TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

DIPLOMA IN BUILDING & CIVIL ENGINEERING (DBCE 13S 14J)

EBC 2207: SOIL MECHANICS 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*

This paper consists of **FIVE** questions. Answer any **THREE** questions of the **FIVE** 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 **THREE** printed pages

Question One

a) Define the following:
    (i) Ultimate bearing capacity
    (ii) Allowable bearing capacity   **(4 marks)**

b) Explain the THREE considerations that a foundation is expected to satisfy   **(6 marks)**

c) A footing 2.5m square is located at a depth of 1.5m in dense sand of shear strength parameters
$\phi' = 40^o$ $C' = 25KN/m^2$
                Determine ultimate bearing capacity using figure 1 provided for the
following cases:
    (i) Ground water level at foundation level
    (ii) Ground water level at the surface:
        $\left(Take \;_b = 17KN/m^3 \;\;\;_{sat} = 20KN/m^3 \right)$

                                                      (10 marks)

Question Two

a) Briefly describe the general mode of shear failure that can occur in a soil below a formation
                                                      (6 marks)
b) Explain the terms in Terzaghi's general expression used to determine ultimate bearing capacity
                                                      (5 marks)
c) A strip footing is designed to carry a safe load of 750KN per meter run a depth of 0.55m in silty sand. Ground water level is at foundation level considering a factor of safety of 3 determine using figure the width of the footing.
    $\phi' = 40^o$, $c' = 0$, $_b = 18KN/m^3$ *and* $_{sat} = 21KN/m^3$

                                                      (9 marks)

Question Three

a) Outline the produce for student penetration test specific gravity for the soil was 2.68, find the void ratio.   **(8 marks)**

b) Explain the adjustment needed if standard penetration test is carried but below water table
                                                    (2 marks)
c) Explain the effect of ground water on foundation settlement   **(4 marks)**

d) Explain the THREE conditions that a foundation is expected to satisfy   **(6 marks)**

Question Four

a) Explain the term shear strength parameter as applied to soils   **(4 marks)**

b) Drained traixial tests were carried out on fully saturated specimens of a clay soil. Each specimen tested measured 38mm in diameter an 76mm in length. The test results were:

Test Number	1	2	3
All round pressure (KN/m^2)	200	400	600
Axial load (N)	480	895	1307
Axial compression (mm)	7.22	8.35	9.42
Volume change (cm^3)	5.25	7.39	9.31

(i) Compute data for principal stresses
(ii) Determine shear strength parameters in terms of effective stresses **(16 marks)**

Question Five

a) Explain:
   (i) The term "Rankine Earth Pressure"
   (ii) Effect of "surcharge" on cohesive soils **(7 marks)**

b) A vertical wall supports a sol mass with horizontal balk and has a uniformly distributed surcharge as shown in figure 1:

figure 1

   (i) Determine distribution of lateral earth pressure at the back of the wall
   (ii) Determine level at which active thrust acts at the back of the wall **(13 marks)**