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

Instructions to Candidates

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) Explain the following terms:

(i) Principal plane

(ii)Principal stress

(4 Marks)

(b) The results shown in Table 1 were obtained at failure in a series of consolidated-undrained tests, with pore water pressure measurement, on specimens of a saturated clay. Determine the values of the effective stress parameters C' and ¢'

(16 Marks)

TABLE 1

All round Pressure (kN/m^2)	Principal stress difference (kN/m^2)	Pore water pressure (kN/m^2)
150	192	80
300	341	154
450	504	222

QUESTION TWO

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

(4 Marks)

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

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

(ii) Determine the height above the base at which the total horizontal thrust acts.

(16 Marks)

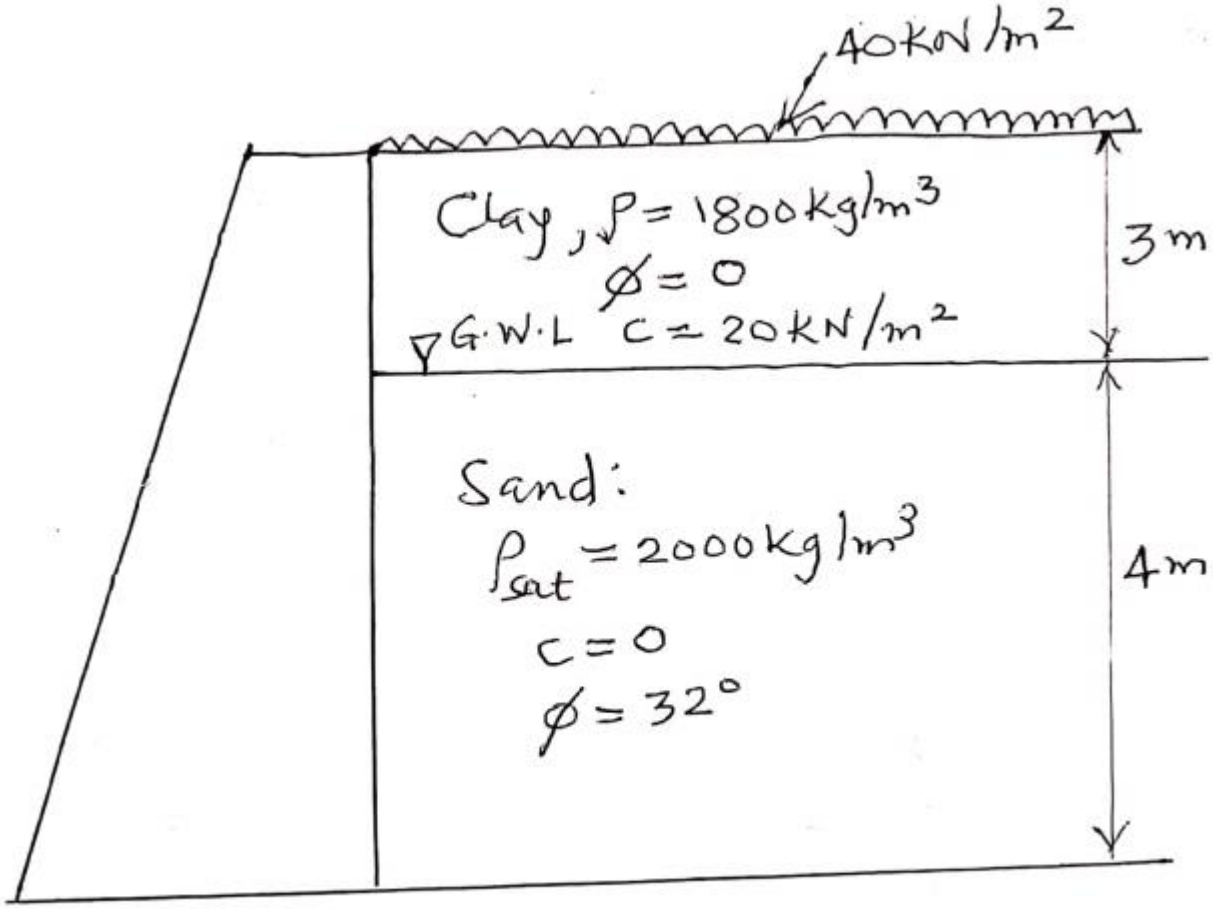

FIG. 1: RETAINING WALL AND BACKFILL

QUESTION THREE

(a) With the aid of sketches, describe the following types of slope failures:

(i) Rotational

(ii)Flows

(10 Marks)

(b) A 450 slope is excavated to a depth of 8m in a deep layer of saturated clay of unit weight 19 kN/m^3, the relevant shear strength parameters are C_u = 65 kN/m^2 and ¢$_u$ = 0. Determine the factor of safety for the trial failure surface specified in Fig. 2.

