THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

HIGHER DIPLOMA IN BUILDING AND CIVIL ENGINEERING
(HD/BC/09)

END OF COURSE EXAMINATIONS

APRIL/MAY 2010 SERIES

EB 2316 : FOUNDATION ENGINEERING I

TIME: 2 HOURS

Instructions to Candidates

You should have the following for this examination:

- Answer Booklet
- Scientific Calculator

This paper consists of **FIVE** Questions.
Answer Question **ONE** (which is compulsory) and any other **TWO** Questions.
Maximum marks for each part of a question are as shown.

Question ONE (Compulsory)

(a). With the aid of a sketch, briefly describe the Dutch Cone Test. **(9 Marks)**

(b). A footing 3m square is to be located at a depth of 1.5m in a sand deposit, the water table being 3.5 below the ground surface. Values of standard penetration resistance were determined as detailed in Table 1. Determine the allowable bearing capacity. Take bulk unit weight γ=17KN/m^3 and submerged unit weight γ=10KN/m^3. Use Figure 1 and 2. **(10 Marks)**

Table 1

Depth (m).	**N**
0.75	8
1.55	7
2.30	9
3.00	13
3.70	12
4.45	16
5.20	20

(c). (i). State **FOUR** assumptions made in Terzaghi's theory of consolidation.

(ii). During a consolidation test, a sample of fully saturated clay soil 30mm thick was consolidated under a pressure increment of 196.2KN/m^2. At the end of the experiment the sample thickness was 26mm. While being allowed to expand the sample thickness increased to 28mm and its moisture was 24%. Determine the void ratio before and after consolidation. Take specific gravity of particles as 2.70. **(11 Marks)**

Question TWO

(a). With aid of sketches, briefly explain the **THREE** types of pressure in relation to earth retaining structures. **(6 Marks)**

(b). Using Fig.3 of a retaining wall determine:

(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. **(14 Marks)**

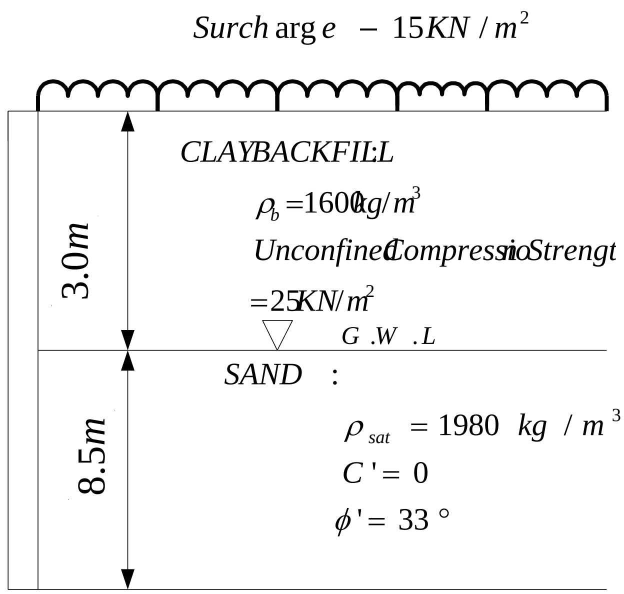

Fig.3

Question THREE

(a). State Terzaghi's formula for strip footings and explain all the terms. **(7 Marks)**

(b). Fig.4 shows the section of a shallow foundation. Using the information given and fig. 4, calculate the safe bearing pressure when water level is at:

(i). Ground level
(ii). 10m below ground level.

(13 Marks)

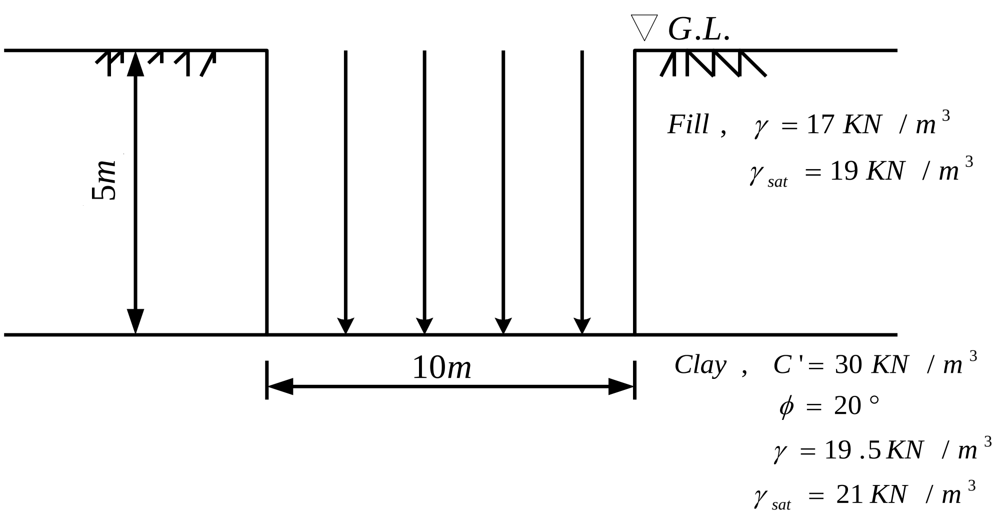

Fig. 4

Question FOUR

(a). Briefly explain the **THREE** consolidated soil conditions. **(6 Marks)**

(b). Distinguish between primary and secondary consolidation. **(4 Marks)**

(c). Table below represents results from an Oedometer test:

	Pressure Increment	**Void Ratio at start of range**	**Void ratio at end of range**
(i).	100-200	0.620	0.541
(ii).	1000 – 1500	0.810	0.720

Find the coefficient of compressibility for each case. **(6 Marks)**

(d). (i). Compute the compression index for case c(ii) above.

(ii). Define the term compression index.

(4 Marks)

Question FIVE

(a). A rectangular footing of size 8m x 2.5m is to be founded at a depth of 1.65m on a layer of soil. Assuming a factor of safety of 3 and using chart (Bearing capacity), determine the safe bearing capacity value. Take $\phi = 15°$, $C = 75KN/m^2$, $\gamma = 20KN/m^3$ **(10Marks)**

(b). Determine the maximum and minimum pressure under the base of the cantilever retaining wall detailed in Figure below. The appropriate shear strength parameters for the soil are C′=0 and Ø′ =40°; unit weight γ=17KN/m^3, the water table being below the base of wall. Take $\delta = 30°$ on the base of the wall.

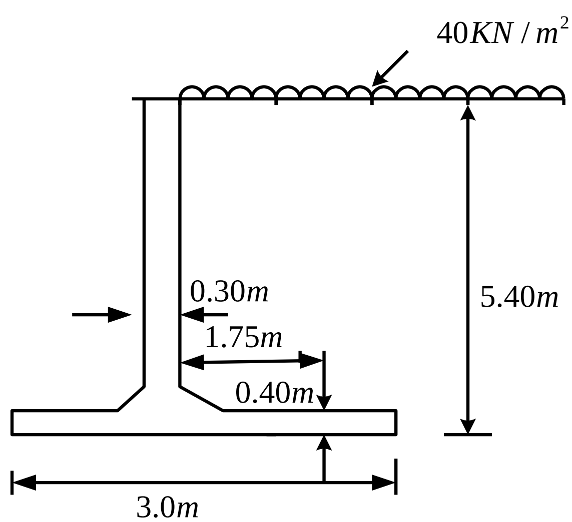

Fig.5 **(10 Marks)**