Education and Sport Development

Department of Education and Sport Development
Departement van Onderwys en Sport Ontwikkeling
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NORTH WEST PROVINCE

PROVINCIAL ASSESSMENT

GRADE 11

AGRICULTURAL SCIENCES
JUNE 2017
EXAMINATION

MARKS: 150

TIME: 2 ½ HOURS

This question paper consists of 13pages.

Demo

NW/JUNE/AGRSC/ EMIS/6*******

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

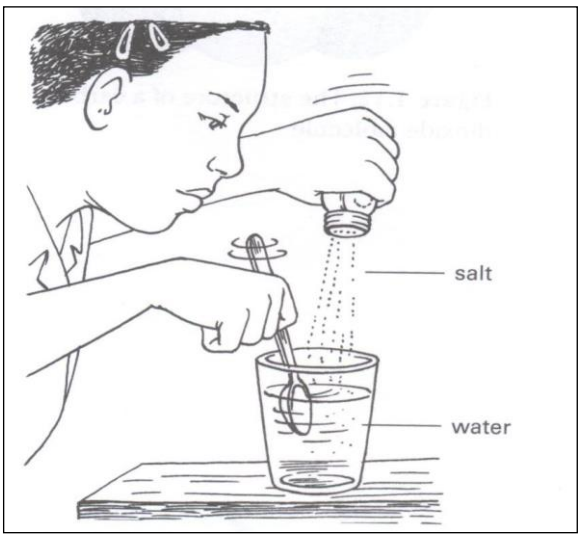
QUESTION 1

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 …is the smallest particle of matter that cannot be broken down further by chemical means.

A. molecule
B. matter
C. element
D. atom.

1.1.2 The diagram below illustrates water as a …



A. Water as a heat receptor
B. Water evaporating from a glass
C. Water is a very good solvent
D. Salt as a polysaccharide

1.1.3 A/ the …arranges elements accordingly to their atomic number so that those with the same properties are in the same column.

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

1.1.4 The symbol for Sodium is…

A. S

B. Na

C. K

D. Ne

1.1.5 Proteins are broken down into amino acids by…

A. hydrolysis

B. Oxidation

C. Dehydration

D. Dissociation

1.1.6 A vertical cut in the soil exposing the arrangement or succession of the horizontal layers

A. Soil structure

B. Soil horizon

C. Soil classification

D. Soil profile

1.1.7 A condition when the oxygen content of the soil is too low

A. Soil anaerobiosis

B. Waterlogged soil

C. Mottled soil

D. Crusted soil

1.1.8 The total volume occupied by pores per unit volume of soil and is calculated from bulk density and particle density

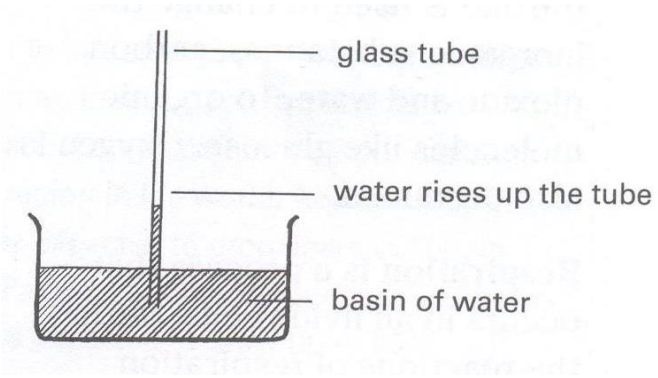
A. Soil density

B. Soil drainage

C. Porosity

D. Soil compaction

1.1.9 The following diagram illustrates…



A. Capillary action

B. Latent heat

C. Surface tension

D. Solvent.

1.1.10 The level of soil moisture at which water becomes unavailable to plants temporarily or permanently and this affects plant growth

A. Field water capacity

B. Wilting point

C. Soil water balance

D. Water potential.

[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	When one or more atoms lose (donate) electrons and other atoms gain (accept) them in order to produce noble gas configuration.	A. Ionic bond B. Covalent
1.2.2	Carbohydrates.	A. Supply energy and also as storage form of energy e.g. glygogen B. Form structural material for cell walls in plants. E.g. cellulose
1.2.3	Biomolecules which includes fats, oils and waxes	A. Proteins B. Lipids
1.2.4	The type of soil in which sodium and potassium ions predominates	A. Sweet soil B. Alkaline soil
1.2.5	The dark coloured, amorphous, colloidal matter from organic matter.	A. Humus B. Mottled soil

[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 The atoms which have the same atomic number but have different mass numbers.

