



“Investing in Africa’s future”

COLLEGE OF HEALTH, AGRICULTURE AND NATURAL SCIENCES

ACP 209 SOIL FERTILITY AND PLANT NUTRITION

END OF SEMESTER FINAL EXAMINATIONS

NOVEMBER/DECEMBER 2023

LECTURER: MRS S MBIZI

DURATION: 3 HOURS

INSTRUCTIONS

1. Read and understand all questions before you answer.
2. **Do not** write your name on the answer sheets.
3. All working for numerical answers must be shown.
4. The intended number of marks is given in brackets at the end of each question or part of the question.
5. Begin your answer for each question on a new page.

SECTION A (60 MARKS)
Answer all questions in this section

1. Suggest six strategies that a poor resource farmer can use to reduce N losses from the soil.
(6)
2. State the benefits of using the Biological Nitrogen Fixation (BNF) over using synthetic fertilisers. (5)
3. State the benefits of applying lime into the soil. (6)
4. Define pH buffering and explain its importance into the soil. (5)
5. (i) Describe the process of Ammonium Volatilisation. (4)
(ii) What are the factors that influence the process? (4)
6. (a) Calculate the % of N in Ammonium Nitrate (NH_4NO_3) and Urea ($(\text{NH}_2)_2\text{CO}$) given the following atomic masses.
 $\text{N} = 14, \text{O} = 16, \text{H} = 1, \text{C} = 12$ (6)
(b) How many Kgs of NH_4NO_3 will be needed to produce 100Kgs of N. (3)
7. Given that the neutralising value of CaCO_3 is 100, use the molecular masses given below to calculate the neutralising values of CaMgCO_3 and CaO .
 $\text{C} = 12\text{g}, \text{O} = 16\text{g}, \text{Ca} = 40, \text{H} = 1\text{g}, \text{Mg} = 24$ (6)
8. One of the limitations of maize, Horticulture and citrus production in small holder farming areas is the depletion and lack of micronutrients. Describe the significance of Mo, Bo and Zn in crop production. (6)
9. List any six factors that can cause soil acidity and three that can cause soil alkalinity (9)

SECTION B
Answer any two questions in this section

10. (a) State the important physical, chemical and Biological properties that organic matter gives to soil. (12)
- (b) Explain the principal cause of alkalinity in sodic soils and explain in detail how soil alkalinity and sodicity may affect crop growth. (8)
11. (a) Describe in detail the N losses and gain pathways in soil. (16)
- (b) Discuss the management of Nitrogen Depression Period (NDP) in crop production. (4)
12. While Phosphorous is a major nutrient required by plants in large amounts it is often unavailable in the soil. Discuss the validity of this statement, clearly stating the reasons for the less availability of P in the soil including effects of P losses in the soil. (20)

END OF EXAMINATION PAPER