INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions:

1. Answer **ALL** the questions.
2. Answer Section A (QUESTION 1) on the attached ANSWER SHEET.
3. Answer Section B (QUESTIONS 2, 3 and 4) in the ANSWER BOOK.
4. Read all the questions carefully and make sure you answer only what is asked.
5. Number the answers correctly according to the numbering system used in this question paper.
6. Place the completed ANSWER SHEET for SECTION A (QUESTION 1) inside the ANSWER BOOK.
7. You may use a non-programmable calculators and appropriate mathematical instruments.
8. Please write neatly – we cannot mark illegible handwriting.
9. Any student caught cheating will have his or her examination paper and notes confiscated. The College will take disciplinary measures to protect the integrity of these examinations.
10. If there is something wrong with or missing from your question paper or your answer book, please inform your invigilator immediately. If you do not inform your invigilator about a problem, the College will not be able to rectify it afterwards, and your marks cannot be adjusted to allow for the problem.
11. This question paper may be removed from the writing venue after the examination has taken place.

This question paper consists of **TWO** sections: Section A and Section B. Answer **ALL** the questions.

<table>
<thead>
<tr>
<th>Question</th>
<th>Section</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A: ONE question</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Answer the question</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>B: THREE questions</td>
<td>105</td>
</tr>
<tr>
<td>3</td>
<td>Answer ALL the questions</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
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<tr>
<td><strong>TOTAL MARKS:</strong></td>
<td></td>
<td><strong>150</strong></td>
</tr>
</tbody>
</table>

**NOTE:** An answer sheet has been attached at the back of the question paper. Fill in your name and student number in the appropriate spaces, detach it from your question paper and place inside your answer book.
SECTION A
(45 MARKS)

ANSWER THE QUESTION

QUESTION 1

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

EXAMPLE:

1.1.6 A B C D

1.1.1 An atom with the same atomic number but different mass number is called:
A. a cation.
B. an ion.
C. an isotope.
D. an isomer.

1.1.2 When a solution becomes acid, the pH value will . . .
A. increase.
B. remain constant.
C. first increase then decrease.
D. decrease.

1.1.3 Soil with strong cohesion forces is called . . .
A. sand.
B. loam.
C. gravel.
D. clay.

1.1.4 A good air : moisture ratio is a property of . . .
A. crumbly soil.
B. rectangular structure.
C. rough texture.
D. single grain structure.

1.1.5 A high bulk density occurs in the following cases, except . . .
A. fine sandy soil.
B. single grain soil.
C. soil which is continuously cultivated.
D. soil with a high humus content.
1.1.6 The total pore space of soil is influenced by the following factors, except . . .

A. soil water content.  
B. structure.  
C. texture.  
D. soil cultivation.

1.1.7 An optimum temperature for the germination of seeds, plant growth, production and microbe activity is between . . .

A. 20°C and 23°C.  
B. 20°C and 30°C.  
C. 26°C and 28°C.  
D. 15°C and 24°C.

1.1.8 Unsaturated flow of water means . . .

A. water flows from high tension areas to low tension areas.  
B. water movement is upwards.  
C. water movement is downwards.  
D. water flows from a low tension area to a high tension area.

1.1.9 The following factors determine the speed of percolation through soil, except . . .

A. the infiltration capacity of topsoil.  
B. the drainage of subsoil.  
C. the microbe activity in the soil.  
D. the water capacity in the soil.

1.1.10 Mottled soil is caused by . . .

A. organic matter.  
B. a varying water table.  
C. dry conditions.  
D. microbes.  

(10 × 2 = 20)
1.2 Choose a description form Column A that matches a concept / phrase in Column B. Write only the letter (A. – H.) next to the question number (1.2.1 – 1.2.5) on the attached answer sheet, for example 1.2.6 J.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2.1 organic colloids</td>
<td>A. humus</td>
</tr>
<tr>
<td>1.2.2 formation of aggregates</td>
<td>B. glucose</td>
</tr>
<tr>
<td>1.2.3 hydrolysis</td>
<td>C. stabilizers</td>
</tr>
<tr>
<td>1.2.4 disaccharide</td>
<td>D. splitting of a molecule</td>
</tr>
<tr>
<td>1.2.5 carbon dioxide in soil water</td>
<td>E. sod crops</td>
</tr>
<tr>
<td></td>
<td>F. clay</td>
</tr>
<tr>
<td></td>
<td>G. sucrose</td>
</tr>
<tr>
<td></td>
<td>H. carbonic acid</td>
</tr>
</tbody>
</table>

(5 × 2 = 10)

1.3 Give ONE agricultural term / phrase for each of the following descriptions. Write only the term / phrase next to the question number (1.3.1 – 1.3.5) on the attached answer sheet.

