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 $464cm^3$ 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:

   i.   Porosity   (3 marks)

   ii.   Soil moisture content   (3 marks)

   iii. Volumetric moisture content   (2 marks)

   iv.   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)