



**MACHAKOS UNIVERSITY**

ISO 9001:2015

SCHOOL OF AGRICULTURE AND NATURAL RESOURCES

DEPARTMENT OF AGRICULTURAL EDUCATION

**Supplementary/Special Examination for Degree in Agricultural Education**

**AGN 352: SOIL AND WATER CONSERVATION**

**Date: xxx**

**Time:xxxx**

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**Instructions: Answer question ONE and any other TWO questions**

**QUESTION ONE (30 Marks)**

- 1) Differentiate between **(1 Mark)**
  - a) land and soil degradations **(1 Mark)**
    - i) Accuracy and precision **(1 Mark)**
    - ii) Back site and fore site **(1 Mark)**
  - b) Explain briefly what you understand by the term error with respect to survey **(1 Mark)**
  - c) What are the advantages of plane tabling **(3 Marks)**
  - d) Explain the factors that affect amount and distribution of precipitation **(5 Marks)**
  - e) Explain three methods of precipitation measurement **(3 Marks)**
  - f) Calculate the annual water loss a  $5\text{km}^2$  reservoir when  $U=10.3\text{km/h}$  and  $e_s$  and  $e_d$  are 14.2 and 11mm of mercury respectively **(6 Marks)**
  - g) Explain the factors affecting water erosion **(3 Marks)**
  - h) Explain how the following factors affect erosion **(1 Mark)**
    - i) Erosivity **(1 Mark)**

- ii) Erodibility (1 Mark)
- 2) Define the following terms
- a) Land degradation (1 Mark)
- b) Bench Mark (1 Mark)
- c) Hydrology (1 Mark)

**QUESTION TWO (20 Marks)**

- i) What is land conservation? (2 Marks)
- ii) State using a schematic diagram, the processes of soil erosion (6 Marks)
- iii) Differentiate between mechanical and chemical soil erosion (6 Marks)
- iv) State two main Effects/Consequences of Soil Erosion Soil (4 Marks)
- v) State and explain methods of making linear measurements (3 Marks)

**QUESTION THREE (20 Marks)**

- a) Explain the basic rules of levelling (5 Marks)
- b) Explain simple steps of setting up a tripod (5 Marks)
- c) During a profile leveling, readings were taken from points A to F. The reading at point A was 1.317 taken on a TBM (20.794), point B was 3.018 taken underside of bridge, point C was a change point with readings 2.894, and 1.427, point D was 2.905 taken underside of bridge, point E was 3.602 taken underside of bridge, and F was 1.498 taken on a TBM (19.144). Book the above readings in a leveling field notebook using RISE and FALL method (10 Marks)

**QUESTION FOUR (20 Marks)**

- a) List and describe at least six (6) major processes in the hydrologic cycle (6 Marks)
- b) Briefly explain how evaporation can be measured from a weather station (5 Marks)
- c) Determine the soil loss from a field with the following characteristics: (3 Marks)

Rainfall erosivity = 2564

Erodibility = 0.015

Slope length = 2.6

Steepness = 1.2

Management = 0.55

Conservation = 0.4

- d) There are four rain gauge stations existing in a river catchment. The average annual rainfall values at these stations are 800, 620, 400 and 540mm respectively. **(2 Marks)**
- e) Determine the optimum number of rain gauges for the catchment if it is desired to limit the error in the mean value of rainfall to 10%. **(2 Marks)**
- f) How many more gauges will be required to be installed? **(2 Marks)**

**QUESTION FIVE (20 Marks)**

- i) Explain five types of land surveying **(10 Marks)**
- ii) Explain the Purpose and scope of terraces: **(10 Marks)**