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: DECEMBER 2016

TIME: 2 HOURS

DATE: 22 Dec 2016

Question ONE
(a)Briefly explain the consolidated-undrained test for shear strength.

(4 Marks)

(b)A shear box test was carried out on a sandy clay yielding the following results:

Normal Load (N)	108	202	295	390	484	576
Shear load at failure (N)	172	227	266	323	374	425

Area of shear plane = 60 x 60 mm

Determine the values of the shear strength parameters. Use graph paper.

(16 Marks)

Question TWO

(a)A cutting in a saturated clay is inclined at slope of 1 vertical: 1.5 horizontal and has a vertical height of 10.0 m. The bulk weight of the soil is 18.5 KN/m^3 and its undrained cohesion is 40 KN/m^2. Determine the factors of safety against immediate shear failure along the slip circle shown in Figure 1:

(i) ignoring the tension crack

(ii) allowing the tension crack empty of water

(iii) allowing for the tension crack when full of water

(16 Marks)

(b)With the aid of a sketch, describe the occurrence of rotational slips.

(4 Marks)

Question THREE

(a)A retaining wall having a smooth vertical back retains soil for a depth of 12 m. The soil consists of two horizontal layers:

Upper layer: C′ = 0 ϕ' = 28^0 $\gamma = 18\ KN/m2$ thickness = 7.0 m
Lower layer: C′ = 0 ϕ'=34^0 γ = 20 KN/m^2

(16 Marks)

(b)Explain FOUR assumptions made in Rankine's theory of earth pressure.

(4 Marks)

Question FOUR

(a)With aid of a sketch, describe the local shear failure under footings.

(6 Marks)

(b)A shallow square footing of 3.5 mm side is to be founded at a depth of 2.0 m in a soil which has the following properties:

C = 12 KN/m2 ϕ = 250 γ = 19.0 KN/m3

Determine the safe load/m run if the water table:

(i)   is well below foundation level.

(ii)   Is !.0 m below foundation level.

         Use Fig. 2

(14 Marks)

Question FIVE

(a)A retaining wall with a smooth vertical back retains a soil mass containing a horizontal surface to a depth of 5.4bm. Calculate the magnitude of the resultant active thrust on the wall and give its line of action. The soil has the following properties:

$\phi' = 300$ $C' = 20$ KN/m^2 and$\gamma' = 19.8$ KN/m^3

(14 Marks)

