



Education and Sport Development

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NORTH WEST PROVINCE

PROVINCIAL ASSESSMENT

GRADE 11

**AGRICULTURAL SCIENCES
JUNE 2019
EXAMINATION**

MARKS: 150

TIME: 2 ½ HOURS

This question paper consists of 12 pages.



INSTRUCTIONS AND INFORMATION

1. Answer ALL questions in SECTION A and SECTION B.
2. SECTION B (QUESTIONS 1 to 4) must be answered in the ANSWER BOOK.
3. Start each question from SECTION B on a NEW page.
4. Read ALL questions carefully and answer only what is asked.
5. Number the answers correctly according to the numbering systems used in this question paper.
6. Write neatly and legibly.

SECTION A**QUESTION 1**

1.1 Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A - D) next to the question number (1.1.1 – 1.1. 10) in the ANSWER BOOK, for example 1.1. 11 D.

1.1.1 Indicate which of the following compounds is organic.

- A. Carbon dioxide
- B. Ammonia
- C. Glucose
- D. Water

1.1.2 The/ A ... gives information about the structure and properties of the atoms of each element

- A. Couper's structure
- B. Periodic table
- C. Calorie meter
- D. Lewis structure

1.1.3 The symbol for potassium is ...

- A. K
- B. Na
- C. P
- D. Pt

1.1.4 The ... of an atom symbolizes each electron of the outer shell by a dot or cross placed near the chemical symbol of the element

- A. Couper's structure
- B. Crystal lattice
- C. Periodic table
- D. Lewis structure

1.1.5 The main compound found in plant cell walls is

- A. A monosaccharide called glucose
- B. A disaccharide called lignin
- C. A polysaccharide called starch
- D. A polysaccharide called cellulose

- 1.1.6 A carbon atom has six protons and six neutrons. State how many electrons does it have
- A. Five
 - B. Six
 - C. Twelve
 - D. Four
- 1.1.7 A soil horizon which shows signs of reduction under waterlogged conditions is the...
- A. B – horizon
 - B. C – horizon
 - C. G – horizon
 - D. E – horizon
- 1.1.8 The quantity of capillary water in the soil is dependent on ...
- A. Cohesion forces
 - B. Soil reaction
 - C. Soil colour
 - D. Soil temperature
- 1.1.9 The organic colloid ...
- A. Has a round shape
 - B. Has a small specific area
 - C. Cannot be destroyed
 - D. Has no fixed shape
- 1.1.10 Water movement will be the slowest but highest in a ...
- A. Sandy soil
 - B. Clay soil
 - C. Sandy loam soil
 - D. Loam soil

[10 x 2 = 20]

- 1.2 Indicate whether each of the descriptions in COLUMN B applies to A ONLY, B ONLY, BOTH A and B or NONE of the items in COLUMN A. Write A ONLY, B ONLY,

BOTH A and B or NONE next to the question number (1.2.1 – 1.2.5) in the ANSWER BOOK, For example: 1.2.6 B ONLY.

COLUMN A		COLUMN B
1.2.1	A. Amino acid	Building blocks of proteins
	B. Glycerol	
1.2.2	A. Soil profile	The sequence of different horizons
	B. Soil horizon	
1.2.3	A. Ionic bond	The type of chemical reaction in which bonds are broken by the addition of water
	B. Hydrolysis	
1.2.4	A source of energy for body processes	The function (s) of carbohydrates in the living organisms
	B. Structural Components e.g. Cellulose	
1.2.5	A. Ethanol	Examples of fatty acids formed from alcohols
	B. Butanol	

[5 x 2 = 10]

1.3 Write the agricultural term/ phrase for each of the following descriptions next to the question number (1.3.1 – 1.3. 5) in the ANSWER BOOK.

