



*(University of Choice)*

**MASINDE MULIRO UNIVERSITY OF  
SCIENCE AND TECHNOLOGY  
(MMUST)**

MAIN CAMPUS

**UNIVERSITY EXAMINATIONS  
2021/2022 ACADEMIC YEAR**

**THIRD YEAR SECOND SEMESTER MAIN EXAMINATION FOR THE  
DEGREE OF BACHELOR OF SCIENCE IN AGRICULTURAL  
ECONOMICS**

**COURSE CODE: AEN 303**

**COURSE TITLE: IRRIGATION AND DRAINAGE PRACTICES**

**DATE: 25<sup>TH</sup> APRIL, 2022**

**TIME: 3-5PM**

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**Instructions to candidates**

- This paper consists of two sections
- Answer **ALL** questions in **SECTION A** and **TWO** questions in **SECTION B**.
- All symbols have their usual meanings unless otherwise stated.
- One Cartesian graph paper should be provided.
- Candidates should not write anything on the question paper.
- Time allowed is **TWO (2)** hours.

MMUST observes **ZERO** tolerance to examination cheating

This Paper Consists of 3 Printed Pages. Please Turn Over.

**SECTION A (Compulsory): 50 MARKS****Question ONE (25 marks)**

- a) Differentiate between infiltration and percolation (2 marks)
- b) What are the objectives of designing an irrigation system (2 marks)
- c) Briefly explain the following terms used in furrow irrigation system
- i. Intake opportunity time
  - ii. Cut back stream (4 marks)
- d) Highlight on THREE advantages and TWO disadvantages of drip irrigation system over other systems of irrigation (5 marks)
- e) Explain the factors that govern design of border irrigation system (6 marks)
- f) Highlight on FOUR advantages and TWO disadvantages of irrigated agriculture (6 marks)

**Question TWO (25 marks)**

- a) Consider a crop with a rooting depth of 0.6m grown in a field with the following data:  $B.d = 1.25 \text{ g/cm}^3$ ,  $FC = 16\%$ ,  $PWP = 8\%$ , the field is to be irrigated when 30% of TAWC is remaining. Compute the Design Net Water Requirement (DeNWR) (4 marks)
- b) State the various components of a typical drip irrigation system (5 marks)
- c) State briefly the possible causes of salinity and alkalinity of irrigated lands (6 marks)
- d) Briefly explain the main factors that need to be considered when selecting an appropriate surface irrigation system (10 marks)

**SECTION B (Answer any TWO Questions): 20 MARKS****Question THREE (10 marks)**

Discuss the FIVE factors that help in the selection of an irrigation system. (10 marks)

**Question FOUR (10 marks)**

In a furrow irrigation trial, the following data was availed.

Distance from furrow head (m)	Advance time (mins)
0	0
10	1.5
20	3.5
30	6.0
40	10.0
50	19.0
60	30.0

Use of double ring infiltrometer gave  $i = 2.5t^{-0.5}$  and  $Di = 50\text{mm}$ . Estimate the length of furrow to keep deep percolation minimum (10 marks)

**Question FIVE**

**(10 marks)**

A cotton crop is to be grown in an area designated for sprinkler system. The following data is available: DRZ = 0.8m, ETc = 6mm/day, MAD = 70%, FC = 28%, PWP = 16%, B.d = 1.2g/cm<sup>3</sup>. A period of 2 days is required for various farm operations and the system efficiency is 85%. If the water is sprinkled at a rate of 8 mm/hr and there are 2 rest days, compute:

- i. Net Water Requirement (NWR) (2 marks)
- ii. Gross Water Requirement(GWR) (2 marks)
- iii. Irrigation Interval (II) (2 marks)
- iv. Design Irrigation Interval (Design II) (2 marks)
- v. Duration of water application (2 marks)

