



# MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF AGRICULTURAL SCIENCES

DEPARTMENT OF AGRICULTURAL EDUCATION AND EXTENSION

THIRD YEAR SPECIAL/ SUPPLEMENTARY EXAMINATION FOR  
BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION AND EXTENSION

AGN 352: SOIL AND WATER CONSERVATION

DATE: 21/01/2021

TIME: 8.30-10.30 AM

---

## INSTRUCTIONS:

Answer *ALL* questions from Section A and any other *TWO* from Section B:

### SECTION A: COMPULSORY: (30 MARKS)

- a) Discuss four importance of water harvesting in a farm. (4 marks)
- b) Distinguish between consolidation and subdivision of land as used in surveying and mapping. (4 marks)
- c) Describe the benefits of soil and water conservation (4 marks)
- d) Discuss four importance of soil structure to soil management (4 marks)
- e) Define the following terms as used in soil and water conservation:
  - i. Soil Conservation (2 marks)
  - ii. Sensitivity (2 marks)
  - iii. Resilience (2 marks)
- f) Explain the four sources of Errors in rain Gauges (4 marks)
- g) Discuss four soil and water conservation measures that can be undertaken to reduce or eliminate the risks of landslides. (4 marks)

**SECTION B: ANSWER ANY TWO QUESTIONS (40 MARKS)**

**QUESTION TWO (20 MARKS)**

- a) Discuss four factors affecting runoff in an agricultural land. (4 marks)
- b) With an aid of a diagram, describe the three soil phases that were analysed in a dug sample pit. (6 marks)
- c) A moist sand sample has a volume of  $464\text{cm}^3$  in the natural state and a weight of 793g. The dry weight is 735g and the specific gravity of the soil particles is 2.68.  
Determine:
- Porosity (3 marks)
  - Soil moisture content (3 marks)
  - Volumetric moisture content (2 marks)
  - Degree of saturation (2 marks)

**QUESTION THREE (20 MARKS)**

- a) While highlighting the various types of rain gauges and errors associated to their performance, discuss FOUR ways of reducing errors in a tipping bucket rain gauge. (8 marks)
- b) Discuss three factors that influence the likelihood of the occurrence of degradation (6 marks)
- c) You are a soil and water conservation expert and you are to educate farmers in Machakos on macro-catchment structures. Describe three macro-catchment water-harvesting structures to be constructed in the area. (6 marks)

**QUESTION FOUR (20 MARKS)**

- a) You are consulted to construct a water pan in Machakos, which is a water conservation structure. Explain how you will use automatic leveller in construction of a water pan in respect to the three properties of levelling. (6 marks)
- b) Discuss the type of errors experienced in the use of mapping and levelling instruments in determining the soil and water conservation site. (6 marks)
- c) Discuss four site factors considered during the design for water harvesting systems for crop production. (8 marks)

**QUESTION FIVE (20 MARKS)**

- a) Discuss the process of determining runoff discharge from Machakos town after rainfall intensity of 40mm/hr. (6 marks)
- b) Describe four errors that affects observation during measuring of precipitation. (8 marks)
- c) There are different methods of surveying; each method is specific to its area of use. Describe three methods of surveying that can be use in an agricultural land. (6 marks)