- 1.3.1 Molecules with the same chemical formulae but different structural formulae.
- 1.3.2 The smallest form of matter that can exist alone.
- 1.3.3 The term that describes the attraction of cations to the negative surface of clay colloids.
- 1.3.4 The number of protons in the nucleus of an atom.
- 1.3.5 The mineral present in red soils.

[5 x 2 = 10]

1.4 Change the UNDERLINED WORD(S) in each of the following statements to make the statements TRUE. Write only the correct word(s) next to the question number (1.4.1 – 1.4.5) in the ANSWER BOOK

- 1.4.1 Cellulose is a monosaccharide that occurs in the cell wall of plants.
- 1.4.2 Protons in an atom have a negative charge.
- 1.4.3 Soil with a dark colour indicates the presence of aluminium compounds.

1.4.4 Active acidity refers to hydrogen (H^+) ions bound onto the soil particle, and cannot readily be exchanged.

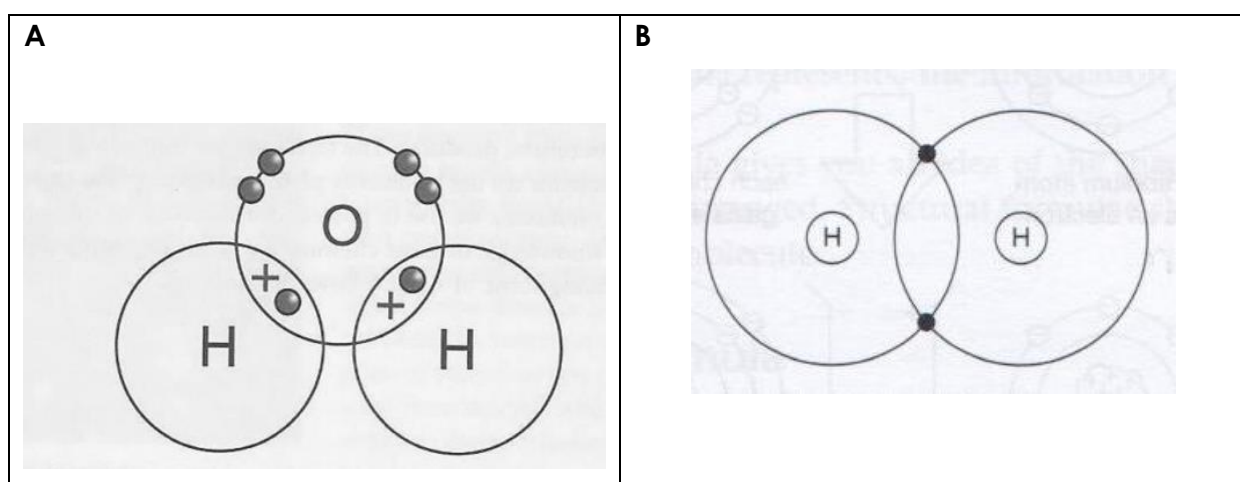
1.4.5 Nitrification is the conversion of the organic nitrogen compounds in the soil to ammonium compounds through the action of soil micro – organisms.

[5 x 1 = 5]

TOTAL SECTION A: 45

SECTION B

QUESTION 2: BASIC CHEMISTRY



2.1 Study the compounds illustrated above and answer the questions that follow:

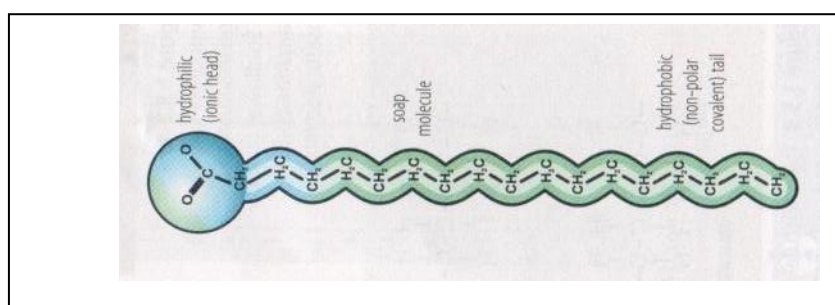
2.1.1 Identify the molecules labelled A and B. (2)

