



education

Department:
Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 11

AGRICULTURAL SCIENCE P1

NOVEMBER 2007

MARKS: 150

TIME: 2 hours

This question paper consists of 13 pages and 1 answer sheet.

INSTRUCTIONS AND INFORMATION

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

SECTION A**QUESTION 1**

1.1 Various possible options are provided as answers to the following questions. Choose the correct answer and make a cross (X) over the appropriate letter (A – D) next to the question number (1.1.1 – 1.1.10) on the attached answer sheet.

1.1.1 Which ONE of the following gives the best description of water?

- (i) Two hydrogen atoms and one oxygen atom
- (ii) Bonding is covalent
- (iii) Slightly positive at the oxygen end
- (iv) Most effective solvent

- A (i), (ii) and (iii)
- B (ii), (iii) and (iv)
- C (i), (ii) and (iv)
- D (i), (iii) and (iv)

1.1.2 The only group of soil organisms that contains chlorophyll is ...

- A protozoa.
- B actinomycetes.
- C algae.
- D fungi.

1.1.3 Most of the plant nutrients are absorbed by the ...

- A root hair region.
- B cell division and elongation region.
- C whole root tip.
- D the root cap.

1.1.4 Which ONE of the following is NOT an advantage of hydrogenation of unsaturated fats?

- A Change the consumption of animal fats to the staple part of the diet
- B Change plant oils into a more acceptable and usable hardened form
- C Conversion of oil into a fat
- D Margarine is made by hardening of oil

1.1.5 The fixation process of organic nitrogen compounds in soil to ammonia microbes, is called ...

- A photosynthesis.
- B denitrification.
- C ammonification.
- D nitrogen fixation.

- 1.1.6 This method of irrigation can easily cause the wash-away of soil:
- A Cannon spray irrigation
 - B Flooded irrigation
 - C Sprinkler irrigation
 - D Centre pivot irrigation
- 1.1.7 When a farmer practises mulching, it results in ...
- A an increase in water infiltration.
 - B an increase in evaporation losses.
 - C the weakening of soil structure.
 - D a fluctuation in soil temperature.
- 1.1.8 The danger of soil brackishness is greatest when there is a high concentration of ... in the soil.
- A hydrogen
 - B sodium
 - C nitrogen
 - D magnesium
- 1.1.9 The pH of an acid soil can be corrected by the application of ...
- A farm manure.
 - B superphosphate.
 - C LAN.
 - D agricultural lime.
- 1.1.10 The binomial soil classification system used in South Africa contains a broad, more general level regarding ... and a lower, more specific level regarding ...
- A soil forms; soil series.
 - B horizons; soil series.
 - C soil forms; soil horizons.
 - D soil profiles; horizons.
- (10 x 2) (20)

1.2 In the table below, a statement and two answers are given. Decide whether the statement in COLUMN B relates to ONE, BOTH or NONE of the answers in COLUMN A. Choose the correct answer and make a cross (X) in the appropriate block next to the question number (1.2.1 – 1.2.5) on the attached answer sheet.

EXAMPLE:

COLUMN A	COLUMN B
A: O-horizon B: C-horizon	Contains solid rock

ANSWER:

The statement refers to:			
ONLY A	ONLY B	A and B	NONE
X	X		

COLUMN A	COLUMN B
1.2.1 A: Emulsion B: Hydrophobic	When both materials in a colloidal system are liquids, for example oil and water
1.2.2 A: Eight electrons B: Four valence electrons	Structure of carbon dioxide
1.2.3 A: Nitrates B: Calcium	Nutrients added to the soil during thunderstorms
1.2.4 A: Nitrification B: Denitrification	Reduction of nitrates and nitrites with the release of nitrogen gas and sometimes small quantities of nitrogen oxide
1.2.5 A: Ferric form B: Yellow, brown and rusty	Mineral rich rocks exposed to oxygen

