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GRADE 11

NOVEMBER 2022

**AGRICULTURAL SCIENCES P1
MARKING GUIDELINE**

MARKS: 150

This marking guideline consists of 9 pages.

SECTION A**QUESTION 1**

- | | | | | |
|-----|--------|---------------------|----------|------|
| 1.1 | 1.1.1 | B ✓✓ | | |
| | 1.1.2 | C ✓✓ | | |
| | 1.1.3 | C ✓✓ | | |
| | 1.1.4 | D ✓✓ | | |
| | 1.1.5 | B ✓✓ | | |
| | 1.1.6 | D ✓✓ | | |
| | 1.1.7 | A ✓✓ | | |
| | 1.1.8 | D ✓✓ | | |
| | 1.1.9 | A ✓✓ | | |
| | 1.1.10 | B ✓✓ | (10 x 2) | (20) |
| 1.2 | 1.2.1 | B only ✓✓ | | |
| | 1.2.2 | None ✓✓ | | |
| | 1.2.3 | Both A and B ✓✓ | | |
| | 1.2.4 | A only ✓✓ | | |
| | 1.2.5 | None ✓✓ | (5 x 2) | (10) |
| 1.3 | 1.3.1 | Sucrose ✓✓ | | |
| | 1.3.2 | Catenate ✓✓ | | |
| | 1.3.3 | Nitrogen ✓✓ | | |
| | 1.3.4 | G-horizon ✓✓ | | |
| | 1.3.5 | Nitrification ✓✓ | (5 x 2) | (10) |
| 1.4 | 1.4.1 | Ethanol ✓ | | |
| | 1.4.2 | Structure ✓ | | |
| | 1.4.3 | Cation adsorption ✓ | | |
| | 1.4.4 | Hygroscopic ✓ | | |
| | 1.4.5 | Denitrification ✓ | (5 x 1) | (5) |

TOTAL SECTION A: 45

SECTION B**QUESTION 2: BASIC AGRICULTURAL CHEMISTRY****2.1 Inorganic compounds****2.1.1 Identification of substances**

- (a) Substance B ✓
 (b) Substance C ✓
 (c) Substance A ✓ (3)

2.1.2 Indication of the role of water in SUBSTANCE A

It serves as a solvent. ✓ (1)

2.1.3 Structural formula of SUBSTANCE C**2.1.4 Justification of the components in SUBSTANCE A regarded as compound.**

They are formed from the combination ✓ of two different chemical elements. ✓ (2)

2.2 Carbohydrates**2.2.1 Classification of the carbohydrate**

Monosaccharide ✓ (1)

2.2.2 Chemical formula of a monosaccharide

$\text{C}_6\text{H}_{12}\text{O}_6$ ✓✓ (2)

2.2.3 TWO important uses of monosaccharide

- Provides energy ✓
- Work as flavour and sweetener in the human diet ✓ (2)

2.3 Fats**2.3.1 Classification of fat in food**

Food type A – Unsaturated fat ✓
 Food type B – Saturated fat ✓ (2)

2.3.2 Identification of fat recommended to be included in a diet

Unsaturated fat ✓ (1)

2.3.3 TWO reasons

They are of plant origin ✓ and lower the blood cholesterol level ✓ (2)

- 2.3.4 **Distinguishing between *unsaturated* and *saturated* fat**
- (a) **Reaction at room temperature** – Unsaturated fat is liquid at room temperature ✓ and saturated fat is solid at room temperature. ✓ (2)
- (b) **Bond between the carbon atoms** – Unsaturated fat has one or more double bonds between carbon atoms ✓ and saturated fat has a single bond between carbon atoms. ✓ (2)

2.4 Protein

- 2.4.1 **Building block of protein**
Amino acids ✓ (1)
- 2.4.2 **Difference between *simple* and *complex* protein**
Simple proteins are proteins which when broken down yield only amino acids ✓
Complex proteins are simple proteins combined with some non-protein material. ✓ (2)
- 2.4.3 **Reason for giving protein to:**
- (a) **Injured animals** – To repair damaged tissues ✓ (1)
- (b) **Newly born animals** – To build up new cells and tissues/growth ✓ (1)

