



"Investing in Africa's Future"

FACULTY OF AGRICULTURE AND NATURAL RESOURCES

ACP101: INTRODUCTION TO SOIL SCIENCE

END OF FIRST SEMESTER EXAMINATIONS

NOVEMBER/DECEMBER 2016

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DURATION: (3HRS)

INSTRUCTIONS

1. Do Not Write Your Name On The Answer Sheets.
2. Use Answer Sheets Provided.
3. Begin Your Answer For Each Question On A New Page.
4. Credit Is Given For Neat Presentation Of Answers.



ACP101 INTRODUCTION TO SOIL SCIENCE EXAMINATION

READ QUESTIONS CAREFULLY BEFORE YOU ANSWER.

THIS PAPER HAS TWO SECTIONS. ANSWER ALL QUESTIONS IN SECTION A AND TWO QUESTIONS IN SECTION B.

SECTION A:

1. There are 5 important soil forming factors. List them. (5)
2. You determined soil texture in the laboratory using the hydrometer method. Explain how you did this. (6)
3. Define CEC and soil consistence. (4)
4. Soil pore space and colour are important to a farmer. With examples explain why soil pore space and colour are important. (8)
5. Explain why a house built on vertisols or other smectite containing clays may crack if the foundation is not reinforced. (3)
6. With the aid of a drawing explain the difference between: (5)
 - a tetrahedron and an octahedron
 - 1:1, 2:1 and 2:1:1 layers
7. An Aluminium dominated octahedral sheet is called _____ and a magnesium dominated octahedral sheet is called a _____ sheet. (2)
8. Explain how isomorphous substitution takes place in a tetrahedral sheet. (2)
9. Explain why water rises higher in a thin capillary tube than in a capillary tube of larger radius. Calculate the height of water in a capillary tube of 1cm radius. (4)
10. Explain the difference between gravitational water, capillary water and hygroscopic water. (3)
11. Give six of the ten orders in Soil Taxonomy (USDA System). (6)
12. Explain the differences between Alluvium, Colluvium and Aeolian. (3)

13. Why is it important for the farmer to know the colour, texture and bulk density of a soil? (3)
14. A soil has a bulk density of 1.39g/cc. Assuming its particle density is 2.65g/cc, give the pore space of the soil. (4)
15. If the soil had a bulk density of 1.90g/cc what would you advise the farmer to do? (2)

SECTION B:

ANSWER ANY TWO QUESTIONS IN THIS SECTION.

Question 1:

- a. What are the major characteristics of the soil orders in soil Taxonomy? (8)
- b. What is a soil Catena in the Zimbabwean soil classification system? (2)
- c. Give the major parent materials of Zimbabwean soils and the 4 orders. (10)

Question 2:

- a. Define: Electrical conductivity, ESP and SAR. (3)
- b. Explain the main difference between saline, saline sodic and sodic soils in relation to the following: electrical conductivity, soil pH, exchangeable Na^+ percentage and soil physical conditions. (10)
- c. Give the steps you would take to reclaim a saline soil, and a saline sodic soil. (7)

Question 3:

- a. Explain the effect of soil organic matter on soil properties. (6)
- b. With the aid of a diagram explain what happens when organic residue with wide/high C:N ratio is applied and incorporated into the soil. (12)
- c. What should be done to avoid the nitrogen depression period above? (2)

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