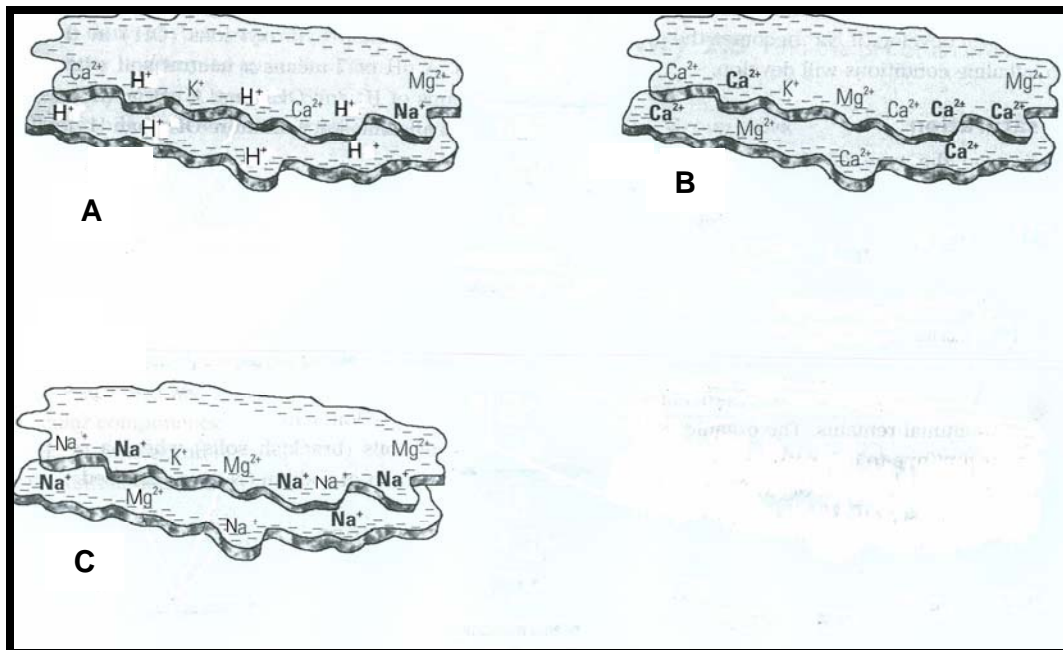
(5 x 2) (10)

1.3 Change the underlined word/term to correct EACH of the statements given below. Write only the correct word/term next to the question number (1.3.1 – 1.3.10) on the attached answer sheet.

- 1.3.1 Glucose is nitrogen containing organic compounds with an amino group and a carboxyl group.
- 1.3.2 Colloidal particles absorb ions to their surface.
- 1.3.3 Scientists have shown that gases like carbon and nitrogen oxides are the main cause of acid rain.
- 1.3.4 In emulsions the dispersed particles are larger than ordinary molecules, but not large enough to settle under the influence of gravity.
- 1.3.5 Older plants of the same species will take longer to decay in soil than younger plants, because they contain more cells than the younger ones.
- 1.3.6 The subsoil is the layer between the topsoil and the subsoil.
- 1.3.7 The mass of the soil sample divided by the total volume of the soil sample is known as the veld water capacity.
- 1.3.8 Silt particles are larger than fine sand.
- 1.3.9 The illuvial horizon is where mobilisation and migration of iron and aluminium from the A-horizon to the B-horizon takes place.
- 1.3.10 Drainage is the artificial removal of the excess capillary water from the root zone.

(10)

1.4 Refer to the illustration below and answer the following questions next to the question number (1.4.1 – 1.4.2) on the attached answer sheet:



1.4.1 Use the illustration above to identify the colloidal condition of EACH of the illustrated colloids. (3)

1.4.2 Give an indication of what the pH reading of colloid A and colloid C would be according to the pH scale or pH meter. (2)
[45]

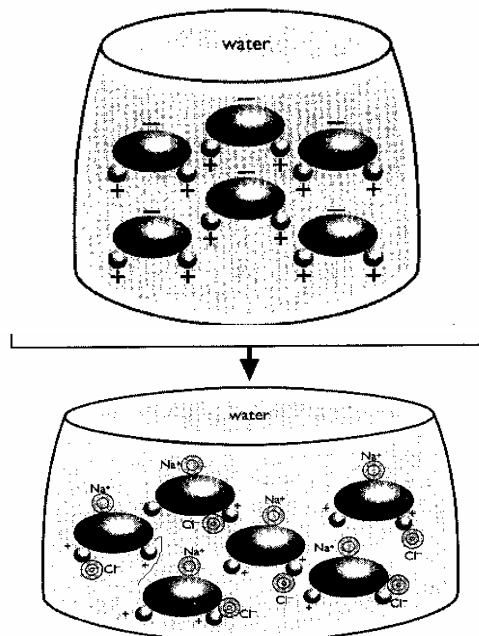
SECTION B

Start EACH question in this section on a NEW page.

QUESTION 2: BASIC CHEMISTRY

- 2.1 Aqua means water in Latin. An aqueous solution is a water solution. Water has various chemical properties that benefit agriculture.

