TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

DIPLOMA IN BUILDING & CIVIL ENGINEERING (DBCE 11)
DIPLOMA IN CIVIL ENGINEERING (DC 11)

EBC 2308: FOUNDATION ENGINEERING

SPECIAL/SUPPLEMENTARY EXAMINATION
SERIES: OCTOBER 2013
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
Maximum marks for each part of a question are as shown
This paper consists of **THREE** printed pages

Question One

a) State the FOUR assumptions made in Rankine's theory of earth pressure.   **(4 marks)**

b) Figure 1 shows the backfill behind a smooth vertical retaining wall.

Figure 1

    (i)   Assuming no tension cracks develop, determine the shear force in KN which must be mobilized beneath the base of the wall to prevent movement away from the backfill.

    (ii)   At what height above the base does the total horizontal thrust act?   **(16 marks)**

Question Two

a) Explain the THREE types of settlement   **(6 marks)**

b) The following readings were obtained from an Oedometer test on a specimen of saturated clay. The load being held constant for 24 hours before the addition of the next increment.

APPLIED STRESS (KN/m^2)	0	25	50
THICKNESS (mm)	19.20	19.00	18.30

At the end of the last load period the load was removed and the sample allowed to expand for 24 hours, at the end of which time its thickness was 18.80mm and its water content was found to be 30.2 per cent. The specific gravity of the soil was 2.65. Compute the void ratio at the start of the test.

                    (10 marks)

c) With the aid of a sketch, explain effect of loss of lateral support on untimbered excavations

                    (4 marks)

Question Three

a) With the aid of a sketch, briefly describe local shear failure   **(6 marks)**

b) A strip footing is to be designed to carry a load of 800KN/m at a depth of 0.5m in a gravelly sand.
$$\phi' = 40^O$$
The appropriate shear strength parameters are C' = 0 and   . Determine the width of the footing if a factor of safety of 3 against shear failure is specified and assuming that the water table may rise to foundation level. Above the water table the unit weight of sand is 17KN/m^3 and below the water table the saturated unit weight is 19.5KNm^3. **(14 marks)**

Question Four

a) Briefly explain the effects of water on earth retaining structures **(6 marks)**

b) A vertical wall, 9m high, supports cohesive soil, the surface of which is level with the top of the wall. The surface has a surcharge of 20KN/m^2; density of soil is 1900kg/m^3, its cohesion is 20KN/m^2 and angle of internal friction is 10o. Find the active thrust on the wall if the soil is water logged (saturated density = 2000kg/m^3) **(14 marks)**

Question Five

a) Outline **TWO** factors that affect soil bearing capacity **(6 marks)**
b) Figure 2 shows the section of a shallow foundation using the information given and chart 1, (Terzaghi's bearing capacity factors for shallow foundations), calculate the safe bearing pressure when water level is at: **(14 marks)**

G.L