



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY

Department of architecture and built environment

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN QUANTITY SURVEYING

ECV 2204 : CIVIL ENGINEERING TECHNOLOGY

END OF SEMESTER EXAMINATION

SERIES: APRIL 2025

TIME: 2 HOURS

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **five** questions.

Attempt any **THREE** questions.

Do not write on the question paper.

QUESTION ONE (20 Marks)

a) A sample of soil weighing 32.5 kg had a volume of 0.0193 m^3 . When dried out in an oven, its mass was reduced to 29.8 kg. The specific gravity of the solids was found to be 2.75. Determine the following:

- (i) Bulk density
- (ii) Dry density
- (iii) Percentage moisture content
- (iv) Saturated density
- (v) Percentage air voids

(12 Marks)

b) Describe Transported Soils, stating typical examples. (8 Marks)

QUESTION TWO (20 Marks)

a) The following data were recorded during a Cone Penetrometer test:

TABLE 1

Penetration (mm)	15.7	17.8	19.0	21.5	23.2
Moisture Content (%)	32.8	42.6	52.2	60.4	70.2

- (i) Determine the liquid limit of the soil
- (ii) If the plastic limit of the soil was found to be 34%, determine its plasticity index and classify the use using Plasticity Chart. (12 Marks)

b) Define the following terms as applied to grading:

- (i) Effective size
- (ii) Coefficient of curvature
- (iii) Coefficient of uniformity (6 Marks)

c) Define the term Shrinkage limit. (2 Marks)

QUESTION THREE (20 Marks)

a) A borehole log gave the following data:

- 0 - 2m Sand – Saturated density 1900 kg/m^3
- 2 - 5m Silt – Saturated density 1800 kg/m^3
- 5 - 9m Clay – Saturated density 2150 kg/m^3

The water table is 5.0m below the ground surface and the soil above the water table is saturated. Calculate the effective pressure at the bottom of the Clay. (7 Marks)

b) Explain the term Quicksand condition. (2 Marks)

c) A sheet pile wall is driven to a depth of 6m into permeable soil extending to a depth of 14m below the ground level. Below this depth is an impermeable stratum. If the depth of water is 5m on one side of the sheet pile wall, make a neat sketch of the flow net and determine the approximate seepage under the sheet pile wall in litres per day. Take permeability of the soil to be $6.5 \times 10^{-3} \text{ mm/s}$. (11 Marks)

QUESTION FOUR (20 Marks)

During a shear box test on a compacted soil, the following results were recorded:

TABLE 1

Normal Load (N)	120	226	334	442
Shear Load (N)	95	180	263	350

The shear box was 60x60 mm. Determine the shear strength parameters. (12 Marks)

b) A strip footing of breadth 3.5 m is to be founded at a depth 2.0 m in a soil which has the following properties:

$$C = 13.5 \text{ KN/m}^2; \phi = 25^\circ; \gamma = 18 \text{ KN/m}^3$$

Determine the ultimate bearing capacity:

- (i) If the water table is well below foundation level
- (ii) If the water table is at the ground surface

Use Chart 1. (8 Marks)

QUESTION FIVE (20 Marks)

a) Briefly explain FOUR factors affecting soil compressibility and settlement. (8 Marks)

b) Describe the punching shear failure below footings. (4 Marks)

c) Briefly describe cement grouts method of dewatering a site. (6 Marks)

