

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN HORTICULTURE, EDUCATION (GEOGRAPHY/AGRICULTURE, CHEMISTRY/AGRICULTURE, BIOLOGY/AGRICULTURE, PE/AGRICULTURE), ENVIRONMENTAL SCIENCE, AGRICULTURE IN EDUCATION AND EXTENSION, MICROBIOLOGY AND BIOTECHNOLOGY

SOIL 100: INTRODUCTION TO SOIL SCIENCE

STREAMS: BSc (AGED Y1S1, HORT Y1S1, ENSC Y1S1, BED GEO/AGRIC, BIO/AGRIC, CHEM/AGRIC, PE/AGRIC Y1S1, MICROBIO/ BIOTECH Y2S1)

TIME: 2 HOURS

DAY/DATE: FRIDAY 20/12/2024

11.30 A.M – 1.30 P.M.

INSTRUCTIONS TO CANDIDATES

- Answer all questions in section A (30 marks) any two in section B (40 marks).
- Do not write anything on the question paper.

QUESTION ONE

- (a) List the categories of soil organisms and their characteristics. [4 marks]
- b) What soil management practices would you recommend to maintain good soil aeration in clay-dominant soils? [3 marks]
- c) Explain the relationship between soil water content and soil air. How do these two factors influence each other and plant growth? [2 marks]

QUESTION TWO

a) Explain how soil organisms near the rhizosphere influence plant roots. [3 Marks]

(b) Calculate the total porosity of a soil with a bulk density of 1.25 g cm^{-3} and the particle density is 2.65 g cm^{-3} . Comment on its implications on agricultural production. [3 marks]

QUESTION THREE

(a) As a soil scientist highlight any four (4) benefits of soil classification. [4 marks]

(b) How can maize farmers identify signs of soil structure damage in their field? [4 marks]

QUESTION FOUR

a) Explain how a high carbon ratio could lead to nutrient immobilization in the soil. What implications does this have on crop growth during the early stages of organic residue decomposition? [3 marks]

b) Describe the role of sustainable agriculture in mitigating climate. [2 marks]

c) Explain any two (2) consequences of Salinization in a agricultural fields. [4 marks]

SECTION B: ANSWER ANY TWO QUESTIONS (30 MARKS)

QUESTION FIVE

(a) Discuss how Slope and aspect influence soil formation. [10 marks]

(b) Giving examples describe four main steps in degradation of organic matter in the soil. [4 marks]

(c) Describe semi-detailed and detailed types of survey methods based on scale. [6 marks]

QUESTION SIX

a) Why is it important for farmers to consider all three dimensions (horizontal, vertical, and temporal) when managing soil for crop production? [6 marks]

b) Describe the concept of anion exchange capacity in soil and explain how it affects phosphorus availability. [8 marks]

(c) Discuss six (6) functions of water in relation to plant growth and development. [6 marks]

QUESTION SEVEN

(a) Describe and illustrate the rock cycle. [8 marks]

(b) As an extension officer advise farmers on how to achieve integrated soil nutrient management on their farms. [6 marks]

c) Describe the illuviation and eluviation processes and their effects on the Soil Profile. [6 marks]