1.3.2 The bond that links two monosaccharides together.

1.3.3 The relative quantities of sand, silt and clay in the soil.

1.3.4 The force that attracts a body towards the centre of the earth, or towards any other physical body having mass.

1.3.5 A systemic way of grouping soils into classes according to certain characteristics.

[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 Micro – elements are minerals that are needed in relatively large quantities by plants and animals.

1.4.2 Isotopes are molecules with the same molecular formula, but with different arrangements of atoms.

1.4.3 The reduction of nitrates to nitrites with the release of nitrogen gas is nitrification.

1.4.4 The amount of water a soil can hold after drainage has taken place is saturation point.

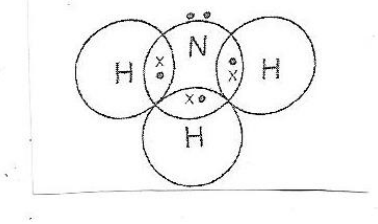
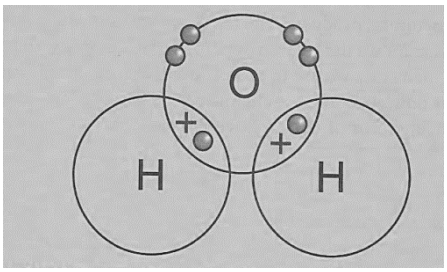
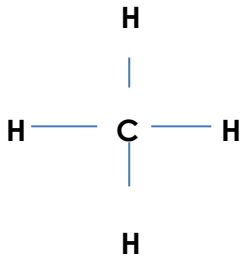
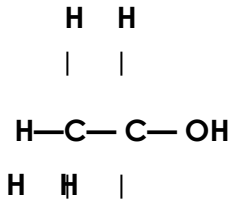
1.4.5 Chemicals which have a pH less than 7 are bases.

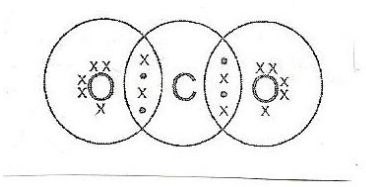
[5 x 1 = 5]

TOTAL SECTION A: 45

SECTION B

QUESTION 2: BASIC CHEMISTRY

A 	**B** 
C 	**D** 

E 	

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

2.1.1 Name the compounds labelled A, B, C, D and E. (5)

2.1.2 Identify the type of bond involved in binding the molecules in compound B and explain the charge (3)

2.1.3 When compound labelled E in the table above is high in the atmosphere, the atmospheric temperature rises and that is known as… (2)

In Nigeria and other parts of Africa, bio – gas is produced from animals waste when it decays in the absence of oxygen. The gas is used for heating, cooking and lighting. It is commonly known as "Natural gas" or marsh gas and is classified as an alkane. It is also found in mines where it is extremely dangerous.

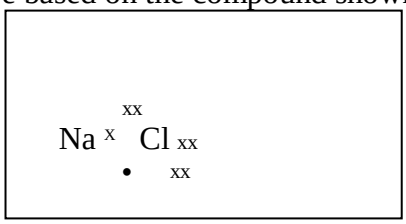
2.2. Study the Case study below and answer the questions that follow:

2.2.1 Give the general name of the gas mentioned above in the case study. (1)

2.2.2 Provide the molecular formula of the gas mentioned in 2.2.1 above. (1)

2.2.3 Give any TWO properties of the gas mentioned in the case study. (2)

2.3 The following questions are based on the compound shown below:



2.3.1 Name the compound (1)

2.3.2 Write down the formula of this chemical compound. (1)

2.3.3 Identify the type of chemical bonding involved in binding the atoms in the compound shown above and explain the charge. (3)

2.4 An atom of an element $_{40.08}Ca^{20}$

2.4.1 Briefly name and explain the numbers 20 and 40.08 in the element. (6)

2.4.2 Give the number of protons, neutrons and electrons in this atom. (3)

2.4.3 State the name of the element represented by the symbol Ca. (1)

2.5 Read the extract below and answer the questions that follow:

> *Atoms or molecules are sometimes positively or negatively charged. This is a state of electrical imbalance, which nature will try to cancel out. Atoms with a charge are called ions. Liquids are either acidic or basic. Distilled water is an exception in this case.*

