



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

(A Centre of Excellence)

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR:
BACHELOR OF SCIENCE CIVIL ENGINEERING
(BSCE YV, SII)

ECE 2510: HARBOUR ENGINEERING

END OF SEMESTER EXAMINATION
SERIES: DECEMBER 2012
TIME: 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 other **TWO** questions

Maximum marks for each part of a question are as shown

This paper consists of **TWO** printed pages

Question One (Compulsory)

- a) Outline the sequence to be followed in the design of breakwaters. **(10 marks)**
- b) (i) State the simplified Sainfluo's formulae for the determination of wave pressure on an upright breakwater.
- (ii) Sketch the typical pressure diagram that illustrates the above formulae. **(10 marks)**
- c) Describe briefly the assumptions for use of Nagai's formula for the design of sea walls. **(5 marks)**
-

- d) Define the wave heights measured at a harbour for purposes of design of harbour structures. **(5 marks)**

Question Two

- a) Sketch and label the following types of breakwater:
(i) Rubble sloping breakwater
(ii) Concrete block upright breakwater
(iii) Caisson type upright breakwater **(18 marks)**
- b) Describe the procedure of construction of the caisson type upright breakwater. **(2 marks)**

Question Three

- a) Illustrate the components of depth at a harbour that should be allowed for when designing the underkeel clearance. **(6 marks)**
- b) Sketch and label a typical layout of a small artificial harbour. **(6 marks)**
- c) (i) Using a suitable sketch, illustrate the width dimensions of a two lane channel.
(ii) State any **FOUR** factors that determine channel width. **(8 marks)**

Question Four

- a) Describe the following berth structure using suitable sketches;
(i) Block wall quay
(ii) Simple sheet pile wall quay **(10 marks)**
- b) State the advantages of sheet pile cell quays over other quays. **(3 marks)**
- c) (i) Outline the factors that affect the choice between solid or open type of berth construction.
(ii) State any **FOUR** types of materials used for open type construction. **(7 marks)**

Question Five

- a) Describe briefly the main types of harbour. **(6 marks)**
- b) State the factors that determine the following:
(i) Decision to build a harbour
(ii) Choice of location of harbour **(6 marks)**
- c) Define the following terms used in harbour design:
(i) Displacement Tonnage
(ii) Dead Weight Tonnage **(3 marks)**
- d) Sketch the following types of dredgers:
(i) Bucket Dredger
(ii) Grab Hopper Dredger **(5 marks)**