higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

SOIL SCIENCE
NQF LEVEL 2

(1011002)

20 November 2019 (Y-Paper)
13:00–16:00

This question paper consists of 9 pages.

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TIME: 3 HOURS
MARKS: 150

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
2. Read ALL the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. Start each section on a NEW page.
5. Use only BLUE or BLACK ink.
6. Write neatly and legibly.

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SECTION A

QUESTION 1

Various options are given as possible answers to the following questions. Choose the correct answer and write only the letter (A–D) next to the question number (1.1–1.10) in the ANSWER BOOK.

1.1 The soil colour which is generally associated with soil fertility is …

A white
B grey
C yellow
D red to dark

1.2 TWO or more different atoms joined together by chemical bonding:

A Mixture
B Compound
C Isotopes
D Isomers

1.3 At … point the molecules begin to leave the surface of water and change into steam.

A boiling
B melting
C evaporation
D solidification

1.4 The growth of thick, green and healthy leaves and stems:

A De-greening
B Lush generative growth
C Lush vegetative growth
D Fruiting

1.5 How many electrons does a magnesium atom loose to become a cation?

A 2 electrons
B 3 electrons
C 1 electron
D 4 electrons

1.6 Soil colour which shows a good air/moisture ratio in soil is …

A yellow soil.
B grey soil.
C mottled soil.
D red soil.

1.7 An instrument that assists farmers to measure relative humidity in their store rooms:

A Thermometer
B Bulb thermometer
C Wet and dry bulb thermometer
D Humidity guide

1.8 Mixture of loose materials in upper layer of the earth which acts as a growth medium for plants:

A Earth crust
B Horizons
C Soil profile
D Soil

1.9 Movement of molecules against concentration gradient:

A Diffusion
B Active transport
C Osmosis
D Adsorption

1.10 Smallest particle into which an element can be broken down:

A Molecule
B Compound
C Atom
D Mixture

(10 × 1) **[10]**

QUESTION 2

Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'True' or 'False' next to the question number (2.1–2.10) in the ANSWER BOOK.

2.1 Soil analysis and leaf analysis are used to determine the nutrient status of the soil.

2.2 Nucleons are protons and neutrons in the nucleus of an atom.

2.3 Loss of water from the soil through plant leaves to the atmosphere depends on soil acidity.

2.4 Rust is iron oxide surrounded by water molecules.

2.5 Root hairs assist in protecting the root against damage during root growth.

2.6 Molecules can be separated by a physical process such as distillation.

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2.7 Soil water forms at least 25% of the phases of soil.

2.8 Changes in state occur at boiling point only.

2.9 Shade cloth around the plant can be used by farmers as a wind break.

2.10 Nitrogen is an essential element in the structures of protein.

(10 × 1) **[10]**

QUESTION 3

Choose a term from COLUMN B that matches a description in COLUMN A. Write only the letter (A–L) next to the question number (3.1–3.10) in the ANSWER BOOK.

COLUMN A		COLUMN B	
3.1	Too small to make a difference	A	cation exchange
3.2	Patches of different soil colours	B	phosphorus
3.3	Holding as much water as it can	C	hygroscopic water
3.4	Swapping of adsorbed cation for another cation	D	proton
3.5	Water that is not available to plant roots	E	negligible
3.6	Diatomic molecule	F	NO_2
3.7	Nutrient that stimulates flower formation	G	saturated
3.8	A positive particle of an atom	H	agent
3.9	Something that has an effect on something else	I	evaporation
3.10	Conversion of liquid to vapour at a temperature below boiling point	J	free water
		K	O_2
		L	mottled

(10 × 1) **[10]**

QUESTION 4

Give ONE word/term for each of the following descriptions. Write only the word/term next to the question number (4.1–4.10) in the ANSWER BOOK.

4.1 A positive particle that is found inside the nucleus of an atom

4.2 The process that allows plant nutrients to be released from the soil to the soil solution where they can be absorbed by the plant roots

4.3 Very small drops of water that can float in a gas

4.4 Temperature at which condensation starts

4.5 Breaking down of rocks by pressure such as heat, swelling and shrinking

4.6 A practice by chemists of determining the nutrient status of the soil using chemicals

4.7 Electrons found on the outer most energy levels

4.8 Very fine soil particles which can be suspended and float in a liquid without settling down under the influence of the force of gravity

4.9 All plant nutrients that occur in the soil

4.10 The changing of a liquid into gas at a temperature below boiling point

(10 × 1) **[10]**

TOTAL SECTION A: 40

SECTION B

QUESTION 5

5.1 Differentiate between *osmosis* and *active transport*. (4)

5.2 Name the part of the root which protects the growing root tip. (1)

5.3 Define:

5.3.1 The available plant nutrients

5.3.2 Diffusion

5.3.3 Macro plant nutrients

(3 × 2) (6)

