.1 System used to classify soil in South Africa

Binomial system ✓

(1)

4.2.2 TWO uses of soil classification data on farms.

- Scientific planning of farm/ planning of farming activities ✓
- Choice of crop ✓
- Choice and management of irrigation system ✓
- Management of soil fertility ✓
- Allocation of land ✓
- Optimal utilisation of country's natural resources / land ✓
- Valuation of land ✓

(Any 2 x 1) (2)

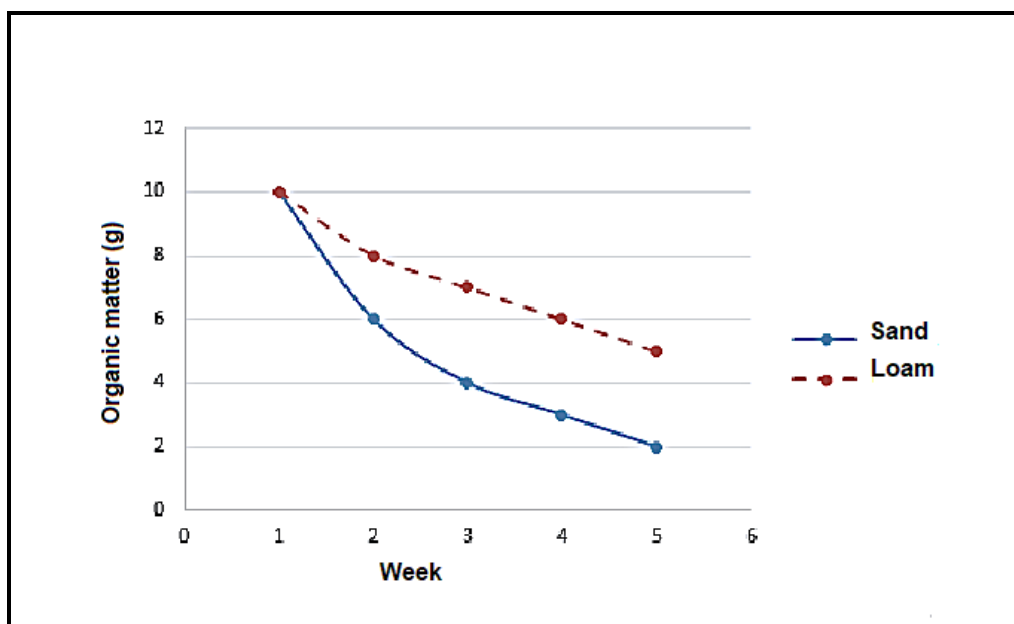
4.2.3 First two steps taken during soil classification.

- Demarcate the master horizon present in the soil profile in the field. ✓
- Identify diagnostic horizons or materials in the profile. ✓

(2)

- 4.3 4.3.1 **Classification of the colloid**
Inorganic colloid ✓ (1)
- 4.3.2 **Process in the diagram**
Cation exchange ✓ (1)
- 4.3.3 **Deduction of the pH class of the soil in the illustration**
Neutral soil ✓ (1)
- 4.3.4 **Motivation to answer in QUESTION 4.3.2**
 Mg^{+} and Ca^{+} cations are in the majority ✓ (1)
- 4.4 **Soil reclamation**
- 4.4.1 **Type of soil that is reclaimed by agricultural lime.**
Acidic soil ✓ (1)
- 4.4.2 **Schematic representation of soil reclamation using agricultural lime.**
- $\begin{array}{|c|} \hline - \\ \hline -Clay- \\ \hline - \\ \hline \end{array} H^{+} \checkmark + CaCO_3 \checkmark \rightarrow \begin{array}{|c|} \hline - \\ \hline -Clay- \\ \hline - \\ \hline \end{array} Ca^{2+} + H_2CO_3 \checkmark$ (3)
- 4.4.3 **TWO negative effects of failure to reclaim acidic soil**
- Poor yields ✓
 - Nutrients like phosphorus become unavailable to plants ✓
 - Aluminium toxicity ✓
 - Weak soil structure ✓
 - Proliferation of nematodes ✓
 - Reduced bacterial activity ✓
 - Reduced productivity of roots ✓ (Any 2 x 1) (2)
- 4.5 4.5.1 **Identification of nutrient cycle**
Carbon cycle ✓ (1)
- 4.5.2 (a) A ✓ (1)
- (b) C ✓ (1)

4.6 4.6.1 **Line graph comparing soil organic matter losses in sand and loam soils over 5 weeks.**



Criteria / marking guideline

- Correct heading
- Correct graph
- Y-axis correctly calibrated and labelled (Organic matter)
- X-axis correctly calibrated and labelled (Week)
- Units (g)
- Accuracy (80%+ correctly plotted)

(6)

4.6.2 **Deduction of the trend presented in the graph**

Sandy soils lose organic matter ✓ faster than loam soils. ✓

(2)

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TOTAL SECTION B: 105

GRAND TOTAL: 150