



# education

---

Department:  
Education  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 11**

**AGRICULTURAL SCIENCES/P1**

**EXEMPLAR 2007**

**MARKS: 150**

**TIME: 2 hours**

**This question paper consists of 12 pages and a 1-page 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 to 4) must be answered in the ANSWER BOOK.
4. Start each question from 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 systems used in this question paper.
7. Write neatly and legibly.

**SECTION A****QUESTION 1**

1.1 Various possible options are provided as answers for the following questions. Choose the correct answer by drawing 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 A micro-organism that plays an important role in nitrification:

- A Pseudomonas
- B Fungus
- C Rhizobium
- D Nitrobacter

1.1.2 The group of elements usually occurring in proteins:

- A C, P, Ca and Mg
- B C, H, O and P
- C C, Si, N, O and H
- D C, H, Mg and Zn

1.1.3 A high bulk density does NOT occur in ...

- A fine sandy soil.
- B single grain soil.
- C soil with a high organic/humus content.
- D soil which is continuously cultivated.

1.1.4 Water movement will be the slowest but have the greatest height in a ...

- A clay soil.
- B loam soil.
- C sandy soil.
- D sandy loam soil.

1.1.5 When a solution becomes acid, the pH value will ...

- A increase.
- B remain constant.
- C first increase and then decrease.
- D decrease.

1.1.6 The organic colloid ...

- A has a round shape.
- B has a small specific area.
- C cannot be destroyed.
- D has no fixed shape.

1.1.7 Which ONE of the following is NOT a characteristic of sandy soil?

- A Highly fertility
- B High water-absorption capacity
- C High drainage
- D Easy to cultivate

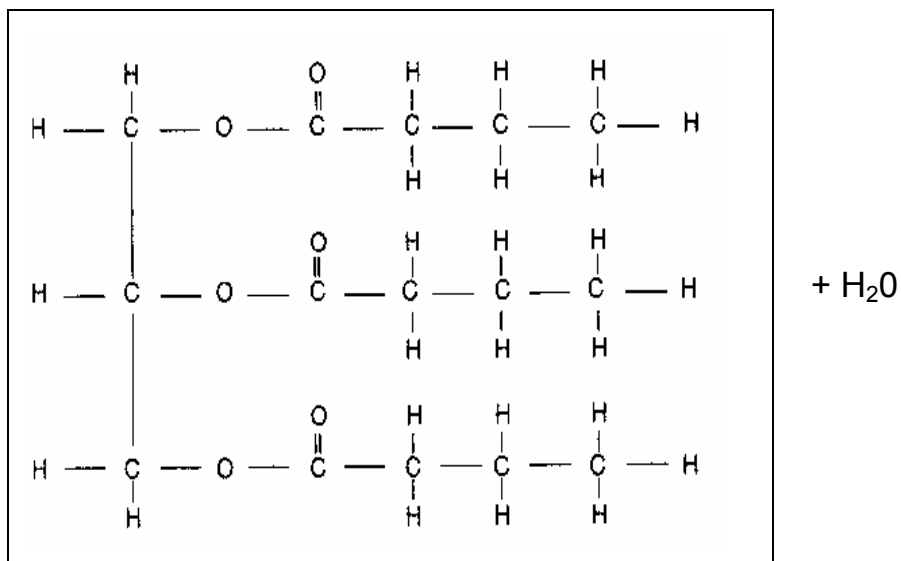
1.1.8 The brownish colour of muddy water is an example of

- A a mixture.
- B a solution.
- C a colloidal dispersion.
- D an emulsion.

1.1.9 The cation that is attracted with the weakest force by the colloids and is the easiest to remove during cation exchange:

- A Calcium
- B Sodium
- C Nitrogen
- D Aluminium

1.1.10 The process and the products formed if the following compound is synthesised:



- A Hydrolysis, dextrin and glucose.
- B Hydrolysis, fatty acids and alcohols
- C Condensation, glycerol and fatty acids
- D Condensation, amino acids and three fatty acids (10 × 2) (20)

- 1.2. Choose an item from COLUMN B that matches a description in COLUMN A. Write only the letter (A - E) next to the question number (1.2.1 - 1.2.5) on the answer sheet, for example 1.2.6 F.

