higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

# MARKING GUIDELINE

## NATIONAL CERTIFICATE (VOCATIONAL)

## SOIL SCIENCE
## NQF LEVEL 2

**15 November 2022**

**This marking guideline consists of 7 pages.**

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## INSTRUCTIONS TO MARKERS

1. Mark all the questions.
2. Follow the answers according to the numbering system used in this question paper.
3. Use only a red pen.
4. Put your ticks and crosses neatly and legibly.

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## SECTION A

### QUESTION 1

1.1 True
1.2 False
1.3 False
1.4 True
1.5 False
1.6 False
1.7 True
1.8 False
1.9 True
1.10 True

(10 × 1) **[10]**

### QUESTION 2

2.1 A
2.2 B
2.3 C
2.4 C
2.5 C
2.6 A
2.7 C
2.8 D
2.9 B
2.10 D

(10 × 1) **[10]**

### QUESTION 3

3.1 E
3.2 L
3.3 G
3.4 A
3.5 C
3.6 K
3.7 B
3.8 D
3.9 H
3.10 I

(10 × 1) **[10]**

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## QUESTION 4

4.1 Nucleus
4.2 Diffusion
4.3 Matter
4.4 Windbreaks
4.5 Erosion
4.6 Leaf analysis
4.7 Cation
4.8 Humus colloids
4.9 Root cap
4.10 Electrostatic attraction

(10 × 1) **[10]**

**TOTAL SECTION A: 40**

## SECTION B

5.1 Total plant nutrients are all plant nutrients that occur in the soil or reserved plant nutrients plus accessible plant nutrients in the soil.✓✓

Available plant nutrients are those plant nutrients that can be absorbed by the plants during a particular growth season.✓✓ (4)

5.2
- Agent of chemical reactions in plants.
- Serves as a transport medium.
- Makes plant cells stiff.
- Makes cell walls rigid.
- Keeps plant temperature more stable. (5 × 2) (10)

5.3
- Growing points of the plant including root tips do not develop.
- Plants' leaves tend to curl.
- Flowers develop partly or not at all.
- Stunted growth. (Any 3 × 2) (6)

5.4 Lush vegetative growth is plant growth that is thick, green and healthy. (2)
**[22]**

## QUESTION 6

6.1
- Soil colour
- Moisture content of the soil
- Soil depth
- Orientation and the shape of the land
- Vegetation and ground cover
- Cloud cover
- Amount of solar radiation
- Season and atmospheric condition
- Organic matter
- Compost and manure
- Soil composition and texture (Any 5 × 1) (5)

6.2
- Apply nitrogen fertilizer in small amount (to minimize leaching)
- Avoid using flood irrigation
- Water crops frequently but with micro irrigation methods like a drip irrigation system
- Apply lime with great care
- Grass mulch
- Apply smaller quantities of organic matter more often
- Apply agricultural lime from time to time (Any 3 × 1) (3)

6.3 S = F (P, R, Cl, O, T) (2)

6.4 6.4.1 plot No.2A-1 ⟶ 5.77✓
plot No.2A-2 ⟶ 6.22✓ (2)

6.4.2 Hydrometer method (1)

6.4.3 Bray 1 (1)

6.4.4 To determine the nutrient status of the soil. (2)

6.5
- Is the source of nitrogen essential for plant growth
- Improves texture of the mineral component
- Improves humus content which builds soil structure
- Improves soil texture
- Improves ability of soil to retain water
- Source of energy for microbes (Any 5 × 2) (10)

6.6
- hygroscopic/adhesion water
- capillary/cohesion water
- gravitational/free water (3)

6.7 6.7.1 Capillarity is the upward movement of water through various pore spaces in the soil.

6.7.2 A soil profile is a section of soil that shows all the horizons.
(2 × 2) (4)

**[33]**

## QUESTION 7

7.1 7.1.1 

7.1.2 Helium

7.1.3 6

(3 × 2) (6)

7.2 7.2.1 Back diffusion is when water diffuses from moist air back into the leaf when the humidity is very high.

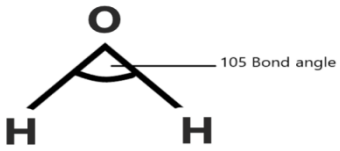
7.2.2 Transpiration is the opening of stomata to release water from plant leaves.

7.2.3 Covalent bonding is the sharing of electrons between atoms that are involved in bonding.

7.2.4 Filtration is a physical process of separating solid from liquid in a mixture using filter paper.

(4 × 2) (8)

7.3 'Relative humidity of 54%' means that the moisture in the air is 54% of the total amount of moisture the air can hold. (3)

7.4 


(5)

7.5 7.5.1 $H_2$ is a polar molecule
7.5.2 $CH_4$ is a non-polar molecule
7.5.3 $H_2O$ is a polar molecule

(3 × 2) (6)

7.6 7.6.1 Ionic bonding (2)

7.6.2 There is a total transfer of electrons from one atom to the other. (2)

7.6.3 


(4)

7.6.4 Symbol A: Sodium
Symbol B: Chlorine
Symbol C: Sodium cation/sodium positive ion
Symbol D: Chlorine anion/chlorine negative ion (4 × 2) (8)

7.7 7.7.1 Nitrogen
7.7.2 7 protons
7.7.3 **N**
7.7.4 7

(4 × 2) (8)

7.8
- straw
- newspaper
- plastic sheeting
- compost
- bark chipping
- stones or pebbles
- groundcover plants

(Any 3 × 1) (3)
**[55]**

**TOTAL SECTION B: 110**
**GRAND TOTAL: 150**

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