

GWANDA STATE UNIVERSITY



FACULTY OF NATURAL RESOURCES MANAGEMENT AND AGRICULTURE

DEPARTMENT OF HORTICULTURE AND CROP PRODUCTION

PROGRAMME: BSc HONOURS in CROP SCIENCE

LCS4103: SOIL AND WATER CONSERVATION

FINAL EXAMINATION

MAIN PAPER

SEPTEMBER 2023

This examination paper consists of 3 pages.

Time Allowed: Three (3) Hours

Total Marks: 100

Special Requirements: Scientific calculator, ruler (supplied by student)

Examiner's Name: Mr Madzaramba T.H

Instructions

1. Answer **ALL** questions in Section A
2. Answer any **THREE (3)** questions in Section B

Mark allocation

Question	Marks
Section A	40
Section B	60
Total attainable marks	100

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SECTION A: Answer **ALL** questions.

Question 1

- a) Define soil erosion [2]
- b) Briefly explain the causes of soil erosion. [8]
- c) Differentiate between agronomical and biological measures for water erosion control.
Provide three (3) examples of each control method. [10]

Question 2

- a) Compute the discharge of a trapezoidal open channel with a base width of 2.5m, a side slope of 2:1, and a hydraulic radius of 0.8 meters. [8]
- b) Write down the USLE equation and briefly describe each variable [12]

SECTION B: Answer any **THREE** questions.

Question 3

Describe the steps involved in implementing rainwater harvesting techniques in both catchment and in-field scenarios. [20]

Question 4

- a) Design a V-notch weir for a water reservoir with a catchment area of 30 ha. The weir should have a discharge coefficient of 0.62. Calculate the weir's discharge capacity for a water depth of 0.8 meters. [6]
- b) Analyze the causes, effects, and potential solutions for soil compaction in agricultural fields. [14]

Question 5

- a) Examine the environmental impacts of traditional agro systems on groundwater quantity and quality [8]
- b) Assuming that an earthen channel is on grade of 1m/1km, depth of water 20cm, bottom width of 40cm and side slopes 1.5: 1, calculate the velocity of flow and carrying capacity of the channel. Take $n = 0.03$. [12]

Question 6

- a) Determine the flow velocity in a rectangular open channel with a discharge of $0.8\text{m}^3/\text{s}$ and a cross-sectional area of 2.4m^2 . [5]
- b) Discuss the potential challenges and limitations of using erosion models and decision support systems in real-world agricultural settings. [15]

Question 7

- a) Elaborate on the process of leaching in soil and its significance in nutrient management. [8]
- b) Discuss the consequences, and mitigation strategies for salinization in irrigated agricultural lands. [12]

END OF QUESTION PAPER!!!