TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF BUILDING & CIVIL ENGINEERING
UNIVERSITY EXAMINATION FOR:
DIPLOMA IN BUILDING AND CIVIL ENGINEERING

EBC 2206 : SOIL MECHANICS II

END OF SEMESTER EXAMINATION
SERIES: AUGUST 2019
TIME: 2 HOURS
DATE: Pick Date

<u>**Instructions to Candidates**</u>
You should have the following for this examination
   -Answer Booklet, Scientific Calculator, examination pass and student ID
This paper consists of five questions.
Attempt question ONE (Compulsory) and any other TWO questions.
Do not write on the question paper.

QUESTION ONE

(a) Outline the procedure for carrying out triaxial compression test.

(6 Marks)

(b) The readings given in Table 1 were recorded during shear box tests on samples of a compacted sand. The shear surface measured 60x60 mm. Determine the shear strength parameters.

TABLE 1

Normal Load (N)	Shear Load (N)
110	97
230	198
350	301

(14 Marks)

QUESTION TWO

(a) Explain the following term:

(i) Elastic equilibrium

(ii)Plastic equilibrium

(4 Marks)

(b) A retaining wall having a smooth vertical back retains soil for a depth of 12 m. The water table is at 7.0 m below the surface. The soil consists of two horizontal layers:
Upper layer: c'=0; ϕ'=28^0; Υ=18 kN/m^3 thickness = 7.0 m
Lower layer: c'=0; ϕ'=34^0; Υ_{sat} =20 kN/m^3

(16 Marks)

QUESTION THREE

(a) Identify and describe TWO types of slope failures.

(6 Marks)

(b) A cutting in a saturated clay is inclined at a slope of 1 vertical: 1.5 horizontal and has a vertical height of 10.0 m. The bulk unit weight of the soil is 18.5 kN/m3 and its undrained cohesion is 40 kN/m2 (ϕu=0). Determine the factors of safety against immediate shear strength along the slip circle shown in Fig. 1:

(i) ignoring the tension crack
Sector angle = 84.06^0
Area of slip mass = 77.35 m^2
Centroid distance from O, d=6.50 m

(ii) allowing for the tension crack of water.
   Sector angle = 67.44^0
   Area of slip mass = 71.64 m^2
   Centroid distance from O, d=5.86 m

(14 Marks)

QUESTION FOUR

(a) With the aid of sketches, describe TWO principal modes of shear failure below footings.

(8 Marks)

(b) A shallow strip footing of breadth 3.5 m is to be founded at a depth of 2.0 min a soil which has the following properties:
C=12 kN/m2; ϕ=250; Y=19.0 kN/m3.
Determine the safe load/m run. Use Chart 1 (Fig, 4)
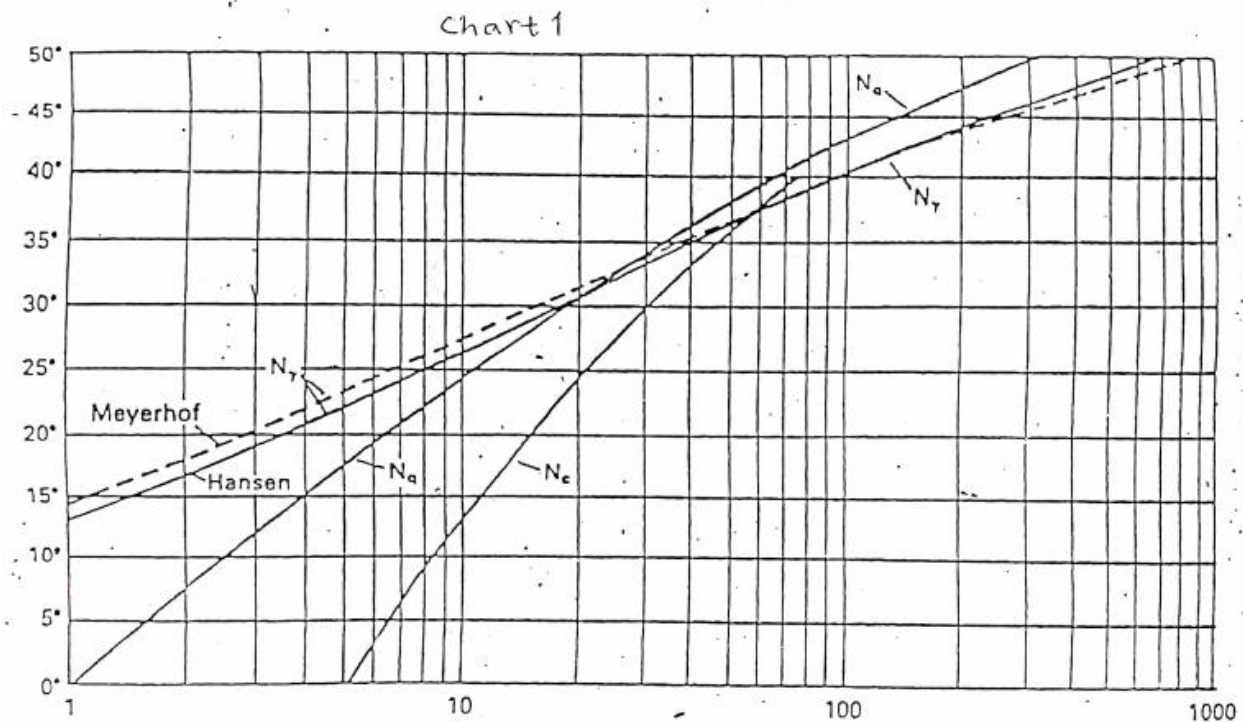
(12 Marks)

FIGURE 4.   BEARING CAPACITY FACTORS
            FOR SHALLOW FOUNDATIONS

QUESTION FIVE

(a) A retaining wall with a smooth vertical back supports soil for a depth of 8.0 m, which has the following properties:

$$c'=20 \text{ kN/m}^2; \phi'=12^0; \Upsilon=18.5 \text{ kN/m}^3$$

Calculate the magnitude of the resultant active thrust when there is a surface surcharge of 25 kN/m².

(14 Marks)

(b) Outline FOUR advantages of shear box test in comparison with triaxial method.

(6 Marks)