



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 AGRICULTURAL EDUCATION AND EXTENSION / BACHELOR OF
ENVIRONMENTAL SCIENCE**

AGN 352/KRM 406: SOIL AND WATER MANAGEMENT

Date:

Time:

INSTRUCTION: Answer Question ONE and any Other Two Questions.

QUESTION ONE (30 MARKS)

- a) Define surveying and explain its importance in land development and environmental management. (3 marks)
- b) Discuss the factors that influence soil erosion by water. (5 marks)
- c) In surveying, accuracy and precision are key. Explain how to ensure the accuracy of area measurements (3 marks)
- d) Explain how good crop management can reduce soil erosion by water to tolerable levels and improve soil fertility. (4 marks)
- e) Explain any two disadvantages which hinder the application of conservation tillage in semiarid conditions. (4 marks)
- f) Explain the two components taken into consideration when designing cut-off drains (2 marks)
- g) With relevant soil loss equation, explain factors used in the calculation of soil loss from a given area (5 marks)
- h) Discuss two implications of salinity on soil fertility and management. (2 marks)
- i) Elaborate how the infiltration capacity of a soil affects its erodability. (2 mark)

QUESTION TWO (20 MARKS)

- a) Discuss five problems associated with over-applying water to a given crop (10 marks)
- b) Levelling is a crucial aspect of surveying. Explain the process of levelling and how it is used to determine the relative heights of different points on a surface. (10 marks)

QUESTION THREE (20 MARKS)

- a) Discuss any three types of irrigation delivery systems available (12 marks)
- b) With relevant examples, explain four main factors that influence the frequency or duration of irrigation (8 marks)

QUESTION FOUR (20 MARKS)

- a) Explain the benefits of soil surface mulching and discuss why the practice is not widely adopted in smallholder farms in Kenya. (10 marks)
- b) Design a trapezoidal grassed waterway with the following data: (10 mark)
 - i) Longitudinal gradient. = 2%
 - ii) Permissible velocity = 1.5m/sec
 - iii) Manning's n : 0.04
 - iv) Design discharge = 3 m³/s

QUESTION FIVE (20 MARKS)

- a) Discuss the on-site and off-site effects of soil erosion by water. (5 marks)
- b) Describe briefly any three methods used for conserving water in dryland farming systems (9 marks)
- c) Discuss any three types of irrigation delivery systems available (6 marks)