2.5 Organic compounds

- 2.5.1 **Labelling**
- A – Propane ✓
- B – C_3H_8 ✓
- C – Hydroxyl/OH ✓
- D –
- $$\begin{array}{c}
 \text{H} \quad \text{H} \\
 | \quad | \\
 \text{H} - \text{C} - \text{C} - \text{OH} \\
 | \quad | \\
 \text{H} \quad \text{H}
 \end{array}
 \quad \checkmark \checkmark$$
- E – Ethanoic / acetic ✓ (6)
- 2.5.2 **Identification of a compound that can be used in alcoholic beverages**
Ethanol ✓ (1)
- 2.5.3 **ONE importance of a compound A for rural communities**
It is used for heating. ✓ (1)

[35]

QUESTION 3: SOIL SCIENCE**3.1 Soil texture****3.1.1 Determining the texture**

- (a) Clay ✓ (1)
 (b) Clay loam ✓ (1)

3.1.2 Comparing clay and sand

- (a) **Tillability** – Clay soil is hard to till ✓ and sandy soil is easy to till. ✓ (2)
 (b) **Degree of plasticity** – High plasticity in clay ✓ and low plasticity in sand. ✓ (2)

3.1.3 TWO reasons for a farmer to know the texture class

- To know the type of crop to cultivate ✓
 - To know when to cultivate and implement to use ✓
 - To be able to assess the efficacy of fertilisers ✓
 - To know the type of irrigation to use ✓
 - To understand how soil will react better to temperature changes ✓
- (Any 2 x 1) (2)

3.2 Soil water**3.2.1 Indication of the water movement demonstrated in the experiment**

Capillarity ✓ (1)

3.2.2 Reason

Water moves upward ✓ (1)

3.2.3 Identification of the soil samples

A – Clay ✓
C – Loam ✓ (2)

3.2.4 Way in which the water can be lost in sample B

Percolation/seepage ✓ (1)

3.2.5 Method to reduce the water loss through percolation

- Controlling the amount of irrigation water ✓
 - Keeping soil under cover/mulching ✓
 - Ploughing in organic material ✓
- (Any 1 x 1) (1)

3.3 Soil air/gas

3.3.1 Prediction of the results of the experiment

Container A – Seeds will germinate and grow ✓

Container B – No germination/growth will occur ✓

(2)

3.3.2 Explaining the reason for no germination in container B

Absence of oxygen ✓ responsible for seed germination due to waterlogged soil conditions ✓

(2)

3.3.3 Name of a gas accumulated in container A

Carbon dioxide ✓

(1)

3.3.4 TWO reasons

- Respiration of plant roots ✓
- Respiration of soil organisms ✓

(2)

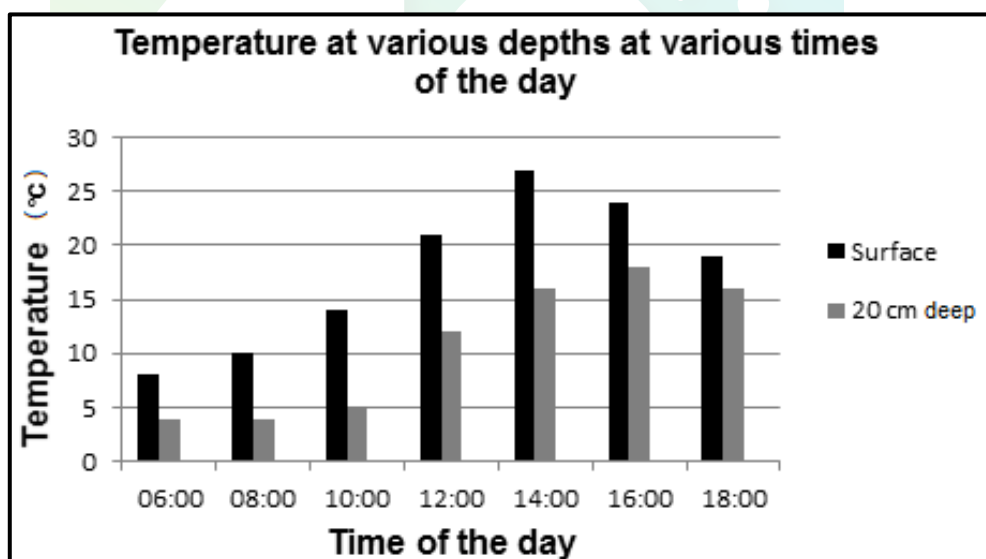
3.4 Soil temperature

3.4.1 Deduction of the factor influencing soil temperature

Soil depth ✓

(1)

