



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)
Faculty of Engineering and Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

DIPLOMA IN CIVIL ENGINEERING (DC 10A)

DIPLOMA IN BUILDING & CIVIL ENGINEERING (DBC 10A)

EBC 2316: FOUNDATION ENGINEERING I

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: OCTOBER 2012

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*
- *Scientific calculator*
- *Chart 4*

This paper consists of **FIVE** questions. Answer any **THREE** questions
Maximum marks for each part of a question are clearly shown

This paper consists of **THREE** printed pages

Question 1 (20 marks)

- a) State **FIVE** assumptions made in Terzaghi's Theory of consolidation **(5 marks)**
- b) Explain the following terms:
- (i) Over-consolidated soil
 - (ii) Normally consolidated soil
 - (iii) Fully consolidated soil **(4½ marks)**
- c) Oedometer test, was carried out a fully saturated soil, 30 mm thick using a pressure increment of 195KN/m². At the end of the experiment the sample thickness was 26mm. While being allowed to expand the sample thickness increased to 28 mm and its moisture was 24%. Calculate the void ratio before and after consolidation. Take specific gravity of particles as 2.70 **(11½ marks)**

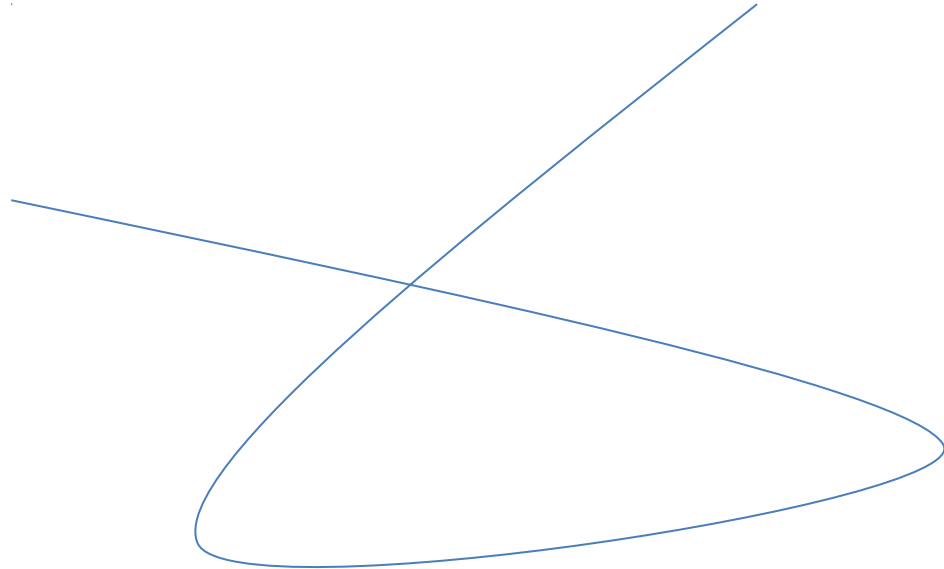
Question 2 (20 marks)

- a) State the **FOUR** assumptions made in Rankine's theory of earth pressure **(4 marks)**
- b) Using figure 1 of a retaining wall determine:
- (i) The shear force in KN to be mobilized the base of the wall so as to prevent movement away from the backfill.
 - (ii) The height of total horizontal thrust above the base **(16 marks)**

4m

Question 3 (20 marks)

- a) Figure 2 shows the section of a shallow foundation using the information given and Chart 4, calculate the safe bearing pressure when water level is at:
- (i) The ground level
 - (ii) Base of the foundation **(10 marks)**



- b) With the aid of sketches, briefly explain the following modes of failure below footings:
- (i) General shear failure
 - (ii) Local shear failure
- (10 marks)**

Question 4 (20 marks)

- a) With the aid of sketches, explain the **THREE** types of pressure in regard to lateral earth **(6 marks)**
- b) Explain the following terms as used in soils:
- (i) Plastic flow
 - (ii) Elastic modulus **(4 marks)**
- c) A circular footing of diameter 1.2m is founded on sand of density 1750kg/m^3 . The angle of internal friction is 36° . Determine the ultimate bearing capacity when the footing is:
- (i) On the ground surface
 - (ii) At a depth 1.5m below the ground surface **(10 marks)**

Question 5 (20 marks)

- a) Explain the following terms used in theory of consolidation.
- (i) Drainage path
 - (ii) Coefficient of compressibility **(5 marks)**
- b) Briefly explain the effect of water on earth retaining structures **(4 marks)**
- c) A rectangular footing of size 9m x 3m is to be founded at a depth of 2m on a layer of soil. Assuming a factor of safety of 3 and using chart 4, determine the safe bearing capacity value.
- $\gamma = 21\text{KN/m}^3$ $\phi = 18^\circ$
- Take $C = 25\text{KN/m}^2$ and **(11 marks)**