Answer the following question on some of the chemical properties of water:



Identify the characteristic of water shown in the figure above and explain it in detail. (6)

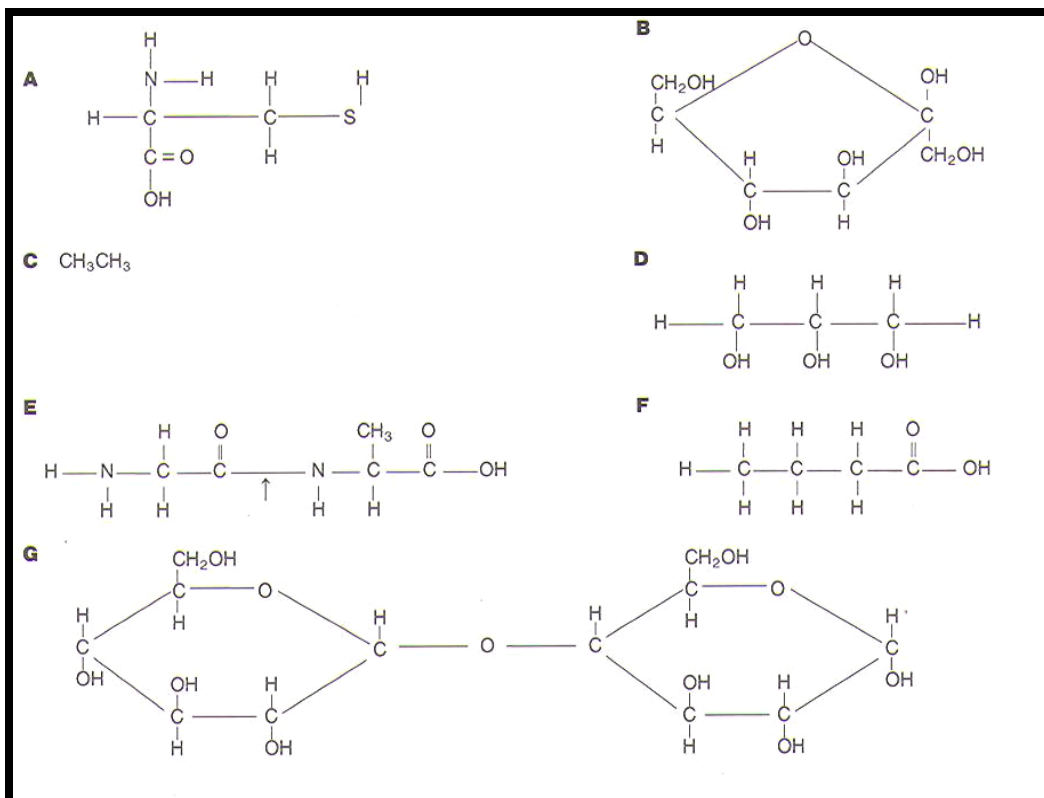
- 2.2 Answer the following questions in connection with colloidal systems:

2.2.1 What will happen to the colour of muddy river water that ends up in the sea? Briefly explain your answer. (3)

2.2.2 Identify the type of solution if the river is still flowing. (2)

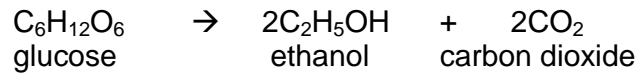
2.2.3 Differentiate between *homogeneous* and *heterogeneous* mixtures. (4)

- 2.3 The following structural formulae represent organic compounds. Carefully observe each one and answer the questions that follow. Write only the letter (A – G) next to the question number (2.3.1 – 2.3.6) in your answer book. (A formula may be used more than once.)



- 2.3.1 Identify an alkane. (1)
- 2.3.2 Name TWO monomers of a fat molecule. (2)
- 2.3.3 Identify a monomer of the protein which is found in wool fibre. (1)
- 2.3.4 Name the monomer of carbohydrates. (1)
- 2.3.5 Name the process by which compounds E and G are formed. (2)
- 2.3.6 Name the products which are formed in the case of structure E. (2)
- 2.4 Carbohydrates are divided into different classes. Name the THREE classes and give an example of each. (6)