2.5.1 Differentiate between acids and bases. (6)

[35]

QUESTION 3

BASIC CHEMISTRY

3.1 Study the structural formulae of organic compounds below and answer the questions that follow

Figure 1: Diagram A

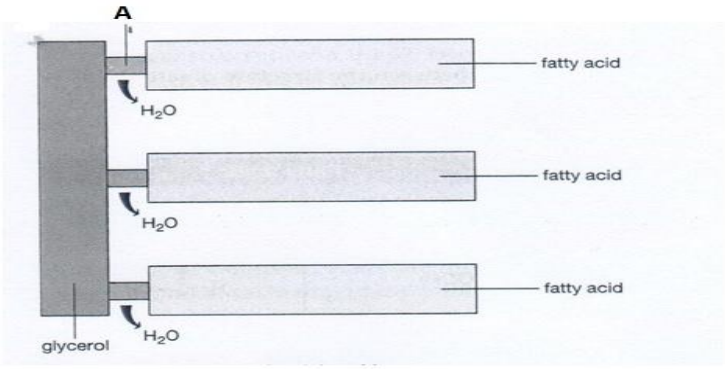
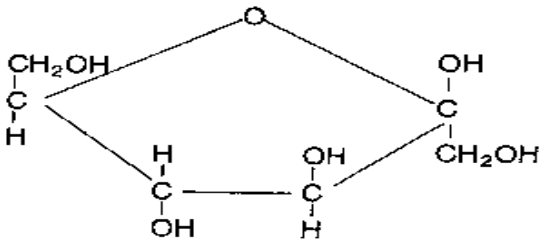


Figure 2: Diagram B



3.1.1 Identify the bond joining the fatty acids to the glycerol in diagram A. (1)

3.1.2 Name the process or reaction taking place when water is removed to bind the fatty acids to the glycerol in diagram A. (1)

3.1.3 Identify the compound illustrated in diagram B. (1)

3.1.4 Give the chemical formula for the compound mentioned in 3.1.3. (1)

3.2 Read the following information about an experiment that was conducted and answer the questions that follow:

An experiment conducted to prove the reaction between acids and bases
The following were used in the experiment: Glass beaker, tablespoon, water – warm and not hot, vinegar, baking soda, pH meter or scale and pH indicator such as litmus paper strips.
Method:
Warm water poured half full in the glass beaker, pH meter or litmus paper strip used to determine the pH of water in the glass beaker. Then 1 – 2 tablespoons of baking soda put in the water to make concentrated solution, pH of the solution determined and recorded. In the same solution, a spoon of vinegar poured.

Source: Shuters Top Class. Agricultural Sciences grade 11

The table below displays a reaction process that may take place between baking soda and vinegar after observation:

Chemical formula	(a)	$NaHCO_3$	CH_3COONa	H_2O	(d)
Compound/ substance	Acetic acid	(b)	Sodium Acetate	(c)	Carbon dioxide

3.2.1 Provide the labels for the letters a, b, c and d on the table above. (4)

3.2.2 Give the possible pH reading of water before pouring any substances used in the experiment. (1)

3.2.3 Suggest the pH of the water after adding baking soda. (1)

3.2.4 Name the salt produced during this reaction. (1)

3.3 Read the Case Study below and answer the questions that follow:

"**Cut back on fat and cholesterol**"

Many people or maybe most of the people try to make the best health choices they can. Some want to cut down all fat, or just saturated fat, or certainly cholesterol or calories in general. Chicken is probably regarded as being lower in cholesterol than beef and pork is the "other white meat". The question is "how much better is chicken compared to beef'.

Research shows that heart attacks can be linked to the amount and type of fat a person eats. When a person eats lots of saturated solid fats, the amount of cholesterol in the blood will increase. High cholesterol levels in the blood vessels lead to hard fatty materials being deposited in the blood vessels causing them to become blocked. This may result in heart attacks. Interestingly, liquid, unsaturated fats or oils actually decrease cholesterol levels. So, in order to reduce the risk of having high cholesterol levels and heart attacks, people are recommended to reduce the total fats in their diets to replace saturated fats with unsaturated fats. Fat is an important part of a healthy diet.

