MACHAKOS UNIVERSITY

University Examinations 2018/2019

SCHOOL OF AGRICULTURE AND NATURAL RESOURCES

DEPARTMENT OF AGRICULTURAL EDUCATION

FOURTH YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR EVIRONMENTAL STUDIES (RESOURCE CONSERVATION)

BACHELOR OF EDUCATION

AGN 352: SOIL AND WATER CONSERVATION

DATE: 9/5/2019   **TIME: 2:00 – 4:00 PM**

INSTRUCTIONS:

   Answer question ONE and any other TWO questions

   YOU MAY USE CALCULATOR

QUESTION ONE (COMPULSORY) (30 MARKS)

a) Explain the Causes of land degradation (3 marks)

b) State five soil Erosion Control Management practices that reduce erosion: (5 marks)

c) What do you understand by personal errors in survey. (2 marks)

d) Explain two types of errors in distance measurement. (4 marks)

e) Explain the Purpose and scope of terraces: (7 marks)

f) In your own words explain what you understand by the term "Straight Line' (2 marks)

g) Calculate the distance when given that 30 links have been counted and the length of one link = 0.2 m. (2 marks)

h) Using a clean diagram, illustrate the composition by volume of Soil as referred to by agriculturalists. (5 marks)

QUESTION TWO (20 MARKS)

a)   Explain the three Bench Mark types used by surveyors   (6 marks)

b)   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	$3^0 40$'	$5^0 C$	120 N

The standardized length of the tape against a reference tape was known to be 30.014 m at 200C 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 $^0 C$.   (14 marks)

QUESTION THREE (20 MARKS)

a)   What do you understand by the term; Soil?   (2 marks)

b)   Clearly explain what you understand by "Random errors"   (5 marks)

c)   What is infiltration?   (2 marks)

d)   The infiltration capacity in a basin is represented by Horton's equation as;

$f_b = 3.0 + 3^{(-2t)}$, where fp 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. Use the Table 1 below 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   (6 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.

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

(14 marks)