2.5 Study the chemical reaction below and answer the following questions:



2.5.1 What type of company will make use of this reaction? (1)

2.5.2 Briefly describe how the above reaction takes place. (2)

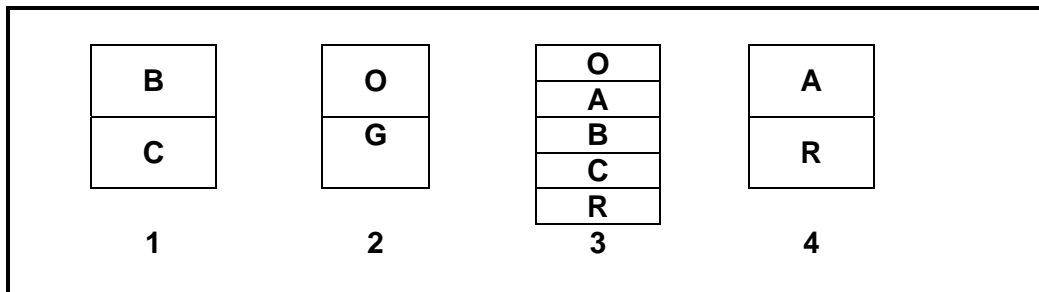
2.5.3 What will happen if the ethanol is exposed to air? (2)

[35]

QUESTION 3: SOIL SCIENCE: CLASSIFICATION, PROFILE AND CHARACTERISTICS

3.1 Soil classification is essential if optimum production is to be achieved. Justify this statement by indicating TWO reasons why this statement is TRUE. (4)

3.2 The illustrations below indicate some soil horizon combinations that are found in soil profiles. The present horizons of a soil profile usually indicate the history or shortcomings of a soil. Identify profiles 1 to 4, based on present horizons.



(4)

3.3 There are two neighbouring sugar cane farms. The table below shows the physical soil characteristics on both farms:

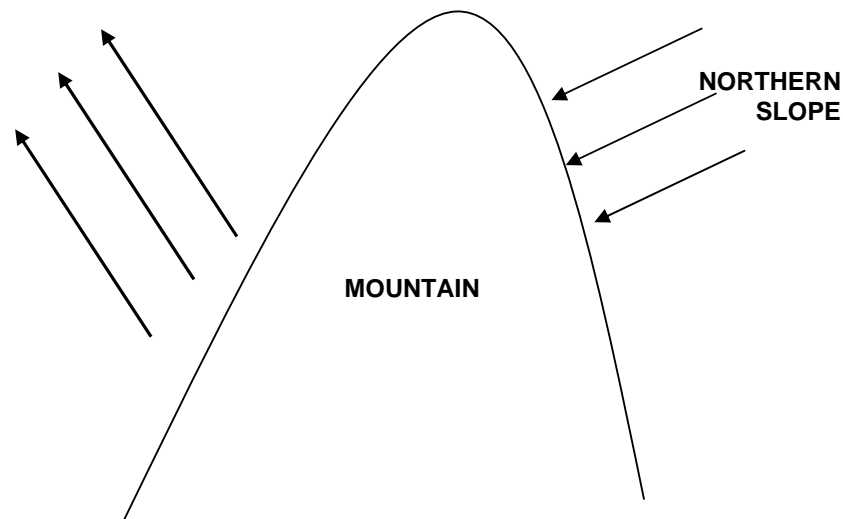
PHYSICAL SOIL CHARACTERISTICS	FARM A	FARM B
Structure	prismatic	granular
Soil depth	shallow – 600 mm	deep – 900 mm
Colour	bluish grey	brown black

3.3.1 Which farm is likely to hold more water in its soil? Give reasons for your answer. (2)

3.3.2 Which farm will have a soil that is prone to waterlogging? Give reasons for your answer. (2)

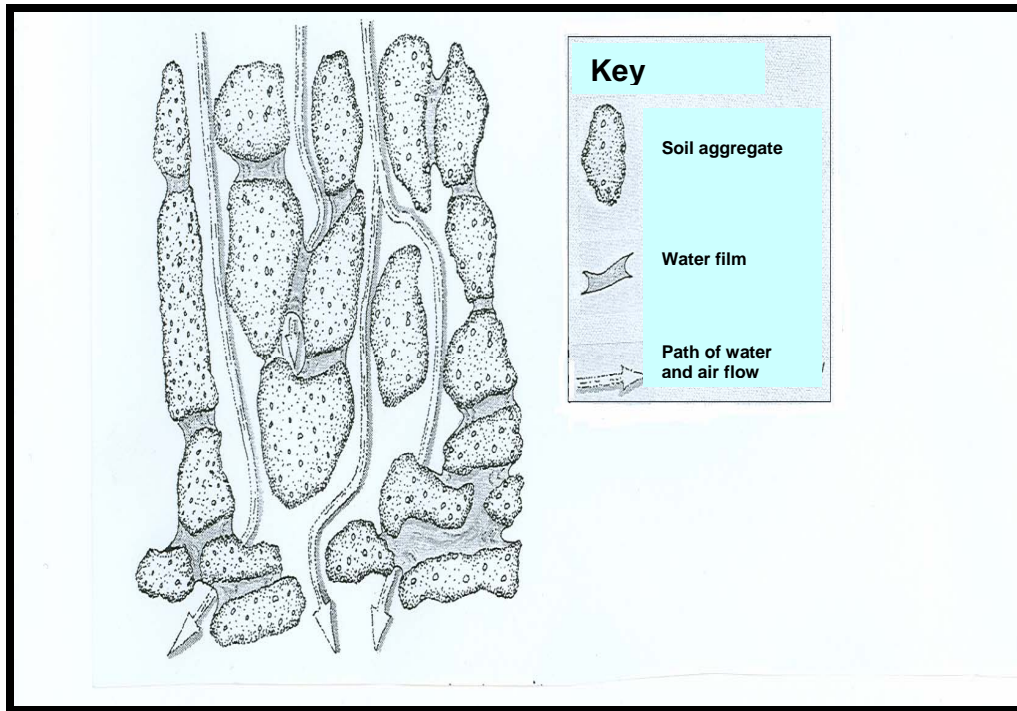
3.3.3 Identify the farm which will have a higher infiltration rate. (1)

