INTERNATIONAL UNIVERSITY OF EAST AFRICA

'Learning to Succeed'

FACULTY OF SCIENCE AND TECHNOLOGY

END OF SEMESTER EXAMINATIONS - MAY 2024/2025

PROGRAMME: BSEM

YEAR/SEM: YEAR 1/SEMESTER 1

COURSE CODE: BSE1102

NAME: SOIL SCIENCE

DATE: 2025-08-08

TIME: 2:00-5:00PM

INSTRUCTIONS TO CANDIDATES:

1. Read the instructions very carefully
2. The time allowed for this examination is STRICTLY three hours
3. Read each question carefully before you attempt and allocate your time equally between all the Sections
4. Write clearly and legibly. Illegible handwriting cannot be marked
5. Number the questions you have attempted
6. Use of appropriate workplace examples to illustrate your answers will earn you bonus marks
7. Any examination malpractice detected will lead to automatic disqualification.

DO NOT WRITE ANYTHING ON THE QUESTION PAPER

Section A Section A: Attempt all questions in this section (40 marks)

Question 1:

a. What role does climate play in pedogenesis? (5 marks)
b. In what ways does relief (topography) affect the thickness and quality of soils? (5 marks)
c. A community gardening project receives a donation of lime and sulfur to improve their garden soil. They are unsure which to apply. A quick soil test shows their soil pH is 9.1. Which amendment should they use, and why? (5marks)
d. What is cation exchange capacity (CEC), and why is it important in soil fertility management? (5 marks)
e. Compare the CEC of sandy soils and clay soils. How does this difference affect their ability to retain nutrients? (6 marks)
f. What type of relationship exists between mycorrhizal fungi and plant roots? What is the importance of this relationship? (5 marks)
g. In which ways do soil contaminants differ from soil pollutants? Explain with examples. (5 marks)
h. Where do soil pollutants come from? (4 marks)

Section B Section B; Answer any 3 questions. (20 marks each)

Question 1:

a. Mention at least five types of organisms in the soil (5 marks)
b. Discuss the roles of living organisms in the soil (12 marks).
c. How do agricultural practices, such as mulching and cover cropping, impact soil biological activity? (3 marks)

Question 2:

a. How do leguminous crops relate with soil fertility? (8 marks)
b. Differentiate between soil fertility and soil productivity. (6 marks)
c. How does fertilizer use in agriculture affect aquatic ecosystems? (6 marks)

Question 3:

a. What are the major steps involved in the transformation of rock into soil? (10 marks
b. What are the major horizons in a typical soil profile, and how do they differ from one another? (10 marks)

Question 4:

Define the following terminologies as applied in soil science. (2 marks each)
i. Saturation
ii. Elluviation
iii. Infiltration
iv. Weathering
v. decomposition
vi. Illuviation
vii. Soil structure
viii. Soil permeability
ix. Field capacity
x. Permanent wilting point

Question 5:

a. What is soil biota? (2 marks)
b. A wetland is drained and converted into agricultural land. Within a year, farmers report increased plant diseases. How might the alteration of soil biological conditions have contributed to this problem, and what management interventions can mitigate them? (8 marks)
c. What soil management practices can promote diversity and activity of soil biota? (10 marks)

Question 6:

a. Define soil composition (2 marks)b. With the help of a suitable diagram, show the components soil in their respective proportions under normal circumstances. (8 marks)c. How can human activities such as mining, urbanization, or agriculture alter the natural composition of soil, and what are the long-term consequences for soil health and environmental quality? (10 marks)