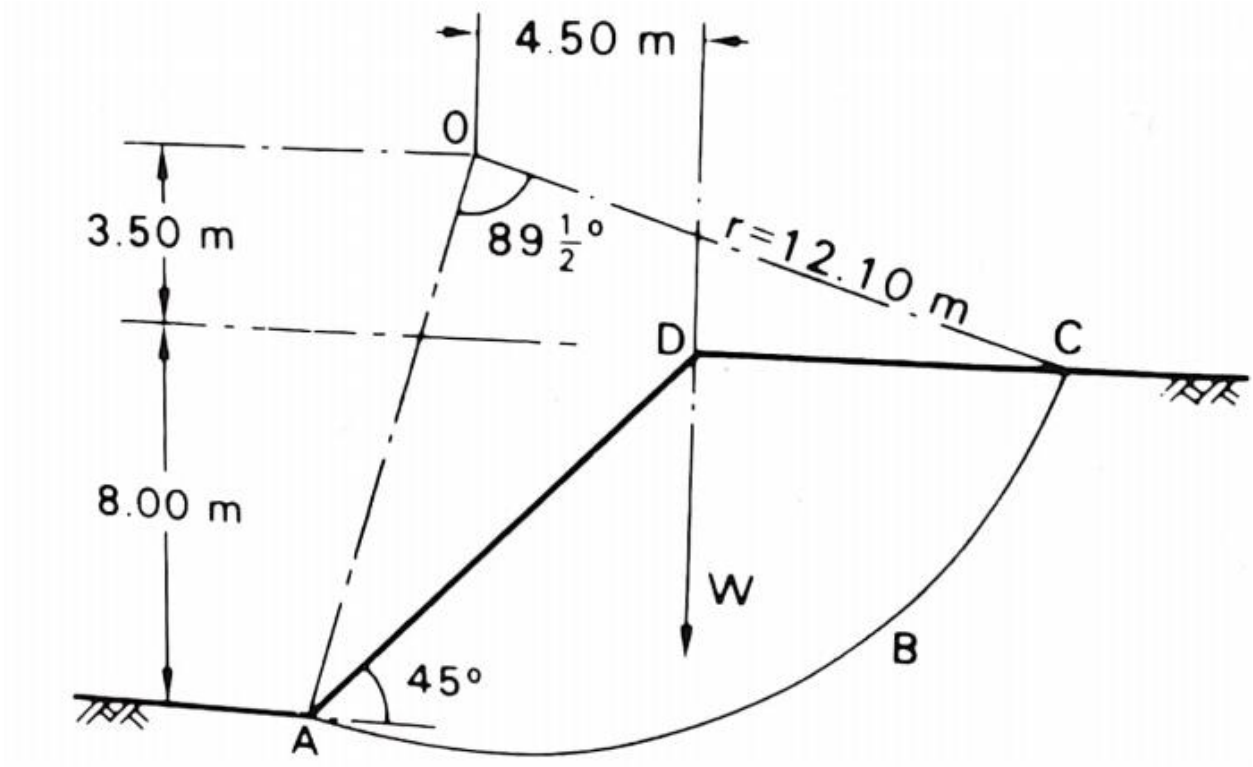

FIG. 2

QUESTION FOUR

(a) Identify and explain FOUR factors affecting bearing capacity of soil.

(8 Marks)

(b) A footing 2.15 m square is located at a depth of 1.5 m in sand, the shear strength parameters being c' =0 and ¢' = 380. Determine the ultimate bearing capacity:

(i) if the water table is at the surface.

(ii)if the water table is at the surface.

The unit weight of the sand above the water table is 18 kN/m^3; the saturated unit weight is 20 kN/m^3. Use chart 1 (Fig. 4)

(12 Marks)

