



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

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR:
BACHELOR OF SCIENCE IN CIVIL ENGINEERING

ECE 2405: IRRIGATION ENGINEERING II

END OF SEMESTER EXAMINATION

SERIES: DECEMBER 2013

TIME ALLOWED: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*

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

Maximum marks for each part of a question are as shown

This paper consists of **TWO** printed pages

Question One (Compulsory)

- a) Express 6400 ppm salt concentration in micromhos, millimhos and mhos/cm given salt concentration $\text{mg/l} = 640 \times \text{EC}$, mmhos/cm **(8 marks)**
Where EC = Electricity Conductivity
- b) Express 1170 ppm sodium chloride salt concentration in meq/l given equivalent weight of NaCl = 58.45 **(4 marks)**
- c) Calculate the crest level of main weir and under sluice for a gated diversion structure for the following data:

$$Q_{\max} = 100 \text{ cumics}$$

$$\text{H.F.L} = 100 \text{ m}$$

$$f = 0.1$$

Length of barrage, $L = 200\text{M}$

(18 marks)

Question Two

- a) Describe the most common pump that is in use in irrigation with the aid of a diagram. **(10 marks)**
- b) With the aid of a diagram, describe the parts of the most common cross-section used in irrigation fully with labels **(8 marks)**
- c) Give reasons why a free board is required in a canal system **(2 marks)**

Question Three

- a) Give reasons why irrigation canals should be lined. **(2 marks)**
- b) What are the limitations on its use. **(1 mark)**
- c) Describe the importance properties to be determined for the diagnosis of salt affected soils. **(1 marks)**
- d) Describe the factors that affect the type of canal lining **(14 marks)**

Question Four

It is required to deliver $0.048\text{m}^3/\text{s}$ of water to a height of 24m through a 150mm diameter pipe and 120m long, by a centrifugal pump. If the overall efficiency of the pump is 75% and $f = 0.01$, for the pipeline, calculate the power required to drive the pump **(20 marks)**

Question Five

- a) Outline or describe the advantages of using border method in irrigation **(6 marks)**
- b) Describe the aims of hydraulic design of sprinkler systems in irrigation engineering **(3 marks)**
- c) Describe the types of drainage **(11 marks)**