

  
TECHNICAL UNIVERSITY OF KENYA  
FACULTY OF ENGINEERING SCIENCE & TECHNOLOGY  
SCHOOL OF INFRASTRUCTURE & RESOURCE ENGINEERING  
DEPARTMENT OF CIVIL & CONSTRUCTION ENGINEERING  
BACHELOR OF ENGINEERING IN CIVIL ENGINEERING  
END OF SEMESTER 2 YEAR 4 EXAMINATIONS AUGUST 2016

EECQ 4271 FOUNDATION ENGINEERING 1B

TIME 2 HOURS

*Instructions to Candidates*

Answer Question One and any other Two Questions

**QUESTION ONE [COMPULSORY] (30 Marks)**

- a) A pile of size 200mm  $\times$  200mm in section  $\times$  15m in length is to be driven into a saturated coarse sand that extends to great depth

Determine the allowable load on the pile by static formula approach using

- i. Terzaghi's method
- ii. Vesic formula
- iii. Berezantser's curve method,

And for each case compute the skin resistance using Nordlund's method

Take

- Average effective density of the soil as 1800 Kg/m<sup>3</sup>
- Average N-value in penetration test is 18 (no overburden correction for N required)
- Factor of safety = 3
- $\phi = 31^\circ$
- $\delta = \frac{3}{4} \phi$
- $N_q = 16$  (for Terzaghi  $\phi = 31^\circ$ )
- $N_q = 14$  (for Vesic when  $\phi = 31^\circ$ )

- $N_u = 28$  (for Benzgarnites when  $\phi = 31^\circ$ )
- $C_r = 0.89$  (for  $\phi = 31^\circ$ )
- $K_u = 1.2$

### QUESTION TWO (20 Marks)

- a) Explain
- the field method of carrying out a pile load test using a reaction beam
  - how to determine the allowable load from a single pile load test data
  - the negative friction on piles
  - using sketches show the field conditions that creates negative friction
- b) Explain how to obtain the pile bearing capacity from penetration test results data

### QUESTION THREE (20 Marks)

- a) Define the following
- Pile
  - Driven and cast in-situ pile.
- b) State
- the type of loading a pile may be subjected to
  - on what the bearing capacity of a pile depends on
  - how to determine the ultimate bearing capacity of a pile
  - the dynamic pile driving formula arrangement with all the forces
- c) Using a sketch explain an under reamed pile indicating the forces acting on it.
- d) For a piles explain the bearing capacity of skin resistance giving the equation

### QUESTION FOUR (20 MARKS)

- a) Describe the use of caissons as well foundation at initial and final stages of foundation installation (5 marks)
- b) Describe using sketches negative friction on pile (8marks)
- c) Explain the behavior of pile or pile groups subjected to lateral loads (9marks)

**QUESTION FIVE (20 MARKS)**

a) State four reasons for shoring of a structure

(4marks)

b) Using a sketch

- i. illustrate raking shores to a story building
- ii. a arrangement for flying shores

(8marks)

c) Describe underpinning by

- i. Load transfer to adjacent soil
- ii. Continuous pit method

(8marks)