higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

SOIL SCIENCE
NQF LEVEL 2

20 November 2024

This marking guideline consists of 7 pages.

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SECTION A

QUESTION 1

1.1 D
1.2 J
1.3 F
1.4 I
1.5 K
1.6 B
1.7 L
1.8 C
1.9 E
1.10 A

(10 × 1) **[10]**

QUESTION 2

2.1 Filtration
2.2 Decomposition
2.3 Sandy soil
2.4 Water
2.5 Non-polar covalent bond
2.6 South-facing slopes
2.7 Deficiency
2.8 Matter
2.9 Amino acids
2.10 100 °C

(10 × 1) **[10]**

QUESTION 3

3.1 B
3.2 A
3.3 C
3.4 D
3.5 B
3.6 A
3.7 C
3.8 D
3.9 A
3.10 D

(10 × 1) **[10]**

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QUESTION 4

4.1 True
4.2 True
4.3 True
4.4 False
4.5 True

(5 × 1) **[5]**

TOTAL SECTION A: 35

SECTION B

QUESTION 5

5.1 5.1.1 Loam sand✓✓✓ (3)

5.1.2 Yes (1)

5.1.3 Because soil is a bit loose for underground crops and it will be easy to harvest them as they are easy to till.✓✓ (2)

5.1.4 Clay✓✓✓ (3)

5.1.5
- Rubbing small amount of soil between thumb and forefinger.
- Rolling wet soil between the palm of hands shaping it into a ball or small sausage. (2)

5.2 5.2.1 Capillarity is the upward movement of water in soil through various micro pores.✓✓ (2)

5.2.2
- Clay soil – has narrowest pore spaces and then will have the strongest capillarity. (highest water level).✓✓
- Sandy soil – has large pore spaces and thus the weakest capillarity giving very low water level.✓✓ (2 × 2) (4)

5.3 5.3.1 A-horizon.
- Horizon near to soil surface.
- Top soil horizon
- Can be the first horizon in the absence of O
- Is dark with accumulated organic matter
- Well mixed with minerals.
- Also called an Eluvial horizon (because soluble salts leach from this horizon). (Any 2 × 1)

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5.3.2 O-horizon.
- Layer of organic matter
- Has fresh fallen leaves
- Has organic debris
- Has partially decomposed organic matter (Any 2 × 1)

(2 × 2) (4)

5.4
- Clay colloids – has very strong cohesive forces between clay particles which play a role in formation of aggregates.✓✓
- Organic colloids – assist in aggregates formation where there are no clay colloids as they promote formation of crumby structure even in sandy soils.✓✓ (2 × 2) (4)

5.5 Soil pH is the acidity or alkalinity of soil.✓✓ (2)

5.6
- water
- acids
- oxidation (3)

[30]

QUESTION 6

6.1 6.1.1 Phosphorus functions
- For formation of flowers
- For formation of seeds
- For formation of fruits
- Improves crop quality
- Formation of roots.
- Formation of cell membrane
- Forms nucleic acids (dna and rna)
- Forms reproductive parts (Any 2 × 1)

6.1.2 Calcium functions
- Assists in root growth/development
- For growth of plant tips (stem and root)
- Neutralises acids in plants
- For formation of cell wall
- Prevents leaves from falling (Any 2 × 1)

6.1.3 Magnesium functions
- Helps during photosynthesis
- Changes light energy into carbohydrates.
- Part of chlorophyll
- Helps in the formation/synthesis of proteins
- Helps in the functioning of enzymes (Any 2 × 1)

(3 × 2) (6)

6.2
- Macro-nutrients – are those nutrients needed by plant in a large quantity.✓✓
- Micro-nutrients – are those nutrients needed by plants in a small quantity.✓✓ (2 × 2) (4)

6.3 Suction in plants is a sucking force and is created when transpiration takes place and water evaporates from the stomata on leaves; it causes water to move up the xylem vessels into the leaves of the plant.✓✓✓ (3)

