



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY
Department of BUILDING & Civil engineering
UNIVERSITY EXAMINATION FOR:

BACHELOR OF SCIENCE IN CIVIL ENGINEERING
ECV 4423 : IRRIGATION ENGINEERING 11

END OF SEMESTER EXAMINATION
SERIES: APRIL 2025
TIME: 2 HOURS

PAPER B

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **five** questions.

Attempt question ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

QUESTION ONE (COMPULSORY) 30 Marks

- a) Explain water logging in irrigation (10 marks)
- b) Explain the procedure for operating sprinkler irrigation (10 marks)
- c) Explain the procedure of lining irrigation canal for better efficiency (10 marks)

ANSWER ANY TWO QUESTIONS FROM THIS SECTION

QUESTION TWO (20 Marks)

- a) Explain quality of irrigation water in relation to crop yield (8 marks)
- b) Explain the advantages of drip irrigation (8 marks)
- c) Determine the corresponding values for $ET_{cro-loc}$ for localized irrigation peak demand given; peak crop water requirement for mature citrus trees is estimated to be 7.1mmper day. Using the modified Penman Monteith method. The ground cover estimated at 70%. The suggested values for K are 0.82 and 0.85 based on Freeman Garzoli and 0.80 based on Decoix. (4marks)

QUESTION THREE (20 Marks)

- a) A farm 25ha. Is planned to be brought under sprinkler irrigation .The textural class of the soil is loam to silt loam, having moisture content at field capacity (FC) and permanent wilting point (WP) of about 42% (by volume) and 26% (by volume) respectively. An infiltration test data showed that constant (basic) infiltration rate is 2mm/hr. A hard pan (relatively impervious layer) exist at a depth of 2.0m below the Soil surfaces. Given ET_o as 4.5mm/day. Crop coefficient is 1.1 and climate is windy. Design the sprinkler irrigation system (10 mark)
- b) A semi modular pipe outlet of diameter 15cm .installed on a distribution with the bed level and full supply level at 100.3m and 101.5m respectively. The minimum water level in the watercourse is at 101.15m.Set the outlet for maximum discharge. Take coefficient as $C = 0.62$. Calculate the discharge (10 marks)

QUESTION FOUR (20 Marks)

- a) Explain the operation of sprinkler irrigation system (12 marks)
- b) State the roles of irrigation inspector in irrigation system (8 marks)

QUESTION FIVE (20 Marks)

- a) State the advantages of micro- irrigation (6 marks)
- b) **State** the factors that affect consumptive use. (4 marks)
- c) Compute the application efficiency given; delivery of $10\text{m}^3/\text{sec}$ to a 32ha farm is continued for 4hrs.The tail water is $0.27\text{m}^3/\text{sec}$ Soil probing after investigation indicates that 30cm of water has been stored in the root zine (6 marks)
- d) Explain the break up jet in irrigation system (4 makes)