1.3.1 The force of attraction between water molecules
1.3.2 The mineral present in a red soil
1.3.3 The phenomenon by which the path of light, passing through a colloidal dispersion, can easily be seen
1.3.4 An odourless, colourless gas found in coal mines
1.3.5 The soil gas which is important to dilute oxygen

(5 × 2 = 10)

1.4 Change the UNDERLINED WORD(S) in the following to make the statements TRUE. Write the appropriate word(s) next to the question number (1.4.1 – 1.4.5) on the attached answer sheet.

1.4.1 A platy soil structure does not have a particular fixed shape.
1.4.2 The silt particles in the soil have a diameter smaller than 0,002 mm.
1.4.3 The R-horizon is rich in organic material.
1.4.4 When sodium is the predominant cation, the soil will be acid.
1.4.5 The oxygen atom is the characteristic atom that is present in all organic compounds.

(5 × 1 = 5) [45]

TOTAL SECTION A: 45
SECTION B (105 MARKS)

ANSWER ALL THE QUESTIONS

QUESTION 2

2.1 The following diagram represents the structural formula of Maltose:

2.1.1 Explain why maltose is called a disaccharide. (1)

2.1.2 Identify the molecules that will form if one molecule of maltose is hydrolysed by an enzyme (e.g. maltase). (2)

2.1.3 From which polysaccharide is maltose formed during digestion? (1)

2.2 Write the chemical and structural formulas for Ethanol. (2)

2.3 Differentiate between the following and give one example of each:

2.3.1 A heterogeneous mixture and a homogeneous mixture (4)

2.3.2 A covalent and ionic bond (4)
2.4 Study the triangle used by soil scientists and answer the questions that follow:

2.4.1 What is the purpose of this triangle? (1)

2.4.2 Indicate measures that should be taken to successfully cultivate soil indicated by Y. (4)

2.4.3 Compare the soil indicated by X and Y with regard to the following characteristics:
   A. water movement (2)
   B. fertility (2)

2.5 The table below shows the amount of carbohydrates, protein and fat per 100 g of three different foods:

<table>
<thead>
<tr>
<th>Food</th>
<th>Carbohydrate (g)</th>
<th>Protein (g)</th>
<th>Fat (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oats porridge</td>
<td>56</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>Peanut butter</td>
<td>24</td>
<td>23</td>
<td>50</td>
</tr>
<tr>
<td>Tinned tuna fish</td>
<td>0</td>
<td>27</td>
<td>1</td>
</tr>
</tbody>
</table>

2.5.1 Draw a bar graph for each of the foods. Each graph must show the amount of carbohydrate, protein and fat in g of the food. (6)
2.5.2 From the graph, deduce which food is the richest source:

A. of carbohydrates. (1)
B. of protein. (1)
C. of fat. (1)

2.5.3 Do you think the fat in peanut butter is saturated or unsaturated? Explain your answer. (2)

2.5.4 In some school feeding schemes, learners are given a peanut butter sandwich as a meal. What are the benefits of a peanut butter sandwich? (1) [35]

QUESTION 3

3.1 A soil scientist gathered the following data. It represents part of a soil profile from a data recording sheet that was used while he was doing some field work.

SONTO SOIL SURVEYANCE: SOIL PROFILE FORM

Location: 113B (Mpumalanga)
Owner: Mr P Naidoo
Size: 560 Ha
Profile number: 0023

Top soil: Vertic A-horizon

A-horizon with high clay content and a predominance of smectic clay minerals. Consistency is highly plastic when moist and sticky when wet. Plasticity index greater than 20.

Sub soil: Red apedal B-horizon

Plasticity index greater than 32.

Soil colour: Dark red (YR5)
Sub soil: (25% of farm consists of a yellow-brown Aapedal B)
Soil structure: No evidence of structure formation

3.1.1 Name THREE different factors that determine the development of a homogenous colour (red) in soil. (3)

3.1.2 Describe at least FOUR interpretations that could be made from the colour of the soil above. (4)

3.1.3 Explain why the clay percentage increases in the subsoil. (2)

3.1.4 The structural development of the soil is very poor. Indicate TWO ways to improve the structure. (2)
3.1.5 Use the data supplied above and deduce the measures a farmer has to take with regard to the following:

A. fertilisation (1)
B. irrigation (2)

3.2 Answer the following questions on water loss in the soil:

3.2.1 Name **TWO** ways in which water is lost from soil. (2)

3.2.2 Water is the factor that has the greatest influence on soil temperature. What do you think is the reason for this? (1)

3.2.3 During a year with a very high rainfall, it may happen that the lower lying parts of the farm become saturated with water. Name **TWO** temporary measures a farmer could implement to get rid of the excess water. (2)