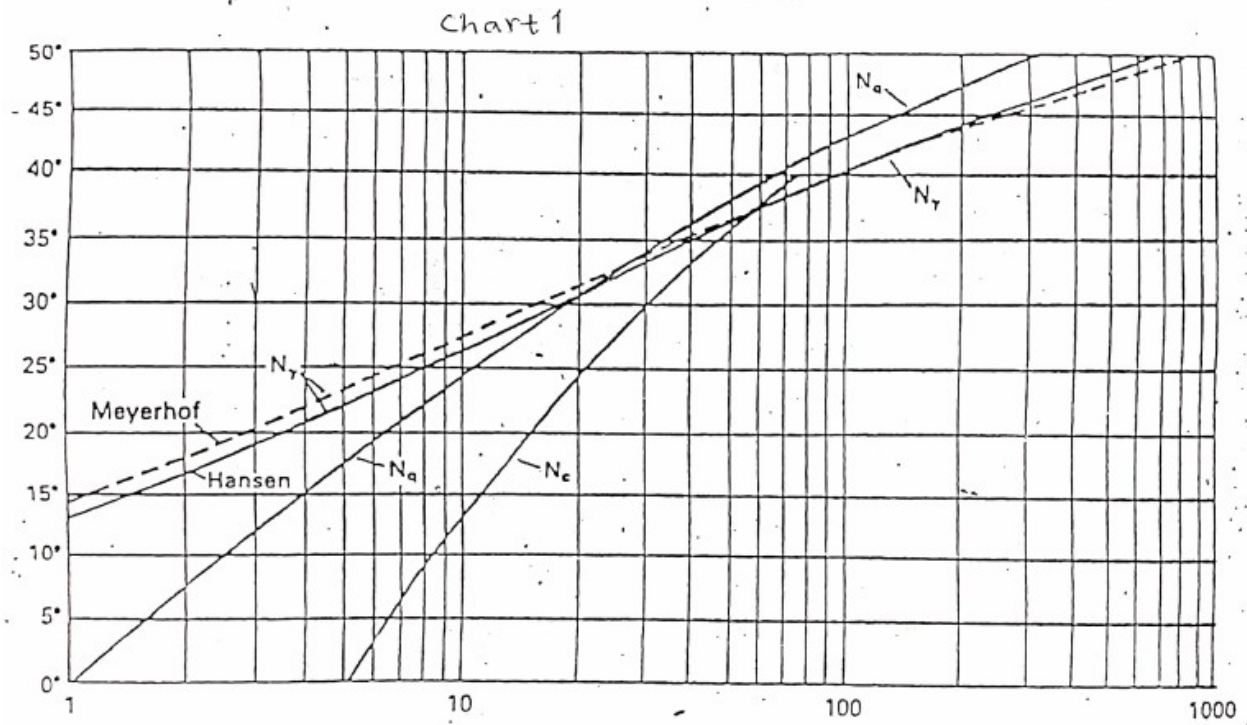
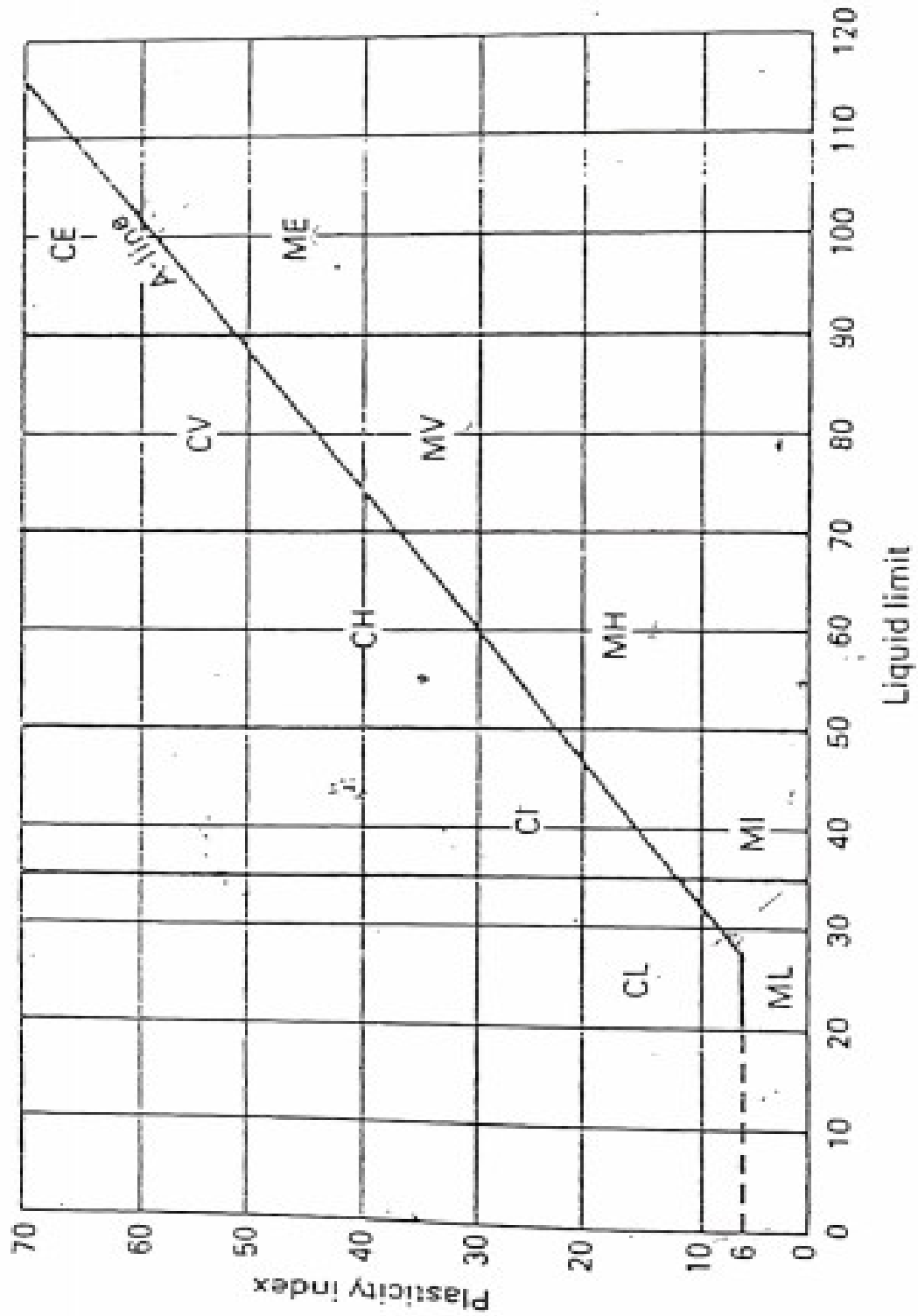


FIGURE 4. BEARING CAPACITY FACTORS
FOR SHALLOW FOUNDATIONS



Plasticity chart: British system. (BS 5930: 1981)

