



MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF AGRICULTURAL SCIENCES

DEPARTMENT OF AGRICULTURAL EDUCATION AND EXTENSION

AUGUST SESSION EXAMINATION FOR

BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION AND EXTENSION

AGN 352: SOIL AND WATER CONSERVATION

DATE: SCHOOL BASED

TIME:

INSTRUCTIONS:

Answer question ONE and any other TWO questions

QUESTION ONE (30 MARKS)

- Explain the causes of land degradation (3 marks)
- Explain five soil erosion control management practices that reduce erosion (5 marks)
- What is regarded as Personal Errors in surveying (2 marks)
- Explain two types of errors in distance measurement. (4 marks)
- Explain the Purpose and scope of terracing (7 marks)
- Explain the term "Straight Line" (2 marks)
- Calculate the distance when given that 30 links have been counted and the length of one link 0.2 m. (2 marks)
- Using a clean diagram, illustrate the composition by volume of Soil as referred to by agriculturalists. (5 marks)

QUESTION TWO (20 MARKS)

- Explain the three Bench Mark types used by surveyors (6 marks)
- A steel tape of nominal length 30 m was used to measure a line AB by suspending it between supports. The following measurements were recorded.

Line	Length measured	Slope angle	Mean temperature	Tension applied
AB	29.872	$3^{\circ}40'$	5°C	120 N

The standardized length of the tape against a reference tape was known to be 30.014 m at 20°C and 50 N tension. If the tape weighs 0.17 N m⁻¹ and has a cross-sectional area of 2 mm⁻², calculate the horizontal length of AB. The Young's modulus (E) for the tape material is 200 kN mm⁻¹ and the coefficient of thermal expansion (α) is 0.000 011 2 per °C. (14 marks)

QUESTION THREE (20 MARKS)

- a) What do you understand by the term soil (2 marks)
- b) Explain the term “base rate” as used in soil water infiltration (5 marks)
- c) i) Define the term infiltration (2 marks)
- ii) The infiltration capacity in a basin is represented by Horton’s equation as: $f_b = 3.0 + e^{(-2t)}$, where f_p is in cm/h and t is in hours.
Assuming the infiltration to take place at capacity rates in a storm of 60 minutes duration, estimate the depth of infiltration in the first 15 minutes (11 marks)

QUESTION FOUR (20 MARKS)

- a) Explain the four factors affecting amount and distribution of precipitation (8 marks)
- b) The soil loss from a farm planted with maize was estimated to be 115Mg ha⁻¹ yr⁻¹ by the Universal Soil loss Equation. If the field was 125m long with a uniform slope of 15%, determine the soil loss from the field after terracing if the initial practice was contour farming. Use the Table 1 and assume that the cropping management remained the same. (12 marks)

Table 1: Control practice factor values

%Slope	Contour farming	Contour Farming + strip cropping + Rotation of crops	Contour Farming + Terracing
2-7	0.50	0.25	0.10
8-12	0.60	0.30	0.12
13-18	0.80	0.40	0.16

QUESTION FIVE (20 MARKS)

- a) Clearly differentiate between Accuracy and Precision (2 marks)
- b) During a profile leveling, the following consecutive readings were taken: 3.81(BM1), 1.62, 2.71, 3.73, 3.92, 1.60, 2.87, 3.37, 1.96, 1.59, 3.45, 2.87, 1.87 and 1.14 (on BM2). The stations were spaced at intervals of 20m. The dumpy level was moved after 5th and 10th

readings. The elevation of BM1 was 2623.35m above mean sea level. (18 marks)

Book the above readings in a levelling field notebook using RISE and FALL method.