

GWANDA STATE UNIVERSITY



FACULTY OF NATURAL RESOURCES MANAGEMENT AND AGRICULTURE

DEPARTMENT OF CROP SCIENCE

PROGRAMME: BSc HONOURS CROP SCIENCE

LCS4213: IRRIGATION AGRONOMY

FINAL EXAMINATION

JULY 2023

This examination paper consists of 3 pages

Time Allowed: 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 in SECTION A.

**Question 1**

a) Briefly explain the meaning of the following terms

i. Field capacity [4]

ii. Management allowable depletion (MAD)

[4]

iii. Available Moisture content (AMC) [4]

iv. Permanent wilting point (PWP) [4]

v. Saturation point [4]

b) Describe the role of innovative technologies in irrigation agronomy [8]

c) An undisturbed soil sample was collected from a field, two days after irrigation when the soil moisture was near field capacity. The inside dimension of core sampler was 7.5 cm diameter and 15 cm deep. The weight of the wet soil and cylinder was 2.76kg. The dry weight of the soil was 2.61kg. Weight of core sampling cylinder was 1.56 kg.

Use the information provided to determine the available moisture holding capacity of soil and the water depth in centimeter per meter depth of soil

[12]

[40]

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

**Question 2**

Climate change is associated with an increase in atmospheric temperatures and reduced precipitation in the Global South. In commercial farming, irrigation is regarded as a solution to reduce the severity of climate change. Critically discuss constraints to irrigation development in Zimbabwe [20]

### Question 3

- a) Outline disadvantages of surface irrigation systems [8]
- b) Explain in detail factors that influence the selection of a suitable irrigation method in commercial farming [12]

### Question 4

- a) Define the term irrigation scheduling [2]
- b) Given the following information: Type of pan: Class A evaporation pan. Water depth in pan on day 1 = 150 mm. Water depth in pan on day 2 = 144 mm (after 24 hours). Rainfall (during 24 hours) = 0 mm. Assume  $K_{pan} = 0.75$  and a bean crop 45 days after planting. Determine  $E_{t_0}$  and  $ET_{crop}$  [8]
- c) What are the benefits of irrigation scheduling [10]

### Question 5

A farmer intends to produce a crop of wheat and the following information is provided. Total irrigable area to be irrigated is 18 ha, soil is medium texture loam, root depth is 0.7m. Recorded peak daily water use is 5.8mm/day. The available moisture is 140mm/m. Allowable depletion is 50%. Soil infiltration rate is 5-6mm/hr. You are also told that the climate is moderate.

Calculate:

- a) Net depth of application [4]
- b) Irrigation frequency [4]
- c) Gross depth of application [4]
- d) Volume of application [4]
- e) System capacity (Q) taking operating time of 11hrs per shift at 2 shifts per day and an irrigation cycle of 7 days to complete the irrigation cycle [4]

### Question 6

- a) Suggest advantages of localised irrigation systems [8]
- b) Enumerate the necessity of irrigation in commercial farming [12]

**END OF QUESTION PAPER!!!**