COLUMN A		COLUMN B
1.2.1	Polysaccharide is a common carbohydrate	A Micro pores
1.2.2	The greatest portion of free water is inaccessible to plants	B Organic matter
1.2.3	During the night heat radiation increases to a large extent	C Glucose
1.2.4	Colloid dispersion with the same charge	D Deflocculation
1.2.5	Soils that have a fine texture are poorly aerated	E Macro pores

(5 × 2)

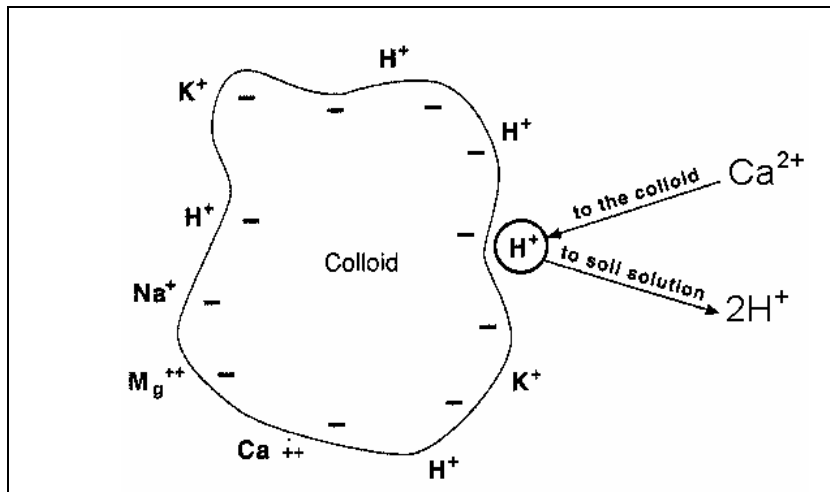
(10)

- 1.3 Supply the correct term or concept for each of the following descriptions on the attached answer sheet.

- 1.3.1 A soil fraction that has a diameter of 0,02 to 0,002 mm
- 1.3.2 The amount of water a soil can hold after drainage has taken place
- 1.3.3 An atom that has obtained an electrical charge due to the gain or loss of an electron
- 1.3.4 Unicellular micro-organisms that are probably the simplest form of animal life
- 1.3.5 Polysaccharides that occur in the woody part of older plants
- 1.3.6 Organisms that are able to produce their own food
- 1.3.7 The compound product between two molecules of glucose
- 1.3.8 The mineral present in red soils
- 1.3.9 The form in which carbohydrates are stored in the animal body
- 1.3.10 A weathering process that is brought about by the freezing action of water

(10)

- 1.4 Answer the questions that follow regarding the representation of cation exchange in the figure below. Write the answers in the space provided on the answer sheet.



- 1.4.1 Indicate the cation which is adsorbed by the soil solution. (1)
- 1.4.2 All cations tend to be adsorbed around the colloid of certain types of soil. Identify the type of cation that is predominantly adsorbed around the colloid of the following types of soil:
- (a) Acid soil (low pH)
- (b) Sweet soil (neutral pH) (2)
- 1.4.3 Briefly explain how the cation exchange takes place between the two cations. (2)

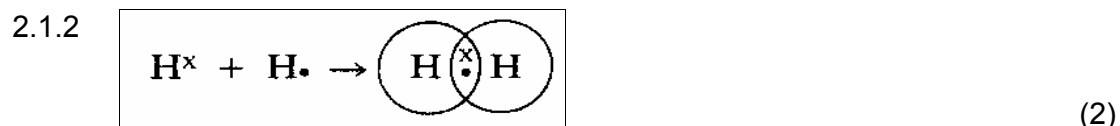
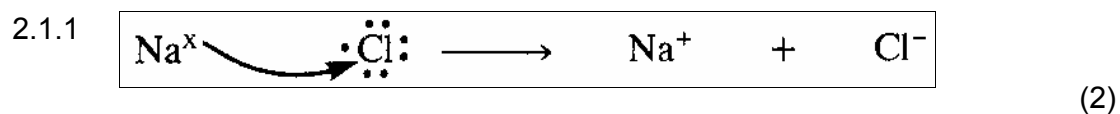
**TOTAL SECTION A: 45**

