



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)

ECE 2510: HARBOUR ENGINEERING

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

- a) Outline the importance of seaports in national and international communication **(7 marks)**
- b) Define the following terms:
(i) Harbour
(ii) Port **(4 marks)**
- c) Describe any FOUR types of harbours **(6 marks)**
- d) Outline the factors that determine the choice of location of harbours **(6 marks)**

- e) Draw a well labeled sketch of a medium-sized artificial harbor with full-sized turning basin
(7 marks)

Question Two

- a) State the factors that determine the width of approach channel to a harbor (5 marks)
- b) Using a suitable sketch illustrate the components of width of a two way approach channel
(5 marks)
- c) Sketch typical plans, elevation and section of a ship to illustrate its dimensions and characteristics
(10 marks)

Question Three

- a) Explain the purpose of dredging (2 marks)
- b) State the factors to be considered when: (7 marks)
- (i) Planning a dredging operation
 - (ii) Choosing the suitable dredger for a given operation
- c) Describe the following dredgers using suitable sketches (11 marks)
- (i) Self propelling bucket dredger
 - (ii) Grab hopper dredger
 - (iii) Dipper dredger

Question Four

- a) (i) Outline the assumptions in Nagai's formula for design of breakwaters (5 marks)
- (ii) Sketch the typical pressure diagram that is assumed in Salflou's formula for the design of breakwaters and hence state the formula in its simplified form . (6 marks)
- b) Define the FIVE main wave heights that should be recorded in a harbor for design purposes (6 marks)
- c) Define the following abbreviated ship characteristics used in design: (4 marks)
- (i) DWT
 - (ii) DT

Question Five

Draw well described sketches of the following Harbour structures:

- a) Rubble sloping breakwater (5 marks)
- b) Caisson type upright breakwater (5 marks)
- c) Concrete block type upright breakwater (4 marks)
- d) Block wall Quay (6 marks)