3.4.2 Bar graph



Criteria/rubric/marketing guidelines

- Correct heading ✓
- X-axis: Correctly calibrated with label (time of the day) ✓
- Y-axis: Correctly calibrated with label (temperature) ✓
- Correct unit (°C) ✓
- Bar graph ✓
- Accuracy ✓

(6)

3.4.3 Explaining the trend of temperature in soil at 5 cm deep

There is a drastic increase of temperature during the day ✓ and it drops in the afternoon. ✓

(2)

3.5 Bulk density**3.5.1 Calculation of bulk density**

$$\begin{aligned}\text{Bulk density} &= \frac{\text{Mass of dry soil (g)}}{\text{Volume of dry soil (cm}^3\text{)}} \checkmark \\ &= \frac{680 \text{ g}}{80 \text{ cm}^3} \checkmark \\ &= 8,5 \text{ g/cm}^3 \checkmark\end{aligned}\quad (3)$$

3.5.2 Commenting on the suitability of soil for deep rooted crops

Not suitable ✓

Reason

Soil is compacted / has a high clay content. ✓

(2)
[35]

QUESTION 4: SOIL SCIENCE**4.1 Reproductive systems****4.1.1 Identification of soil profile**

- (a) Soil profile C ✓
 - (b) Soil profile D ✓
 - (c) Soil profile B ✓
- (3)

4.1.2 Name of the horizon

- (a) B – horizon ✓
 - (b) A – horizon ✓
 - (c) C – horizon ✓
- (3)

4.1.3 TWO possible diagnostic horizons that may occur in soil profile C

- Humic A ✓
 - Vertic A ✓
 - Melanic A ✓
 - Orthic A ✓
- (Any 2 x 1) (2)

4.2 Soil classification**4.2.1 Re-arrangement of steps in soil classification**

- Demarcate master horizons ✓
 - Identify diagnostic horizons ✓
 - Establishing soil form ✓
 - Series characteristics are identified ✓
 - Determine soil series ✓
- (5 x 1) (5)

4.2.2 TWO methods used in South Africa to classify the soil

- Soil form ✓
 - Soil series/family ✓
- (2)

4.3 Soil colloids**4.3.1 Identification of the type of colloid**

Inorganic colloid ✓ (1)

4.3.2 Differentiation between inorganic and organic colloids with regard to shape

Inorganic colloids have a layered structure with flat platelets ✓
 Organic colloids are structureless/ amorphous ✓ (2)

4.3.3 Condition of the colloid based on the cation adsorbed

Colloid A – Acidic ✓
Colloid B – Neutral/sweet ✓ (2)

4.3.4 TWO factors causing colloidal condition in A/acidity

- Carbon dioxide dissolving in water forming carbonic acid ✓
 - Organic acids formed during decomposition process ✓
 - Rain water/irrigation leaching basic ions ✓
 - Fertilisation with ammonium sulphate ✓
- (Any 2 x 1) (2)

4.3.5 **Detrimental effect of cation dominant on the colloid C on soil structure**

It has a deflocculating effect which causes the soil to be structureless ✓

(1)

4.3.6 **TWO ways to correct the colloidal condition C physically**

- Scraping ✓
- Leaching salts from root zone through subsurface drain ✓
- Flushing ✓

(Any 2 x 1)

(2)

4.4 **Nutrient cycling**

4.4.1 **Identification of the letter**

A ✓

(1)

4.4.2 **TWO processes showing the return of carbon dioxide into the atmosphere**

- Respiration ✓
- Decomposition ✓
- Combustion ✓

(Any 2 x 1)

(2)

4.4.3 **THREE conditions necessary for the survival of micro-organisms**

- Soil fertility ✓
- Soil moisture ✓
- Soil temperature ✓
- Soil air ✓
- Soil pH ✓
- Light ✓
- Food and energy supply ✓

(Any 3 x 1)

(3)

4.5 **Symbiotic relationship**

4.5.1 **Name of micro-organism**

- (a) Rhizobium ✓
- (b) Mycorrhiza ✓

(1)

(1)

4.5.2 **Explanation of symbiotic relationship between legume crops and rhizobium bacteria**

Rhizobium bacteria fix atmospheric nitrogen for the legume crop ✓ and plants provide food for bacteria/house bacteria in the nodules formed in their roots. ✓

(2)

[35]**TOTAL SECTION B: 105****GRAND TOTAL: 100**