3.3 The following diagram shows the enlarged soil particles present in a soil:

3.3.1 Choose which of the indicators marked A to D would best fit the following descriptions:

A. a sand particle (1)
B. a macro pore (1)
C. a part that will store water in the soil (1)

3.3.2 Indicate which soil fraction would have the spaces represented by indicator C as predominant spaces. (1)

3.3.3 Give the name of the gas that is predominantly found in the spaces shown in the soil above. (1)

3.3.4 Name a component of soil that is not visible in the diagram above. (1)
3.4 3.4.1 Name the TWO parts that make up the binomial classification system used for soil in South Africa. (2)

3.4.2 Discuss how the results of soil classification can be applied towards efficient crop cultivation. (2)

3.5 Discuss the effect of the following crop production practices on soil bulk density:

3.5.1 ploughing in of farm manure (2)

3.5.2 intensive cultivation (2)

3.6 Discuss the implications for agriculture for planting on a north-facing slope. (2) [35]

QUESTION 4

4.1 Complete the following table by comparing saline and sodic soils:

<table>
<thead>
<tr>
<th></th>
<th>Saline soils</th>
<th>Sodic soils</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH conditions</td>
<td>4.1.1</td>
<td>4.1.2</td>
</tr>
<tr>
<td>Dominant salts</td>
<td>4.1.3</td>
<td>4.1.4</td>
</tr>
<tr>
<td>Surface appearance</td>
<td>4.1.5</td>
<td>4.1.6</td>
</tr>
<tr>
<td>Corrective measures</td>
<td>4.1.7</td>
<td>4.1.8</td>
</tr>
</tbody>
</table>

(8)

4.2. Answer the following questions regarding soil micro-organisms:

4.2.1 Why do soil micro-organisms break down plant and animal residues? (1)

4.2.2 Describe how soil micro-organisms contribute to a crumbly structure in the soil. (2)

4.2.3 Explain how they contribute to the maintenance of a CO₂ : O₂ balance in nature. (2)

4.2.4 Which macro-organisms play a role in limiting crust from forming in the soil's surface? (1)

4.2.5 Explain how the following influence the process of symbiotic nitrogen fixation:

A. the soil pH (2)

B. the presence of plant nutrients in the soil (2)

4.3 4.3.1 List the differences between the montmorillonite and kaolinite clay colloid. (4)

4.3.2 Identify the type of clay that is unsuitable for building foundations. Give a reason for your answer. (3)
4.4 Before digging a compost pit, a farmer removed all organic debris from the surface of the soil. The farmer dug the pit until cutting through a part of the underlying rock. Before filling the pit with organic material for the compost, a soil scientist passed by and noticed that four major horizons had been exposed in this soil with different degrees of deviation from the mother material.

4.4.1 In a sequential order (from top to bottom) write down the **FOUR** major horizons visible in the exposed compost pit which caught the attention of the soil scientist. (4)

4.4.2 Deduce the composition of the organic debris which was removed prior to the digging of the pit. (2)

4.5 Soil is made up of various structural units. Indicate the type of soil structure that you would associate with each of the following:

4.5.1 Soil particles are arranged in large upright columns that stand vertically in the soil. This structure is common in the subsoil. (1)

4.5.2 Soil particles are arranged into thin compacted plates found on top of bare soil. This structure is common in the deeper parts of the topsoil. (1)

4.5.3 The soil forms large block-like shapes. This structure is common in the subsoil. The soil particles are arranged in a rounded form. (1)

4.5.4 This structure is common in topsoil and is very suitable for crops. Structural units are either round, hard peds or soft, more porous peds. (1) [35]

TOTAL SECTION B: 105

GRAND TOTAL: 150 MARKS
**GRADE 11**

**AGRICULTURAL SCIENCES**

**MID-YEAR EXAMINATION**

**ANSWER SHEET**

Detach from your question paper and place inside your Answer Book.

**NAME:**  

**STUDENT NUMBER:**  

**QUESTION 1.1**

<table>
<thead>
<tr>
<th></th>
<th>A.</th>
<th>B.</th>
<th>C.</th>
<th>D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1.1</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>1.1.2</td>
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<td>1.1.9</td>
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<tr>
<td>1.1.10</td>
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</tbody>
</table>

(10 × 2 = 20)

**QUESTION 1.2**

1.2.1  

1.2.2  

1.2.3  

1.2.4  

1.2.5  

(5 × 2 = 10)
QUESTION 1.3

1.3.1

1.3.2

1.3.3

1.3.4

1.3.5

(5 \times 2 = 10)

QUESTION 1.4

1.4.1

1.4.2

1.4.3

1.4.4

1.4.5

(5 \times 1 = 5)  [45]

TOTAL SECTION A: 45