

CHUKA

UNIVERSITY



UNIVERSITY EXAMINATIONS

**EXAMINATION FOR THE AWARD OF DIPLOMA IN AGRICULTURAL  
EDUCATION AND EXTENSION**

**SOIL 0320: SOIL FERTILITY AND PLANT NUTRITION**

**STREAMS: DIP (AGED Y3S2)**

**TIME: 2 HOURS**

**DAY/DATE: TUESDAY 09/04/2024**

**2.30 P.M. – 4.30 P.M.**

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**INSTRUCTION**

- Answer ALL question in section A (40 marks) and any two in section B (30 marks)
- Do not write on the question paper

**SECTION A: Answer all questions (40 marks)**

**Question one**

- a) Highlight three (3) advantages of urea fertilizer over other nitrogen fertilizer sources. (3 marks)
- b) Outline three (3) fates of calcium in the soil solution. (3 marks)
- c) Explain how organic matter prevents pollution in the soil and the surrounding environment. (2 marks)

**Question two**

- a) Briefly describe the format of soil test report. (4 marks)
- b) Highlight any four (4) physiological functions of phosphorus in plants. (4 marks)
- c) Briefly discuss four (4) factors influencing the cation exchange capacity of the soil. (4 marks)

**Question three**

- a) A farmer in Meru County has noticed that every season his maize crop develops the following problems:

- i) The maize plants become shorter than normal
- ii) The lower leaves turn yellowish

With your knowledge in soil fertility what should the farmer do to correct the problems in future? (2 marks)

- b) Elucidate the relationships between pH and ion toxicity. (4 marks)
- c) Briefly describe how nutrients move from the soil to plant roots through mass flow pathway. (4 marks)

**Question four**

- a) Giving two examples, distinguish between mobile and immobile nutrients. (4 marks)
- b) Describe the essentiality criteria of nutrients as describes by Arnon and Stout (1939). (3 marks)
- c) Describe three barriers in plant cells that selectively regulate the movement of water and nutrients into and out of the plant. (3 marks)

**SECTION B: Answer ant two questions (30 marks)**

**Question five**

- a) Write summary notes on the use of radioisotopes in plant nutrition. (7 marks)
- b) Most crops do not thrive well under acidic conditions. With your knowledge in soil acidity management describe how lime neutralizes acidity in agricultural fields. (8 marks)

**Question six**

- a) As an extension officer, advice farmers on any five (5) factors that limit use of organic fertilizers in agricultural production. (10 marks)
- b) Visual symptoms of nutrient deficiency in plants may take various forms. Discuss them. (5 marks)

**Question seven**

- a) Describe potassium cycle in the soil. (10 marks)
- b) Plants have ability to adjust to metal-element excesses. Briefly explain any five (5) of these possible mechanisms involved in the adjustment. (5 marks)

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