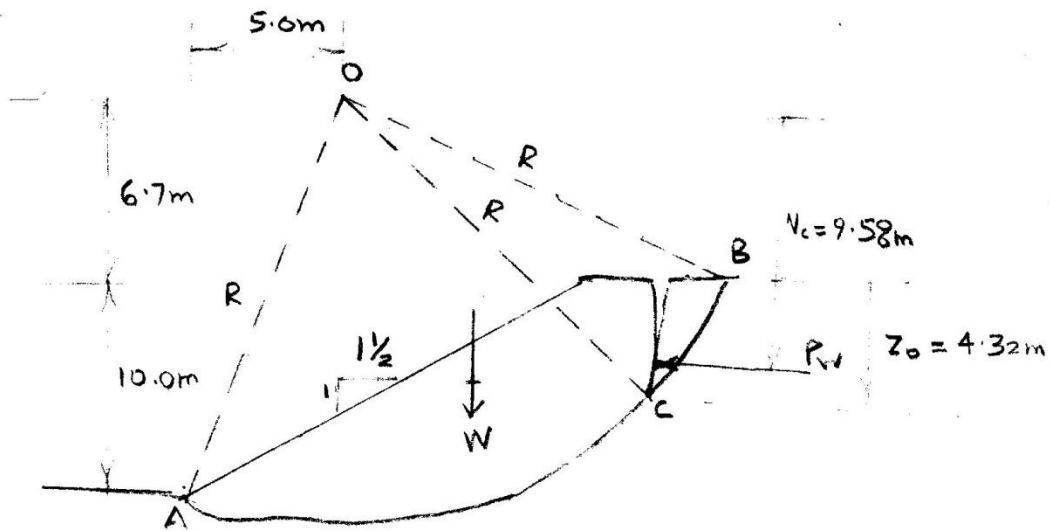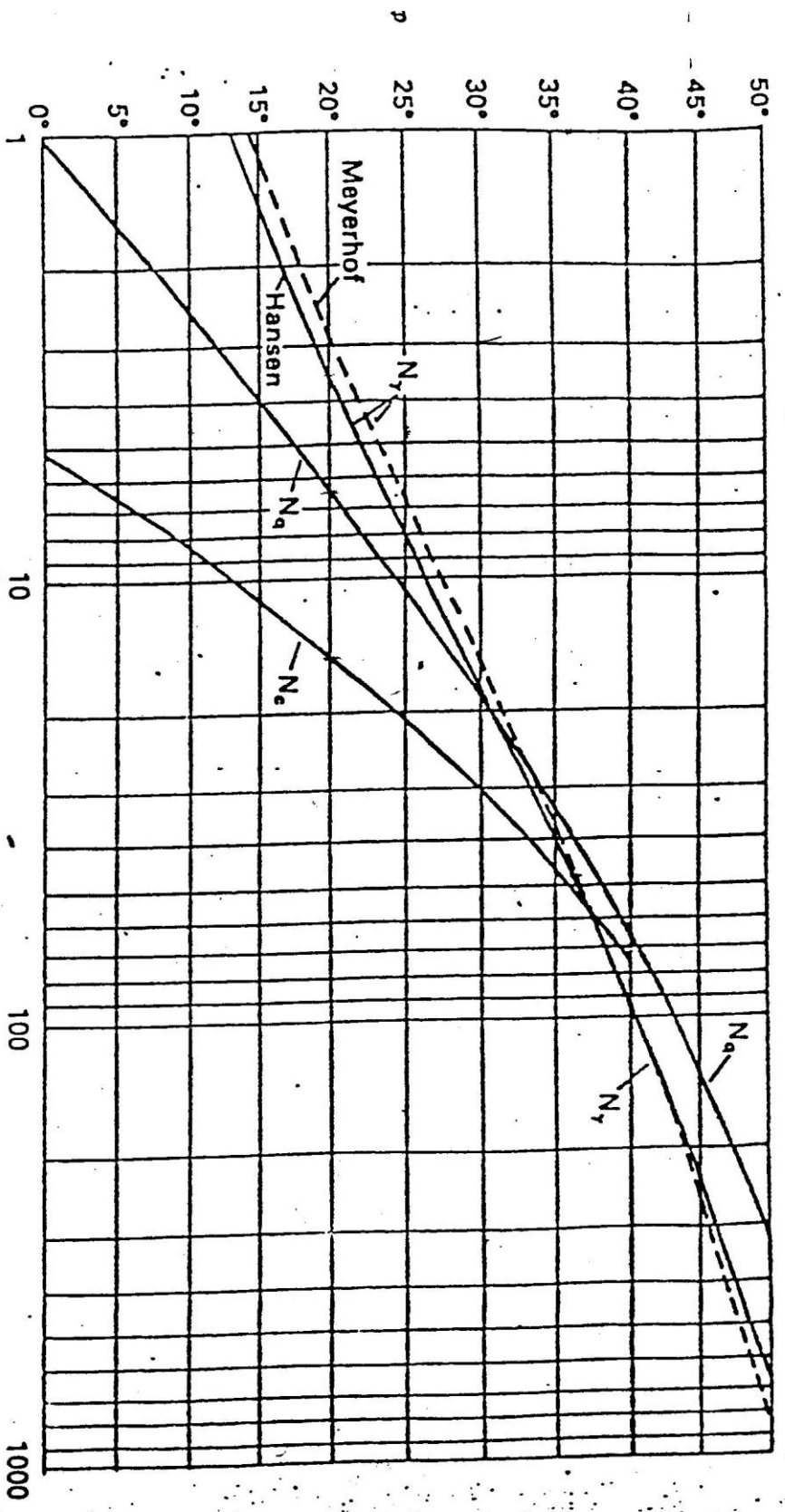(b)Briefly describe THREE factors which affect bearing capacities of soil.

(6 Marks)

FIGURE I

FIGURE 2 · BEARING CAPACITY FACTORS FOR SHALLOW FOUNDATIONS