**SECTION B**

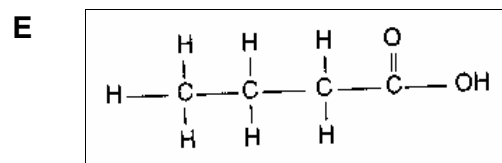
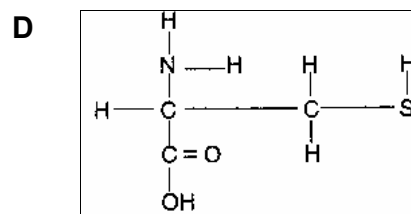
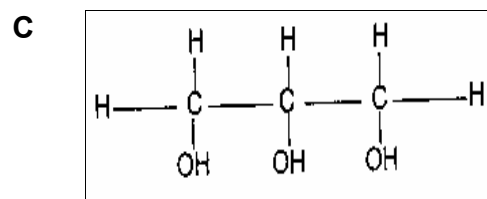
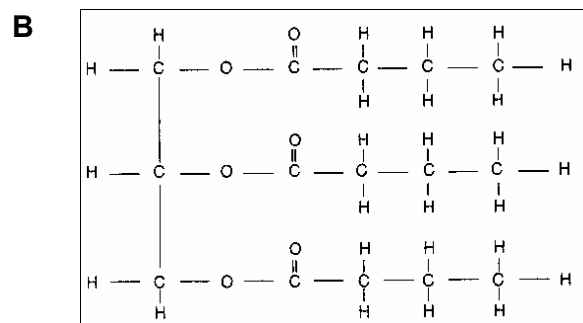
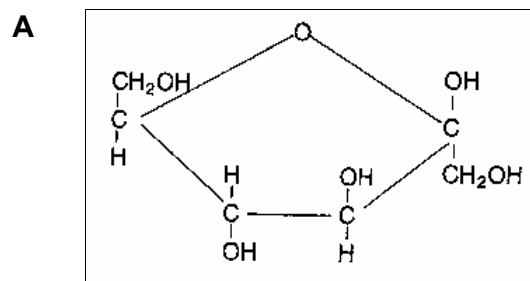
Start this question on a NEW page of your ANSWER BOOK.

**QUESTION 2: BASIC CHEMISTRY**

- 2.1 Below are two different types of electrovalent bonds. Identify the TWO types of electrovalent bonds and briefly explain your answer.



- 2.2 The following structural formulae represent organic compounds. Study them and answer the questions that follow:



- 2.2.1 Identify the structures A, B, C, D and E. (5)

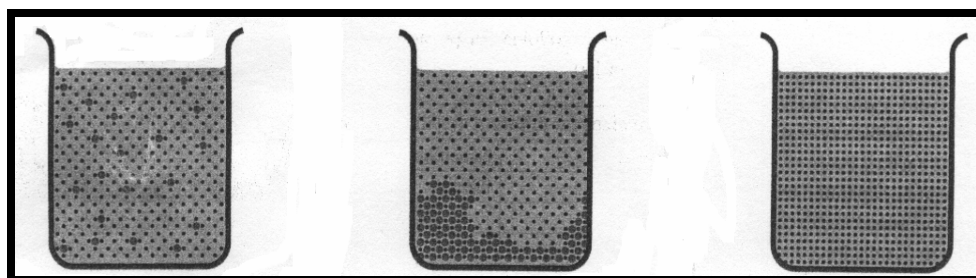
- 2.2.2 Name the monomers of the organic compound in B. (2)

2.2.3 Which of the structural formulae is a monomer of carbohydrates? (2)

2.2.4 Name FOUR examples of common carbohydrates. (4)

2.2.5 Give the functional groups of the structural formulae D and E. (4)

2.3 Solutions play a very important role in the agricultural industry. Study the different types of solutions as indicated below and answer the questions that follow:



A

B

C

2.3.1 Identify the solutions numbered A, B, and C. (3)

2.3.2 In which glass beaker will a beam of light pass through? (2)

2.3.3 Identify and describe the effect of the observation made in QUESTION 2.3.2. (3)

2.3.4 Which glass beaker indicates a flocculated phase? (2)

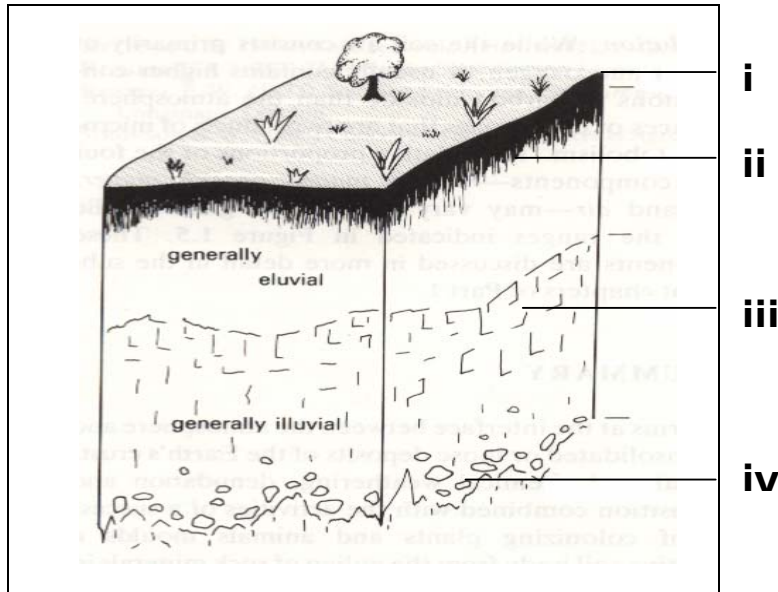
2.3.5 What will happen in solution A if a solute like hydrochloric acid is added. (4)

**[35]**



**QUESTION 3: SOIL SCIENCE: CLASSIFICATION, PROFILE AND CHARACTERISTICS**

- 3.1 The soil profile illustrated below represents a vertical section of the soil and reveals the different layers that make up the soil. The unique properties of each horizon also allow us to identify and classify a soil. Answer the questions that follow:



- 3.1.1 Name the layers labelled i, ii, iii and iv as indicated on the diagram. (4)
- 3.1.2 Briefly explain the terms *eluvial* and *illuvial* as indicated on the diagram. (4)
- 3.1.3 Name the characteristics of layer ii. (3)
- 3.2 Soil is an important factor in sustainable agriculture. Advise a farmer by supplying FOUR factors that play an important role in the formation of soil. (4)
- 3.3 To be a successful farmer, you need to know more about your soils. State ONE reason why soil classification is important in agriculture. (2)

- 3.4. The table below gives soil temperature readings at two different depths (soil surface and at 20 cm) taken from 06:00 until 18:00 in the evening:

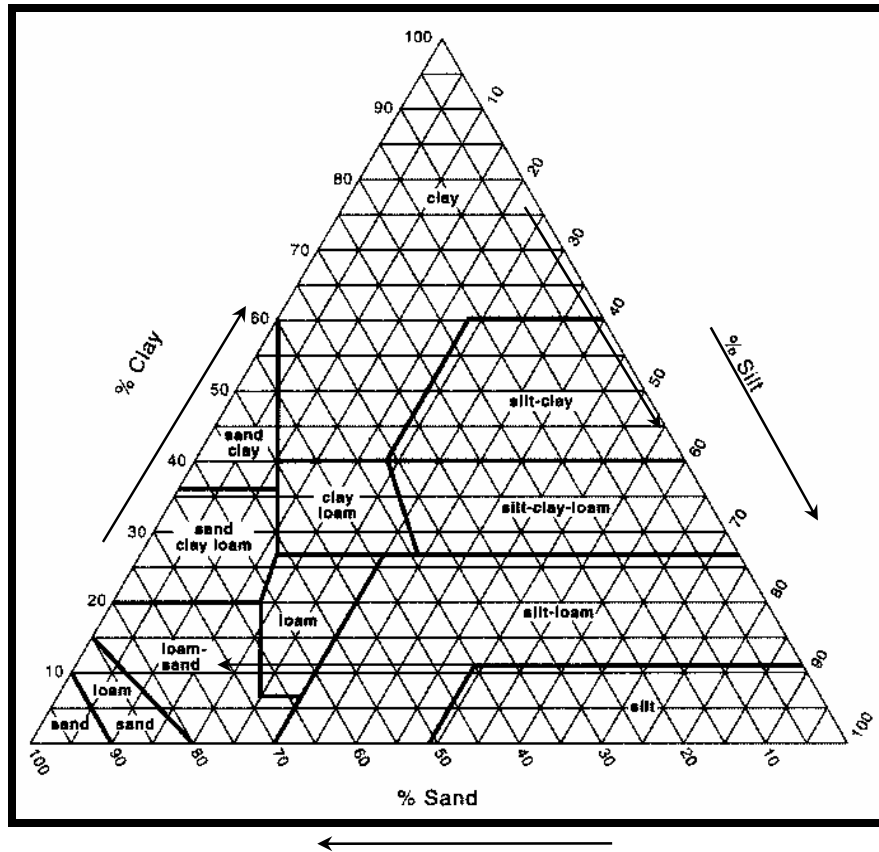
Time	Surface	20 cm depth
06:00	8°C	4°C
08:00	9,5°C	4°C
10:00	14°C	4,5°C
12:00	21°C	11,5°C
14:00	26,5°C	16°C
16:00	23,5°C	17,5°C
18:00	19°C	15,5°C

