



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 2414: FOUNDATION ENGINEERING II

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) Explain the working of a standard penetration test **(4 marks)**
- b) A footing 3m square is to be located at a depth of 1.5m in a sand deposit. The water table is 5m below the surface. Values of standard penetration resistance were determined as shown below:

Depth (m)	N
1.50	9
2.25	13
3.00	12
3.75	16
4.50	18

Determine the allowable bearing capacity for the footing using:

- (i) Terzaghi and peck method (5 marks)
- (ii) Meyerhot method (3 marks)
- (iii) Discuss remote sensing (6 marks)

Question Two

- a) Define with illustrations FOUR types of Caissons (8 marks)
- b) Explain the design and construction of pier foundation (6 marks)
- c) Explain how open caissons are founded on site (4 marks)
- d) Name TWO soil resistance properties which act as countermeasures to sliding of caissons under horizontal forces (2 marks)

Question Three

- a) Distinguish between a bored pile and a driven pile in their installation (4 marks)
- b) Mention FOUR types of pile depending on the material used (4 marks)
- c) A precast concrete pile 450mm diameter to form part of a jetty is to be driven into a river bed, which consist of a depth of sand. The results of standard penetration test in the sand are as follows:

Depth (m)	1.5	3.0	4.5	6.0	7.5	9.0	10.5	12.0
N	4	6	13	12	20	24	35	39

The pile is required to support a compressive load of 650KN and to withstand an uplift load of 225KN; the load factor in each case is to be 2.5. Determine the depth to which the pile must be driven and hence the load factor under compressive load (12 marks)

Question Four

- a) State TWO advantages and TWO disadvantages of geophysical test methods in ground exploration (4 marks)
- b) Using illustrations, describe how waves are generated, transmitted and retracted in seismic refraction method (8 marks)
- c) Describe flanking span abutment (4 marks)
- d) Define cofferdam and state THREE design considerations (4 marks)

Question Five

- a) Mention THREE stages of constructing a bored pile (3 marks)
- b) Determine the outside dimensions, internal dimensions and thickness of wall of a square open Caisson to be sunk through 40m of sand and water to bedrock if the allowable bearing capacity is 200g/m². The Caisson receives a load of 9440+ from the super structure. The mantle friction is 3t/m². Assume feasibility of sinking of the caisson (7 marks)

- c) Illustrate THREE methods of founding a box Caisson **(4 marks)**
- d) Explain how a pier or Caisson can be design to resist lateral loads **(6 marks)**