- 3.3.4 Which ONE of the two farms, do you think, has soil with the highest production potential? (1)
- 3.3.5 Provide FOUR reasons for your answer to QUESTION 3.3.4. (4)
- 3.4 Colour is the direct indication of the conditions under which a soil develops. It can also be used to describe and classify soil.
- Name THREE factors that can influence the soil colour. (3)
- 3.5 The diagram below illustrates the influence of slope on soil temperature:



- 3.5.1 Why will the ground/soil on the northern slope have warmer temperatures? Explain your answer. (4)
- 3.5.2 Predict how this will affect the ripening of crops. (2)
- 3.5.3 What can you conclude from crops grown on the southern slope? (2)

3.6 The diagram below shows the movement of water and air in soil:



3.6.1 In which type of soil will you usually find pores with a balance between water movement and aeration? (1)

3.6.2 How does water movement and air flow differ in sand and clay? (3)

3.6.3 What will you do to increase the percentage of pore space in the topsoil? (2)
[35]

QUESTION 4: SOIL SCIENCE: CHEMICAL, COLLOIDAL AND MICROBIOLOGY

4.1 Complete the table below by comparing saline and black brack soils. Copy the table in your answer book and complete it.

	SALINE SOILS	BLACK BRACK SOILS
pH condition		
Dominant salts		
Surface appearance		
Effect of the soil on plant growth		

(2)
(2)
(2)
(6)

4.2 Distinguish between *active* and *reserve/residual* acidity. (3)

- 4.3 Micro-organisms are very important in nature as well as in our lives. In agriculture they are significant for their influence on soil properties and their functions in soil. Support this statement by stating SIX functions that are performed by micro-organisms in soil. (6)
- 4.4 Apart from the physical influence organic matter has on soil, it also has an important chemical influence on soil. Briefly discuss THREE chemical influences of organic matter on soil. (6)
- 4.5 Soil colloids can be divided into TWO groups. Briefly explain the contrast between them by referring to the following in table form:
- | | | |
|-------|--------------|-----|
| 4.5.1 | Examples | (2) |
| 4.5.2 | Shape | (2) |
| 4.5.3 | Charge | (2) |
| 4.5.4 | Surface area | (2) |
- [35]**

TOTAL SECTION B: 105

GRAND TOTAL: 150

NAME: _____

ANSWER SHEET

SECTION A

QUESTION 1

1.1

1.1.1	A	B	C	D
1.1.2	A	B	C	D
1.1.3	A	B	C	D
1.1.4	A	B	C	D
1.1.5	A	B	C	D
1.1.6	A	B	C	D
1.1.7	A	B	C	D
1.1.8	A	B	C	D
1.1.9	A	B	C	D
1.1.10	A	B	C	D

(10 x 2) (20)

1.3

- 1.3.1 _____
- 1.3.2 _____
- 1.3.3 _____
- 1.3.4 _____
- 1.3.5 _____
- 1.3.6 _____
- 1.3.7 _____
- 1.3.8 _____
- 1.3.9 _____
- 1.3.10 _____

(10)

1.2

	ONLY A	ONLY B	A and B	NONE
1.2.1				
1.2.2				
1.2.3				
1.2.4				
1.2.5				

(5 x 2) (10)

1.4

- 1.4.1 _____
- _____
- _____

(3)

1.4.2

- _____
- _____

(2)

TOTAL SECTION A: 45