6.4 Functions of water in the uptake of plant nutrients
- It acts as a solvent✓✓
- Acts as a transport medium✓✓
- Acts as a temperature buffer✓✓
- Gives shape to cells (makes cells to be stiff)/(makes cell walls rigid)✓✓
- Acts as an agent for chemical reactions✓✓ (5 × 2) (10)

6.5 6.5.1 Osmosis is movement of water molecules through the cell membrane/semi-permeable membrane from high concentration to lower concentration.✓✓

6.5.2 Toxicity is when too much of a nutrient is present in soil and cause a poisoning effect to plants.✓✓

(2 × 2) (4)

6.6 Essential elements must be present in the soil – for optimal plant growth. If they are not present naturally, they must be applied artificially by fertilisers. Because if they lack in the soil, the plant cannot grow and can die.✓✓✓ (3)

[30]

QUESTION 7

7.1 7.1.1 Water✓✓ (2)

7.1.2 A – sea evaporation
B – transpiration
C – surface evaporation
D – precipitation (rain, snow, fog, hail, dew)

(4 × 1) (4)

7.1.3 B – Transpiration is the loss of water from soil through plant leaves.✓✓
C – Evaporation is the conversion of a liquid into vapour at a temperature below the boiling point.✓✓

(2 × 2) (4)

7.2 7.2.1 Atomic mass number – Total of protons and neutron is mass number of an atom.✓✓

7.2.2 Negligible means too small to make a difference.✓✓

7.2.3 Relative humidity is the ratio between the amount of water vapour in the air and the amount that the air can hold at that temperature.✓✓

7.2.4 Valence electrons are electrons that occupy the last energy level of an atom which are the ones that get involved in chemical bonding.✓✓

7.2.5 Wet bulb thermometer is a thermometer that is cooled by evaporation because it is wrapped by a wet cloth when it takes its readings.✓✓

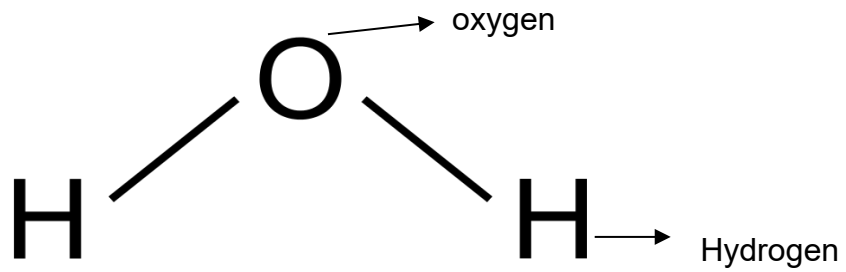
(5 × 2) (10)

7.3
- Windbreaks – shelters farmers put around the plants to block strong prevailing winds that might cause an effect on plants.✓✓
- Mulching – is covering the soil surface to reduce water loss through evaporation.✓✓

(2 × 2) (4)

7.4
- Storeroom
- Greenhouse
- Trellising among leaves at different stages (3)

7.5 Labelled structural formula of water

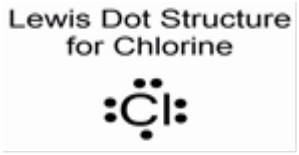


✓✓✓✓ (4)

7.6 7.6.1 Chlorine✓✓ (2)

7.6.2 1. electrons
2. orbits/energy level/shell
3. nucleus (3 × 1) (3)

7.6.3 17✓✓ (2)

7.6.4 

✓✓✓✓ (4)

7.6.5 Protons✓ and neutrons.✓ (2)

7.7 7.2.1
- Symbol: Al
- Atomic number: 13

7.2.2
- Symbol: H
- Atomic number: 1

7.2.3
- Symbol: Ca
- Atomic number: 20

7.2.4
- Symbol: N
- Atomic number: 7

7.2.5
- Symbol: K
- Atomic number: 19

(5 × 2) (10)

7.8 Hydroxide (1)
[55]

TOTAL SECTION B: 115
GRAND TOTAL: 150

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