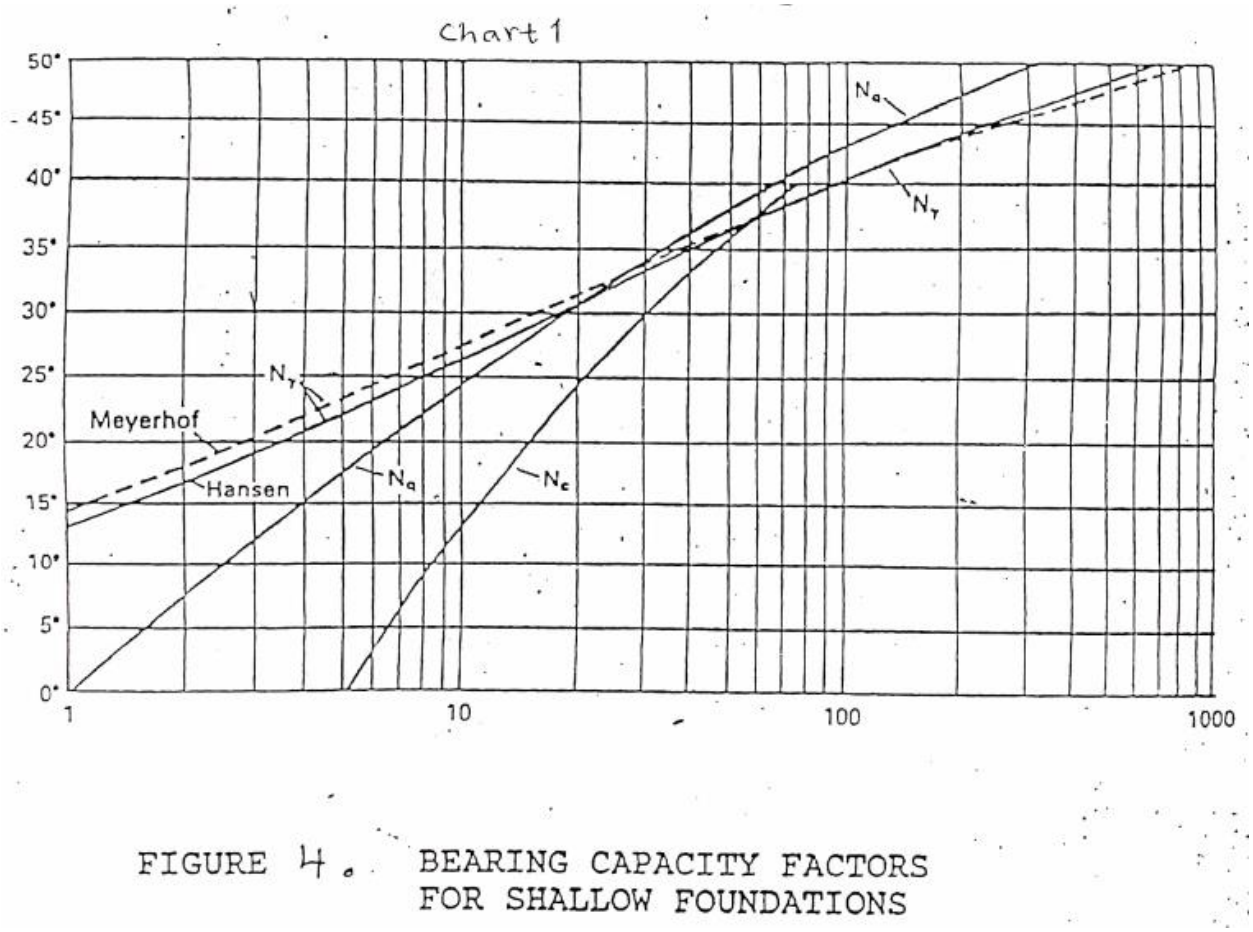

FIGURE 4. BEARING CAPACITY FACTORS FOR SHALLOW FOUNDATIONS

QUESTION FIVE

(a) The soil conditions adjacent to a sheet pile wall are given in Fig. 5, a surcharge pressure of 50 kN/m^2 being carried on the surface behind the wall. For soil 1, a sand above the water table, c'=o, ϕ' $=38^0$ and Υ'$= 18kN/m^3$. For soil 2, a saturated clay, c'=10 kN/m^2, ϕ'$=28^0$ and $\Upsilon sat=20$ kN/m^3.

(i) Calculate the resultant active thrust on the back of the wall.

(ii) Calculate the resultant passive thrust on the wall.

(15 Marks)

(b) Outline the procedure for carrying out shear box test.

(5 Marks)

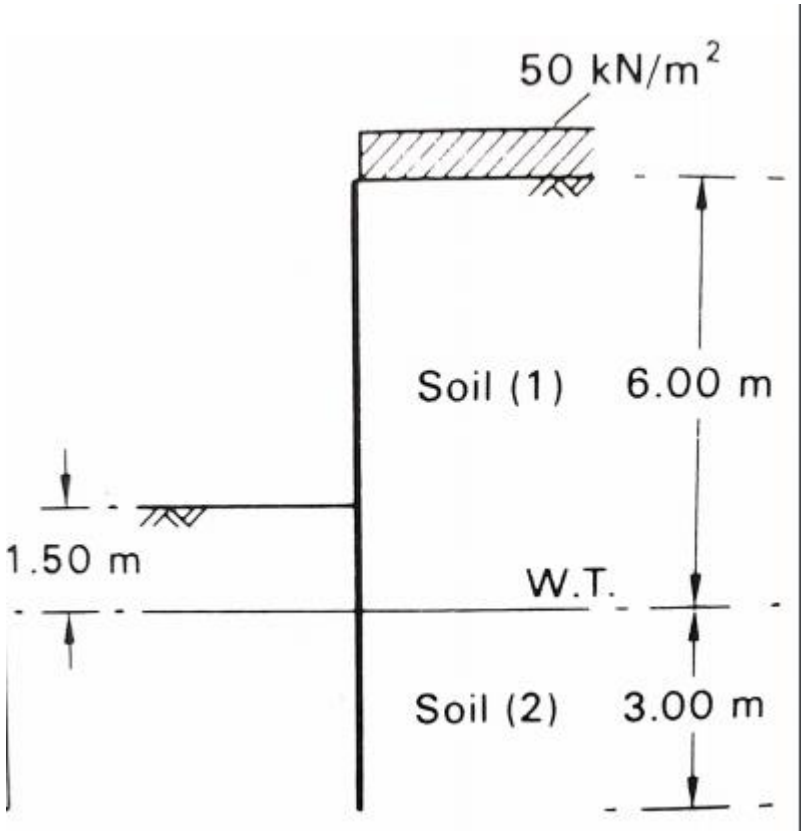

FIGURE 5