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 TWO shear strength parameters.

(4 Marks)

(b)The following results were obtained from direct shear tests on specimens of a sand compacted to the in-situ density. Determine the values of the shear strength parameters.

NORMAL STRESS(KN/m^2	50	100	200	300
SHEAR STRESS (KN/m^2	36	80	154	235

(9 Marks)

(c)Outline the procedure for carrying out drained test.

(7 Marks)

Question TWO

(a)With aid of sketches, describe TWO typical forms of slope failure.

(10 Marks)

(b)A slope is excavated to a depth of 8 m in a deep layer of saturated clay of unit weight 19 KN/m^2. The relevant shear strength parameters are Cu = 65KN/m^2 and ϕ = 0. Determine the factor of safety for the trial failure surface specified in Fig.1.

(10 Marks)

Question THREE

(a)With aid of a sketch, state FOUR principles upon which Rankine's theory of earth pressure is based.

(4 Marks)

(b)(i) Calculate the total active thrust on a vertical wall 5 m high retaining a sand of unit weight of 17 KN/m^3 for which ϕ' = 35^0: the surface of the sand is horizontal and the water table is below the bottom of the wall.

   (ii) Determine the thrust on the wall if the water table rises to a level 2 m below the surface of the sand. The saturated unit weight of the sand is 20 KN/m^3.

(16 Marks)

Question FOUR

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

(6 Marks)

(b)A strip footing is to be designed to carry a load of 800KN/m at a depth of 0.7 m in a gravelly sand. The appropriate shear strength parameters are C' = 0 andϕ' = 40^0. Determine the width of the footing if a factor of safety of 3 against shear failure is specified and assuming that the water table may rise to foundation level. Above the water table the unit weight of the sand is 17KN/m^2 and below the water table the saturated unit weight is 20KN/m3. Use Fig. 2

Question FIVE

(a)With the aid aid of a sketch, explain the Mohr-Coulomb theory.

(10 Marks)

(b)Explain the concept of plastic equilibrium in a soil mass.

(4 Marks)

(c)The following data refer to a strip footing:

- Breadth = 3.0 m
- Depth   = 2.0 m
- Unit weight of subsoil = 18.5 KN/m³
- ϕ = 23⁰.

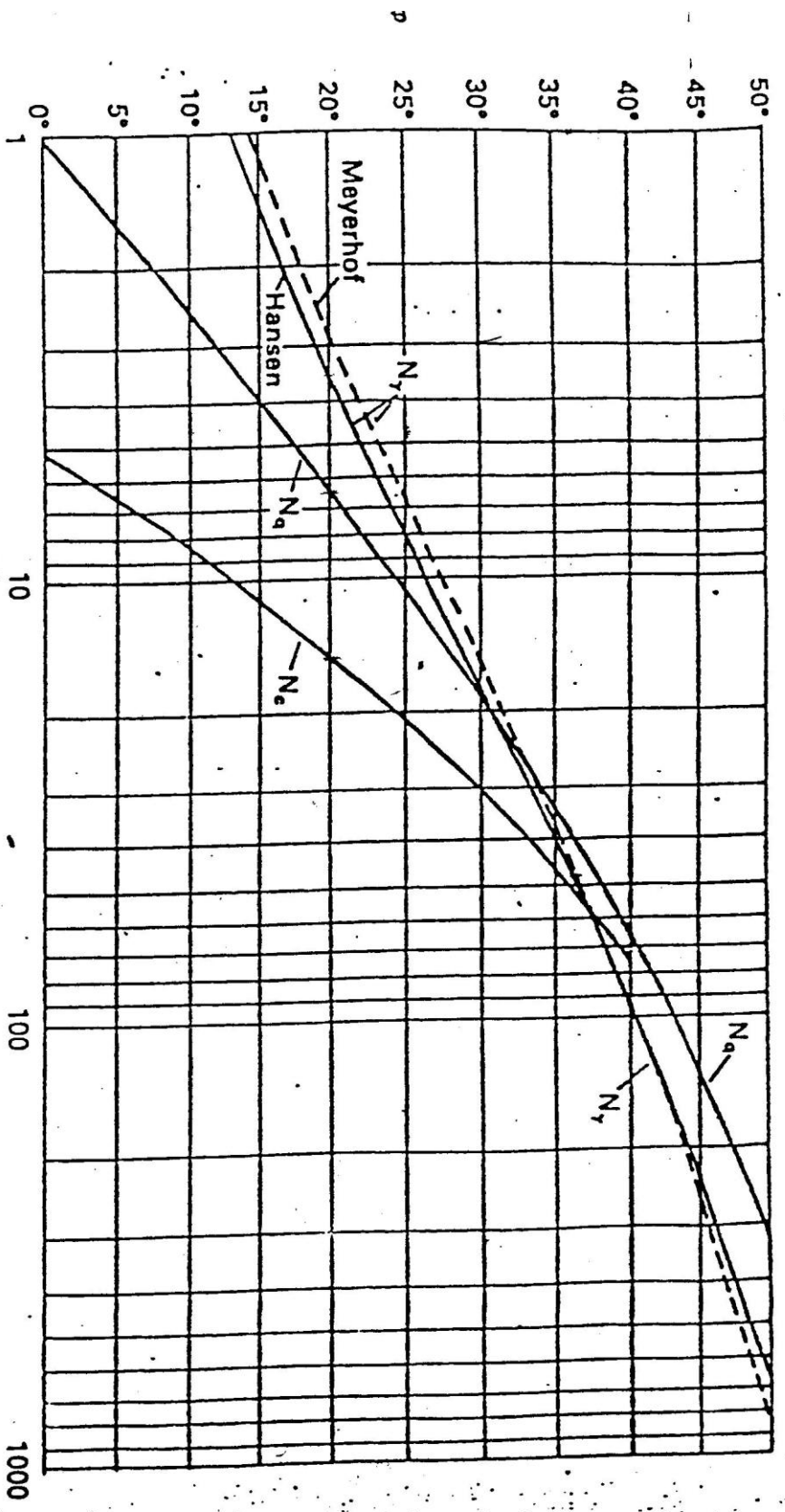Determine the ultimate bearing capacity of the subsoil.

(6 Marks)

FIGURE 1

FIGURE 2 • BEARING CAPACITY FACTORS
FOR SHALLOW FOUNDATIONS