



**TECHNICAL UNIVERSITY OF MOMBASA**  

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**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**DEPARTMENT OF BUILDING AND CIVIL ENGINEERING**  
**UNIVERSITY EXAMINATION FOR:**  
**DIPLOMA IN BUILDING AND CIVIL ENGINEERING**

**EBC 2206 : SOIL MECHANICS II**

**SPECIAL/SUPPLEMENTARY EXAMINATION**

**SERIES: SEPTEMBER 2018**

**TIME: 2 HOURS**

**DATE: -- Sep 2018**

**Instructions to Candidates**

You should have the following for this examination

*-Answer Booklet, examination pass and student ID*

*-Drawing instruments.*

This paper consists of **FIVE** questions.

Attempt **any THREE** questions.

**Do not write on the question paper.**

**QUESTION ONE**

**(a)** State **THREE** reasons that make the “triaxial shear strength test.” preferred to the direct shear strength test.” **(6 marks)**



(b) The following results were obtained from drained shear strength tests done on a silty clay soil using a shear box.

Normal stress (KN/m <sup>2</sup> )	150	250	350	450
Shear stress at failure (KN/m <sup>2</sup> )	89	125	160	195

Determine the shear strength parameters for the soil tested.

(c) Another specimen similar to the soil in 4.0 (a) is to be tested using triaxial apparatus under drained conditions, at a cell pressure of 100KN/m<sup>2</sup>.

(i) Determine deviator stress that is anticipated to act at failure,

(ii) Calculate normal stress and shear stress that would develop on plane of failure.

**(14 marks)**

### QUESTION TWO

(a) Outline **THREE** modes of failure for triaxial test samples

**(9 marks)**

(b) Outline any **ONE** condition of test applied in triaxial tests.

**(5marks)**

(c) (i) Sketch typical graphical results expected from an undrained triaxial test.

(ii) Explain the sketch in (c) (i).

**(6 marks)**

### QUESTION THREE

(a) (i) Outline **THREE** conditions a foundation must satisfy.

(ii) Briefly describe General mode of failure that can occur beneath a footing.

**(12 marks)**

(b) A square footing 2.2m x 2.2m is to be founded at a depth of 2.0m in a sand soil of the following properties:  $\phi = 35^\circ$   $C = 15\text{KN/m}^2$   $\gamma_b = 17.5\text{KN/m}^3$  and  $\gamma_{sat} = 20\text{KN/m}^3$

Determine the ultimate bearing capacity considering water table to be at foundation level.

**(8 marks)**

#### QUESTION FOUR

(a) State four assumptions made in Terzaghi's theory applied to footings. (8marks)

(b) A strip footing is to transmit a safe load of 325KN/m run at a depth of 2m to a ground of the following properties:  $C = 18\text{KN/m}^2$   $\phi = 20^\circ$   $\gamma_b = 19 \text{KN/m}^3$

Using figure 1, determine breadth for the footing taking. Take factor of safety  $F = 3$ .

(12 marks)

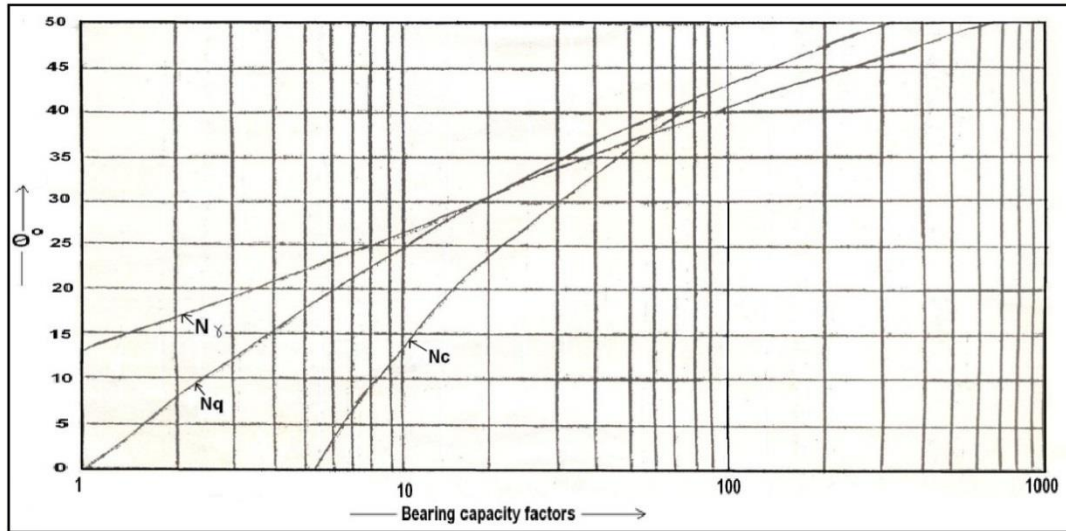


Fig.1

#### QUESTION FIVE

(a) Briefly explain the following:

- (i) Cohesion
- (ii) Angle of shearing resistance
- (iii) Undisturbed soil

(10 marks)

(b) (i) Explain the term 'shallow footing' applied to Terzaghi's theory on shallow foundations.

(ii) Explain each term that form Terzaghi's theory for bearing capacity. (10 marks)