



**MACHAKOS UNIVERSITY**

**University examination for 2024/2025 academic year**

**SCHOOL OF AGRICULTURE, ENVIRONMENT & HEALTH SCIENCES  
DEPARTMENT OF AGRICULTURAL SCIENCES**

**FIRST YEAR FIRST SEMESTER EXAMINATION  
BACHELOR OF ENVIRONMENTAL SCIENCE**

**SOL 100: INTRODUCTION TO SOIL SCIENCE**

**Date:**

**Time:**

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**INSTRUCTION: Answer question ONE and any other two.**

**QUESTION ONE (30 MARKS)**

- a) Describe the following soil forming processes:
  - i. Gleyzation (2 marks)
  - ii. Podzolization (2 marks)
- b) Describe the B horizons of a typical profile of a mature soil. (3 marks)
- c) Describe carbonation reaction as a principle of chemical weathering. (3 marks)
- d) Discuss how topography influences soil formations. (6 marks)
- e) Distinguish between gravimetric and volumetric soil water content. (2marks)
- f) Describe any three groups of minerals. (3 marks)
- g) Distinguish between reconnaissance and detailed types of soil survey methods. (3marks)
- h) Discuss any three consequences of soil degradation. (3 marks)
- i) Explain any three ways through which organic matter improves the soil structure (3 marks)

### **QUESTION TWO (20 MARKS)**

- a) Discuss the bearing of cation exchange capacity on pollutant transport and fate in the environment (10 marks)
- b) Explain the four basic processes of soil formation. (10 marks)

### **QUESTION THREE (20 MARKS)**

- a) Describe ribbon and sticky soil textural field tests on a given field. (6marks)
- b) Describe the typical information contained in area soil survey map. (7 marks)
- c) Discuss the influence of earthworm activity on the soil development (7 marks)

### **QUESTION FOUR (20 MARKS)**

- a) Explain soil colloidal properties under the following:
  - i) Availability of nutrients (4 marks)
  - ii) Swelling and shrinkage (4 marks)
- a) Discuss any four that influence soil structure development. (8 marks)
- b) Explain four soil properties that determine its buffering capacity (4 marks)

### **QUESTION FIVE (20 MARKS)**

- a) Describe the general setup of soil taxonomy (10 marks)
- b) Discuss the functions of soil water in relation to plant growth and development. (4 marks)
- c) Explain three functional roles of soil organic matter. (6 marks)