2.1.2 Name the type of bond involved in binding each of the molecules in A and B and explain briefly each of the bonds identified. (4)

2.1.3 Give the chemical formula of the molecule labelled A. (2)

2.1.4 Give THREE functions of the compound labelled A. (6)

2.2. The compound below is a simple fatty acid. Study the illustration carefully and answer the questions that follow:



2.2.1 Briefly differentiate between “hydrophobic” and “hydrophilic”. (4)

2.2.2 Fatty acids are one of the main building blocks of fats. Name THREE main types of fatty acids. (3)

2.3 The table below shows the organic and inorganic compounds. Look carefully at them and provide the missing information labelled A – J (10)

Name of Compound	Chemical Formula	Structural Formula	Type of Compound
Ammonia	A	$ \begin{array}{c} \text{H} \\ \\ \text{H}-\text{N} \\ \\ \text{H} \end{array} $	B
C	CH ₄	D	Organic compound
Carbon dioxide	CO ₂	E	F
Ethanol	G	H	Organic compound
I	J	$ \begin{array}{c} \text{H} \quad \text{H} \quad \text{O} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{OH} \\ \quad \\ \text{H} \quad \text{H} \end{array} $	Organic compound
(10 x 1 = 10)			

2.4 Carbohydrates consist of the elements carbon, hydrogen and oxygen, with hydrogen and oxygen present in the ratio of 2:1. They are divided into three groups: Monosaccharides, disaccharides and polysaccharides.

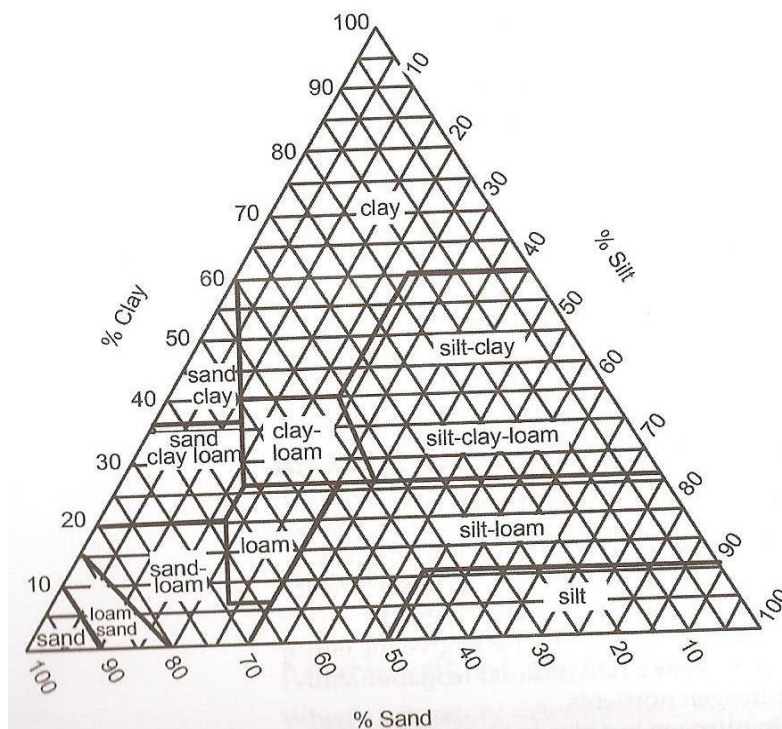
2.4.1 Give THREE common disaccharides that you have studied. (3)

2.4.2 State the bond formed when two monosaccharides are held together to form a disaccharide. (1)

[35]