Table: Fat content of different meats. Source: USDA – google search

3.3.1 Draw a bar graph to compare the total fat and the saturated fat content of different meat

Meat	Total fat (g/ 100g)	Saturated fat (g/ 100g)	Cholesterol (mg/ 100g)
Beef (ground sirloin)	13g	5g	9, 6 mg
Pork (pork sirloin)	8 g	3g	104 mg
Poultry (bone – less, skin less chicken breast)	4g	1g	96 mg
Fish (Salmon steak)	7 g	1g	62 mg

types in the table above. (6)

3.3.2 Deduce form the case study, two negative effects of the high consumption of fats in human health. (2)

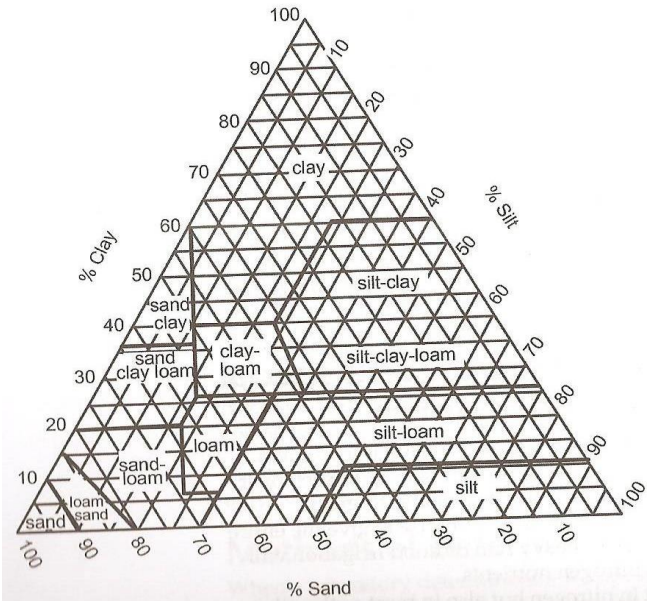
3.3.3 Explain the concept "cholesterol". (2)

3.3.4 Tabulate the difference between fats and oils. (4)

SOIL SCIENCES

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

Letter	**Clay %**	**Sand %**	**Silt %**	**Texture class**
A	20	60	20	
B	30	45	25	
C	15	75	10	
D	30	30	40	
E	50	30	20	



3.4.1 Give the texture class represented by the letters A – E (5)

3.4.2 Provide the soil textural class or type in Question 3.1.1 which will be associated with the following:

(a) The soil with high water capacity. (1)

(b) Identify the soil textural class in the table which will be suitable for crop production (1)

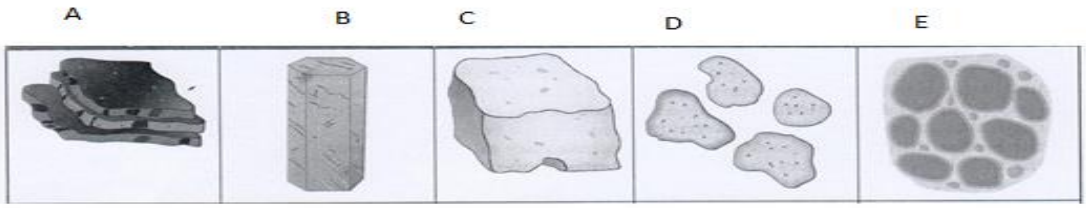
(c) If you slightly mix this soil textural class with water and form a sausage, it will bend a little before cracking. (1)

3.5 Give TWO important reasons for a farmer to know the textural class of his/ her farm. (2)

[35]

QUESTION 4

4.1 The following table shows types of soil structure based on shape of structural unit. Study it carefully and answer the questions that follow:



4.1.1 Identify the soil structures labelled A, B, C and D. (4)

4.1.2 List any TWO factors that may influence the developments (formation) and stability of soil structure. (2)

4.2 Suppose the soil in a bowl weighs 850 g oven dry and that soil has a volume of 520 cm^3. Calculate the bulk density of the soil given. Show all your calculations. (3)