5.4 Discuss the creation of suction and what it does to plants. (3)

5.5 What are the THREE symptoms of phosphorus deficiency? (3 × 2) (6)

5.6 Why do you think leaf analysis is as important as soil analysis? (2)

[22]

QUESTION 6

6.1 Name FIVE soil forming factors that are found in a specific location. (5)

6.2 Explain what capillarity is with relation to various types of soil. (3)

6.3 Differentiate between *macro-organisms* and *micro-organisms*. (2 × 2) (4)

6.4 Briefly interpret yellow soil properties. (4)

6.5 Name and describe briefly the characteristics of FIVE major horizons of a well-developed soil. (5 × 2) (10)

6.6 List THREE groups of organic matter. (3)

6.7 Define the following terms:

6.7.1 Decomposition

6.7.2 Soil

(2 × 2) (4)

[33]

QUESTION 7

7.1 Give the chemical symbol and the atomic number for each of the following elements:

7.1.1 Sodium

7.1.2 Potassium

7.1.3 Nitrogen

(3 × 2) (6)

7.2 Bulb thermometers are instruments used to measure and calculate relative humidity.

Answer the following questions based on relative humidity:

7.2.1 Name THREE places in the farm where farmers have to determine relative humidity. (3 × 2) (6)

7.2.2 Why is it necessary for farmers to measure relative humidity in the places you mentioned in QUESTION 7.2.1? (3)

7.2.3 Interpret the meaning of the statement 'relative humidity is 70%'. (4)

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7.3 List THREE states of matter. (3)

7.4 Present water molecules in the form of the Lewis structure. (5)

7.5 Study DIAGRAM 1 below and answer all the questions.

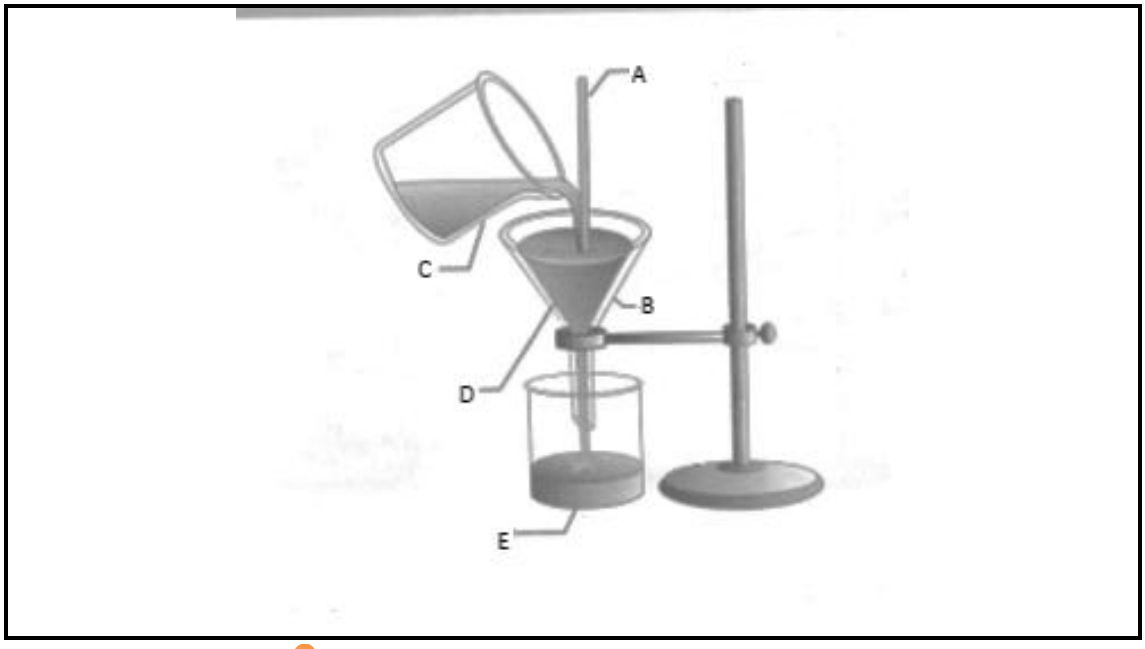


DIAGRAM 1

7.5.1 Identify the process represented by the above diagram. (2)

7.5.2 Label A, B, C, D and E. (5)

7.5.3 Which type of a mixture can be separated by this method? (2)

7.6 Define the following terms:

7.6.1 Mass number

7.6.2 Melting

7.6.3 Anion

7.6.4 Covalent bonding

(4 × 2) (8)

7.7 Answer the following questions with relation to atom number 8 in the periodic table:

7.7.1 Give the name of this atom.

7.7.2 How many protons does this atom have?

7.7.3 Give the symbol of this atom.

7.7.4 If its mass number is 16 what will be the number neutrons inside the nucleus of this atom?

(4 × 2) (8)

7.8 State THREE methods which may be used by farmers to control evaporation from their crops and the soil. (3)

[55]

TOTAL SECTION B: 110
GRAND TOTAL: 150

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