AFRICA UNIVERSITY
A United Methodist-Related Institution

"Investing in Africa's Future"

COLLEGE OF HEALTH, AGRICULTURE & NATURAL SCIENCES

NACP209 SOIL FERTILITY AND PLANT NUTRITION

END OF SEMESTER EXAMINATIONS

NOVEMBER 2019

LECTURER: MBIZI

DURATION: 3 HOURS

INSTRUCTIONS

1. *Do not write your name on the answer sheets.*
2. *Begin your answer for each question on a new page.*
3. *Credit is given for neat presentation.*
4. *This paper is comprised of two parts.*

Answer all questions in Section A and any two questions in Section B

SECTION A (60 MARKS)

1. Given that the neutralizing value of Ca CO_3 is 100%. Calculate the neutralizing values of $Ca(OH)_2$ AND CaO if the molecular masses are given as follows:

   C = 12g

   O = 16g

   Ca = 40g

   H = 1g (6)

2. The increasing prices of simple straight fertilizers in Africa has resulted in Agronamists encouraging farmers to exploit Biological Nitrogen fixation (BNF).

   State the benefits of using these synthetic fertilizers to the farmer as a soil fertility management strategy. (6)

3. Explain how nutrients more by each of the following methods:

   a) Root interception.

   b) Mass flow.

   c) Active uptake (6)

4(a) What are the effects of P losses in soils.? (4)

b) While Phosphorus is a major nutrient required by plants in large quantities, it is often unavailable is soils. Discuss the validity of this statement clearly, stating the reasons for the less availability of P in the soil. (6)

5. What is Nitrogen Depression Period. Explain how you would assist the farmer to manage it. (4)

6. State the benefits of applying lime in the soil. (6)

7. List and explain four strategies that a poor resource communal farmer can use to increase the availability of N to his/her Crop. (8)

8. (a) Calculate the % of N in Ammonium sulphate $(NH_4)_2\ SO_4$ and Urea $(NH_2)_2\ CO$ fertilizers given the following atomic masses:

N = 14, S = 32, O = 16, H = 1, C = 12 (6)

b) How many kgs of Ammonium Sulphate would be needed to provide 100kg of N ? (4)

c) Give the two primary and secondary orthophosphate ionic forms in which Phosphorous is taken up and the pH values in which they occur in the soil for them to be absorbed by plants. (4)

SECTION B (40 MARKS)

Answer any two Questions

9.a) Discuss the Reclamation of Saline and Sodic Soils (10)

b) Describe the three stages involved in the production of NO_3- ions from Organic matter. Include the soil organisms that are responsible for each of the breakdown stages. (10)

10. Write short notes on the following N loss and gain pathways in soil.

i) Volatilization (5)

ii) Denitrification (5)

iii) Lightning (5)

iv) leaching (5)

11. Organic matter helps to improve soil fertility

a) List the important physical, chemical and Biological properties Organic matter gives to soil. (12)

b) Explain how Organic matter can influence the following soil characteristics and properties.

i) soil micro organisms.

ii) soil structure.

iii) temperature.

iv) Aeration . (8)

THE END