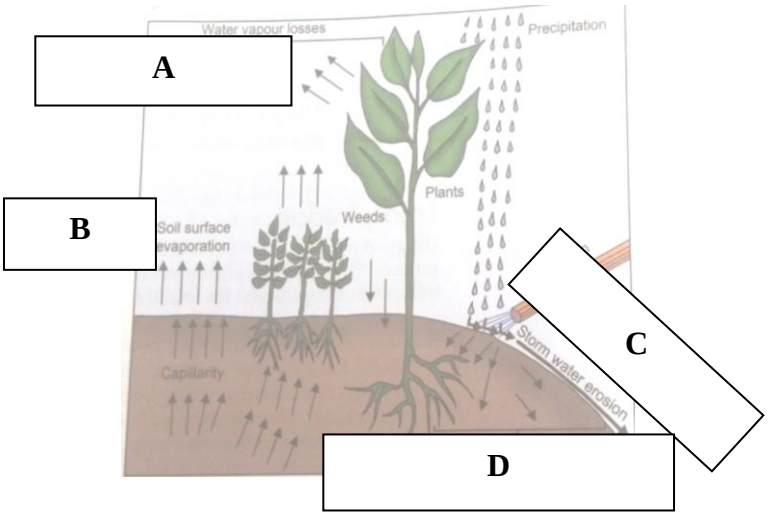
4.3 Briefly explain the relationship between bulk density and porosity. (2)

4.4 Name the soil colour that you would associate with each of the following:

4.4.1 Patches or dots of two or more colours that suggest that the soil is waterlogged for part of the year. (1)

4.4.2 The iron compounds undergone chemical change in the presence of much moisture and a shortage of oxygen. (1)

4.5 The diagram below illustrates the loss of water that can occur in nature. Look at it carefully and answer the questions that follow:



4. 5.1 Identify the type of soil water losses labelled A – D in the diagram above. (4)

4.5.2 Give TWO measures to reduce the water loss in each of the losses labelled A and C in the diagram. (4)

4.6 Study the following soil profiles and answer the questions that follow. Write only the letter of the correct answer next to the question number on your answer sheet.

A	B	C	D	E
A C	A B C R	A R	A G C	B C

4.6.1 Identify a soil profile that represents the most adult soil. (1)

4.6.2 Name a soil profiles with the youngest soil development. (1)

4.6.3 Suggest a soil profile that would have a shortage of oxygen for growing plants. (1)

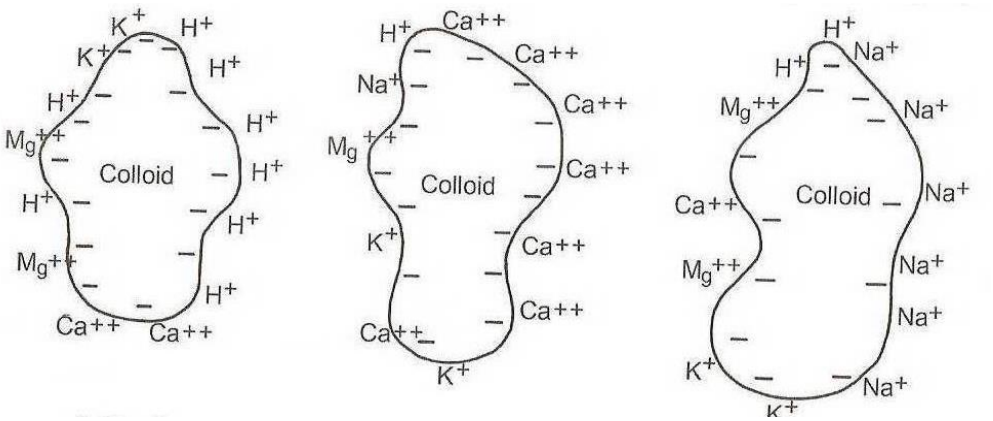
4.7 The binomial soil classification system is a classification into soil series.

4.7.1 Name the main determining factor used to classify the soil into forms. (1)

4.7.2 Name TWO soilcharacteristics that are used for series classification (2)

4.8 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.

A B C



4.8.1 Study the THREE illustrations of cations adsorbed to the soil colloid above and identify the acidity and alkalinity of each colloid labelled A and B. (2)

4.8.2 Tabulate the comparison between saline soils and sodic soils under the following: Surface appearance, pH condition, dominant salts and corrective measures. (6)

[35]

TOTAL: [35]

TOTAL SECTION A: 45

TOTAL SECTION B: 105

GRAND TOTAL:150