QUESTION 3 SOIL SCIENCES

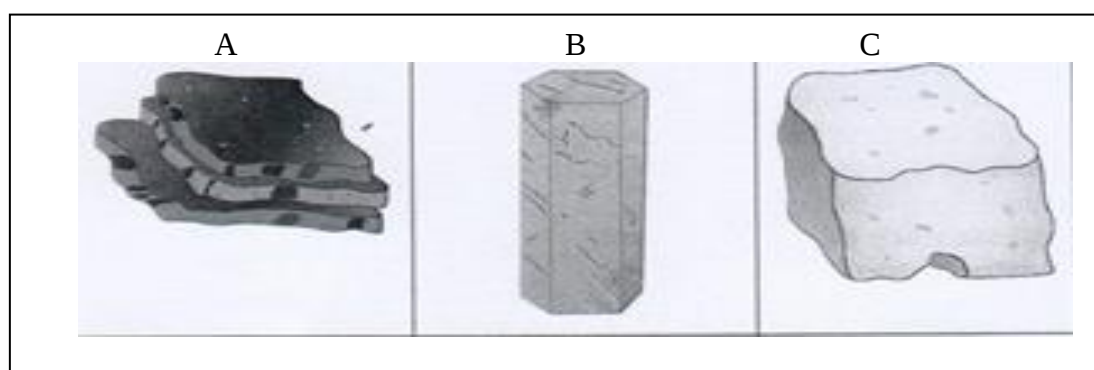
- 3.1 The table below gives examples of different types of soil textures. Use the texture triangle below to determine texture class of the soil samples represented by the letters A, B, and C in the table below.



Sand %	Clay %	Silt %	Texture Class
35	15	50	A
55	20	25	B
60	30	10	C
50	35	15	D

(4 x 2 = 8)

- 3.2 The illustrations below shows different types of soil structure based on shape of structural units. Look carefully at them and answer the questions that follow:

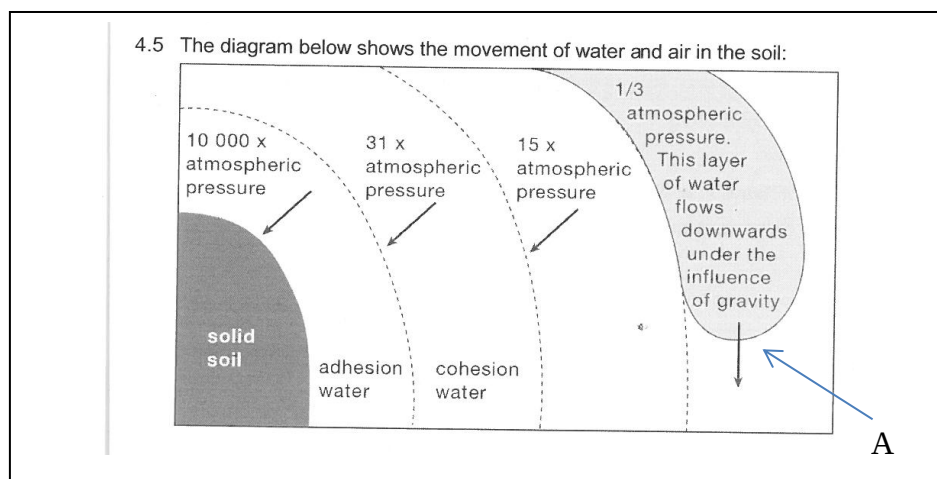


- 3.2.1 Identify the structures labelled A, B, C and briefly describe each of them. (3 x 2 = 6)
- 3.2.2 Give THREE factors influencing the development and stability of soil structure. (3)
- 3.3 Read the extract below and answer the questions on it.

