



TECHNICAL UNIVERSITY OF MOMBASA
**Faculty of Engineering &
Technology**

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR DECREE IN:

BACHELOR OF SCIENCE IN CIVIL ENGINEERING (BSCE 4 SI)

ECE 2405: IRRIGATION ENGINEERING I

END OF SEMESTER EXAMINATION

SERIES: APRIL 2015

TIME ALLOWED: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- Answer Booklet
- Pocket Calculator

This paper consists of **FIVE** questions. Answer question **ONE (COMPULSORY)** and any other **TWO** questions

Maximum marks for each part of a question are as shown

Use neat, large and well labeled diagrams where required

This paper consists of **TWO** printed pages

Question One (Compulsory)

a) Define the following terms;

- (i) Base period
- (ii) Delta
- (iii) Time factor in irrigation engineering
- (iv) Permanent wilting point

(8 marks)

b) Describe the main causes for the development of salinity and alkalinity in soils

(6 marks)

c) Describe the most common problems that result from using poor quality irrigation water

(4 marks)

d) Assume an earth channel on a grade of 0.1% depth of water 40cm, and side slopes $\frac{1}{2}$ to 1. Calculate:

- (i) Velocity of flow and;
- (ii) Carrying capacity of the channel manning's n is 0.025 (12 marks)

Question Two

- a) Describe why assessment of water is needed in irrigation systems (3 marks)
- b) Outline the various methods of improving duty in irrigation engineering (7 marks)
- c) Determine the depth of irrigation water which would change 30cm depth of loam soil into saline condition, if the electrical conductivity of irrigation water is 1milinhos/cm. The bulk density of the soil is 1.2gm/cm² and density of water is 1gm/cm³. The salination percentage of the soil is 40 (10 marks)

Question Three

A water course commands an irrigated area of 600ha. The intensity of irrigation of rice in this area is 60%. The rice transplantation crop takes 12 days and total water depth required by the crop is 50cm on the field during the transplantation period. During the transplantation period, the useful rain falling on the field is 10cmm the duty of the irrigation water for the crop on the field during transplantation at the head of the field and also at the head of distribution assuming losses of water to be 20% in the water course. Calculate the discharge Q required in the water course. (20 marks)

Question Four

- a) Calculate the capacity of a reservoir from the following data. The culturable command area is 80,000 ha.

Crop	Base Period in days	Area in Ha	Intensity of Irrigation in %
Rice	120	1800	25
Wheat	120	2000	30
Sugar cane	320	2500	20

Assume that canal and reservoir losses are 5%% and 10% respectively. (20 marks)

Question Five

- a) Describe why it is necessary to have cross-drainage works (5 marks)
- b) Describe how object of canal lining
- c)
- d) is necessary in irrigation schemes (7 marks)
- e) Outline the basis of classification of canals (8 marks)