- 3.4.1 Plot the above-mentioned information on a diagram. Use the x-axis for time and the y-axis for temperature. (6)
- 3.4.2 Use the given information to indicate at which time of the day the surface temperature and the 20 cm depth temperature were the highest respectively. (2)
- 3.4.3 Explain the daily variation in soil temperature on the soil surface and below the soil surface respectively. (6)
- 3.4.4 Briefly discuss the effect on the soil temperature if the surface is covered with dense vegetation. (4)

**[35]**

**QUESTION 4: SOIL SCIENCE: CHEMICAL, COLLOIDAL PROPERTIES AND MICROBIOLOGY**

4.1 During a soil survey two types of soils were sampled: clay loam (sample 1) and silt loam (sample 2).



4.1.1 Use the textural triangle to identify the percentage of sand and clay in the following soil samples:

- (a) Soil sample 1
- (b) Soil sample 2

(2)  
(2)

4.1.2 Good agricultural soils need to have sufficient organic matter. Explain the influence of organic matter on the physical properties of soil.

(8)

4.1.3 Name FOUR inorganic colloids responsible for the clay fractions in soil types.

(4)

4.2 Read the following paragraph and answer the questions that follow:

***Are you killing plant roots?***

Plant hair roots discharge enzymes, amino acids and sugars to attract microbes for food exchange. You can reduce the use of nitrogen fertiliser by approximately 40%, and still increase harvest volumes by 30% by using microbial products. This is due to the microbes that use and return nitrogen to the plants. This will allow the plant roots to absorb the released nitrogen through osmosis.

- 4.2.1 Give THREE examples of soil organisms found in soil flora and soil fauna. (6)
- 4.2.2 Name the essential elements released in the above paragraph. (2)
- 4.2.3 Name TWO beneficial effects of soil micro-organisms. (2)

4.3 Soils with an excess of mineral salts have a negative effect on the production potential of the soil. The high concentration of dissolved salts makes it difficult for plant roots to absorb water.

- 4.3.1 List TWO types of salt that occur in salinity (white brack) and alkalinity (black brack). (2)
- 4.3.2 Identify THREE disadvantages of white brack salts on plants and the soil. (3)
- 4.3.3 The salts of alkalinity have a deflocculating reaction on soil. Name FOUR characteristics of this type of soil. (4)

**[35]**

**TOTAL SECTION B: 105**  
**GRAND TOTAL: 150**

NAME/EXAMINATION NUMBER:

**ANSWER SHEET**

**SECTION A**

**QUESTION 1**

1.1.1	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
1.1.2	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
1.1.3	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
1.1.4	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
1.1.5	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
1.1.6	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
1.1.7	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
1.1.8	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
1.1.9	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
1.1.10	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>

(10 x 2) (20)

1.2.1	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
1.2.2	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
1.2.3	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
1.2.4	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
1.2.5	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>

(5 x 2) (10)

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)

1.4.1 \_\_\_\_\_ (2)

\_\_\_\_\_

1.4.2 \_\_\_\_\_ (1)

\_\_\_\_\_

1.4.3 (a) \_\_\_\_\_ (1)

(b) \_\_\_\_\_ (1)

**TOTAL SECTION A: 45**