Bulk density is a comparison between mass (weight) and volume (space). The formula below is used to calculate and interpret bulk density of soils.

$$\text{Bulk Density} = \frac{\text{Mass of dry soil}}{\text{Volume of dry soil}} = \frac{\text{g}}{\text{cm}^3}$$

- 3.3.1 Calculate the bulk density of the following soil. The soil is 750g and it occupies a space of 500 cm³. Use the formula given to calculate the bulk density and show all your calculations. (3)
- 3.3.2 Determine if the bulk density is low or high and deduce if the soil is suitable for crop cultivation. (3)
- 3.4 The diagram below shows the movement of water and air in the soil. Study it carefully and answer the questions that follow



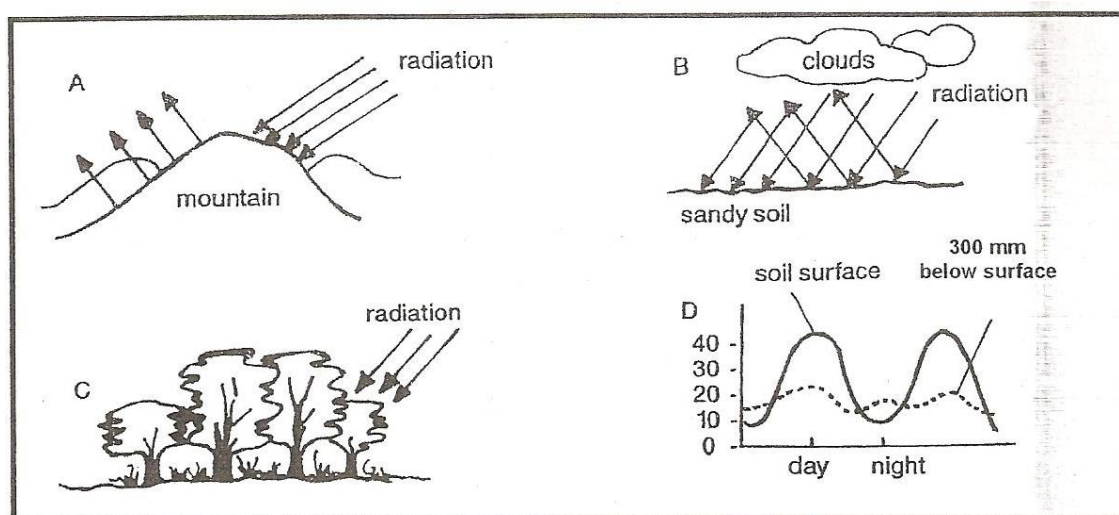
- 3.4.1 Explain briefly the difference in movement of water and air in sand and clay. (4)
- 3.4.2 Devise or formulate a way to increase the percentage of pore space in the top soil. (2)
- 3.4.3 Identify the type of soil water which result from the action taking place in point labelled A. (1)
- 3.4.4 Give any TWO forms of water present in the soil. (2)
- 3.5 Name the soil colour that you will associate with each of the following;

- 3.5.1 Presence of salts, or possibly quarts, or severe leaching. (1)
- 3.5.2 Oxidised iron minerals like haematite which indicate the presence of excess water and less oxygen. (1)
- 3.5.3 Patches or dots of two or more colours that suggests that the soil is waterlogged for part of the year. (1)

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QUESTION 4 SOIL SCIENCES

- 4.1 The diagram below illustrates the factors that influence soil temperature. Look at it carefully and answer the questions that follow



- 4.1.1 Identify the factors labelled A, B, C and D in the diagram. (4)
- 4.1.2 Describe TWO ways in which soil temperature can influence plant growth. (4)
- 4.2 The soil profile below represents a vertical section of the soil and reveals the different layers that make up the soil. The unique properties of each horizon allow us to identify and classify soil. Read the extract carefully and answer the questions that follow:

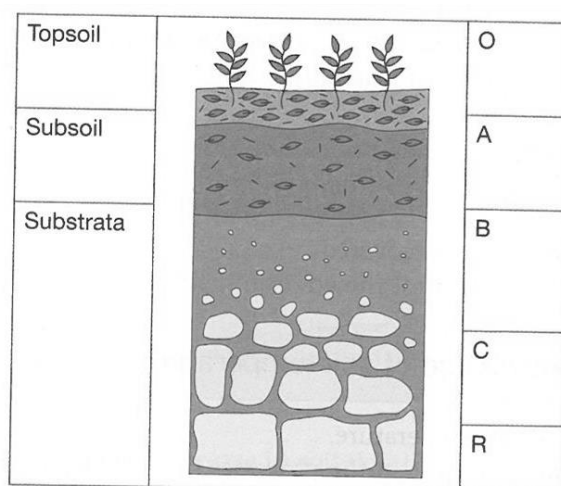


Figure 2 Master soil horizons

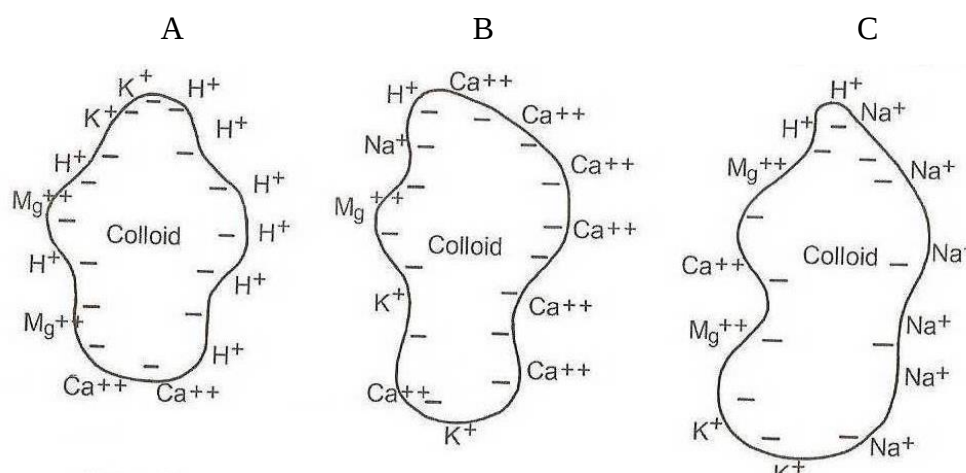
- 4.2.1 Identify the horizon which usually consists of a concentration of clay/ or iron, aluminium and manganese oxides. (1)
- 4.2.2 Briefly explain the properties of a G – horizon which is sometimes present in the soil profile. (2)
- 4.2.3 Give TWO reasons for the classification of soil. (2)
- 4.2.4 Name TWO levels of classes based on taxonomic soil classification system used in South Africa. (2)
- 4.3 Read the extract below and answer the questions that follow:

The environment in which the soil micro – organisms find themselves is determined by the physical and chemical properties of a soil. Soil is the growth medium for soil micro – organisms and supplies their living requirements.

- 4.3.1 Give TWO major groups of micro – organisms found in the soil. (2)
- 4.3.2 Name TWO beneficial effects of soil micro – organisms. (2)
- 4.3.3 Give the micro – organism that plays an important role in denitrification. (1)
- 4.4 Study the table below about soil components and answer the questions that follow:

Soil component	% total volume of soil
Rock particles	45
Organic matter	5
Air	25
Water	25
Living organisms	0, 01

- 4.4.1 Use the information in the table above to draw a bar graph showing the different percentages of the soil components. (6)
- 4.4.2 Give the soil component that makes up the most part of the soil as shown in the graph (1)
- 4.5 A soil colloid is a very tiny soil particle, less than 0,001 mm in size. According to the type of cation adsorbed to the colloid it will influence the pH.



- 4.5.1 Study the THREE illustrations of cations adsorbed to the soil colloid above and identify the acidity and alkalinity of each colloid labelled A and C. (2)
- 4.5.2 Tabulate the comparison between saline soils and sodic soils under the following: Surface appearance, pH condition, dominant salts and corrective measures. (6)

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TOTAL: [35]**TOTAL SECTION A: 45****TOTAL SECTION B: 105****GRAND TOTAL: 150**