"Investing in Africa's future"

COLLEGE OF HEALTH, AGRICULTURE & NATURAL SCIENCES

NACP 209: SOIL FERTILITY AND PLANT NUTRITION

END OF SECOND SEMESTER SUPPLEMENTARY EXAMINATION FOR THE 2021/2022 ACADEMIC YEAR

DECEMBER 2022

LECTURER: MRS. S. MBIZI

DURATION: 3 HOURS

INSTRUCTIONS

1. D0 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 PRESENTATON
4. THIS PAPER IS COMPRISED OF TWO PARTS

ANSWER ALL QUESTIONS IN SECTION A AND ANY TWO QUESTIONS IN SECTION B

SECTION A

ANSWER ALL QUESTIONS IN THIS SECTION [40 marks]

1. Outline one principal function and one common chemical form of each of the following essential nutrients in plants. Potassium (K), Zinc (Zn), Molybdenum (Mo) and Boron (B). (8)

2. (a) Highlight three major challenges associated with the use of organic fertilizer as a source of plant nutrients, relative to a mineral fertilizer. (3)
   (b) The increasing prices of fertilizers in Africa has resulted in Agronomists encouraging farmers to exploit Biological Nitrogen Fixation (BNF). State the benefits that a farmer will get from using BNF as a fertility management strategy. (7)

3.(a)Given that the neutralising value of $CaCO_3$ is 100%, Calculate the Neutralising values of $Ca(OH)_2$ and CaO, if the molecular vaues are given as follows: C= 12g, O = 16g, Ca = 40g and H = 1g. (6)
(b) State the benefits of applying lime to the soil. (6)

4. (a) Describe three key soil physical properties important in soil fertility and the management strategies that can be employed to optimise them. (6)
(b) What are the effects of P losses in soil? (4)

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

6. Explain how organic matter can influence the following soil characteristics and properties.

   i. Soil micro organisms
   ii. Soil structure
   iii. Temperature
   iv. Aeration (8)

7. Give the two primary and secondary orthophosphate ionic forms in which phosphorus is taken up and the pH values in which they occur in the soil to be taken up by plants. (4)

SECTION B (40 MARKS)

8. Describe the role of soil Organic matter in improved soil productivity from the time of planting to crop physiological maturity, using specific examples where necessary. (20)

9. (a) Discuss the reclamation of Saline and Sodic soils. (10)

(b) Describe the Nitrogen (N) loss and gain pathways in soils. (10)

10. (a) Describe the factors that affect soil acidity. (8)

(b) While Phosphorus is a major element required by plants in large quantities, it is often unavailable in soils. Discuss the validity of this statement, clearly stating the reasons for the less availability of P in the soil. (12)

END OF EXAMINATION PAPER