



TECHNICAL UNIVERSITY OF MOMBASA
**Faculty of Engineering &
Technology**

DEPARTMENT OF BUILDING & CIVIL ENGINEERING
DIPLOMA IN BUILDING & CIVIL ENGINEERING (DBCE 12J)

EBC 2302: SOIL MECHANICS II

END OF SEMESTER EXAMINATION

SERIES: DECEMBER 2013

TIME ALLOWED: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*
- *Scientific Calculator*

This paper consists of **FIVE** questions. Answer any **THREE** questions

Maximum marks for each part of a question are as shown

This paper consists of **FOUR** printed pages

Question One

- a) Name and explain the TWO shear strength parameters **(4 marks)**
- b) The data in Table 1 refers to triaxial tests performed on an undistributed soil samples. The load dial calibration factor is 1.4N per division. Each sample is 75mm long and 37.5mm diameter. Plot a graph to determine the shear strength parameters **(11 marks)**

TEST	CELL PRESSURE (KN/m ²)	AXIAL LOAD DIAL READING (DIVISIONS AT FAILURE)
1	50	65
2	150	105
3	250	146

- c) Briefly explain the following conditions while testing soil for shear strength:
(i) Undrained
(ii) Drained **(5 marks)**

Question Two

- a) With aid of a sketch, describe the translational slides. **(5 marks)**
- b) The bank of a canal has the profile shown in figure 1. The material is homogeneous clay of density 2000kg/m³, cohesion 20KN/m² and the angle of shearing resistance zero. For the trial slip circle shown, the area ABCDE is 200m² and the centroid is at G. Find for each of the following conditions the factor of safety for this slip circle:
(i) If the water in the canal is level with the top of the bank
(ii) If the canal is empty
In both cases, allow for a tension crack 3m deep which may be filled with water.

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(15 marks)

Question Three

- a) With the aid of a sketch, describe General shear failure mode under footings. **(7 marks)**
- b) A strip footing 2.5m wide is to be constructed at a depth of 3m below the ground level. Calculate the safe bearing capacity of the soil given the following data:
- Cohesion of soil = 65KN/m²
 Density of the soil = 1800kg/m³
 Factor of safety = 3

Question Four

- a) Explain the following terms as applied in lateral earth pressure:
- (i) Elastic equilibrium
 (ii) Plastic flow **(4 marks)**
- b) Figure 3 shows a retaining wall supporting soil on its back. Determine the following:
- (i) The shear force in KN at the base of the wall so as to prevent its movement away from the backfill.
 (ii) The height of total horizontal thrust above the base **(16 marks)**
- Figure 3

Question Five

- a) Name and define the FOUR categories of bearing capacity. **(8 marks)**
- b) In a series of unconsolidated-undrained triaxial tests on specimens of a fully saturated clay, the results obtained are given in table 2. Determine the shear strength parameters. **(8 marks)**

ALL-ROUND PRESSURE (KN/m ²)	200	400	600
PRINCIPLAL STRESS DIFFERENCE (KN/m ²)	222	218	220

- c) State FOUR assumptions made in Rankine’s theory of earth pressure. **(4 marks)**

