TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN BUILDING AND CIVIL ENGINEERING

(INSTITUTION BASED EXAMINATION)

EBC 2205: SOIL MECHANICS I

SERIES: MARCH 2017

TIME: 2 HOURS

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

-Pocket calculator

This paper consists of **FIVE** questions. Attempt any **THREE** questions

Do not write on the question paper

Mobile Phones are NOT allowed inside the examination room

QUESTION ONE

(a) Outline the Casagrande method of carrying out liquid limit of a soil sample.

(10 Marks)

(b) In a liquid limit test carried out on a soil sample, the following results were obtained:

No. of Blows	55	45	35	25	15
Moisture Content (%)	30	35	40	45	50

In a plastic limit test on the same soil the plastic limit was found to be 23%. Determine the liquid limit and plasticity index of the soil and classify it according to the British Soil Classification System. Use graph paper provided and Figure 1. (10 Marks)

QUESTION TWO

(a).State the FIVE characteristics upon which soils depend. (5 Marks)

(b).A soil has a bulk unit weight of 20.5 KN/m^3 and a moisture content of 25%. If the specific gravity of the soil particles is 2.75, determine:

(i) Dry unit weight
(ii) Void ratio
(iii) Degree of saturation
(iv) Porosity
(v) Saturated unit weight assuming the void remains constant. (15 Marks)

QUESTION THREE

(a). Explain **FOUR** factors that affect permeability. (8 Marks)

(b). A pumping test was carried out for determining coefficient of permeability of soil in place. A well of diameter 40 cm was drilled up to impermeable stratum. The depth of the water bearing stratum was 9 m. The yield from the well was 4 m^3/min at a steady draw-down of 5.5 m. Determine the coefficient of permeability in m/day if the observed radius of influence was 160m. (6 Marks)

(c) Outline the constant head permeameter test.. (6 Marks)

QUESTION FOUR

(a).Derive dry density in terms of bulk density and moisture content. (6 Marks)

(b) Standard Proctor compaction tests carried out on a sample of soil gave the following results:

Bulk Density (Kg/m^3)	2100	2200	2300	2350	2280
Moisture Content (%)	13.5	14.5	15.5	17.0	17.8

Plot the compaction curve and hence find the compaction parameters. Use graph paper provided. (14 Marks)

QUESTION FIVE

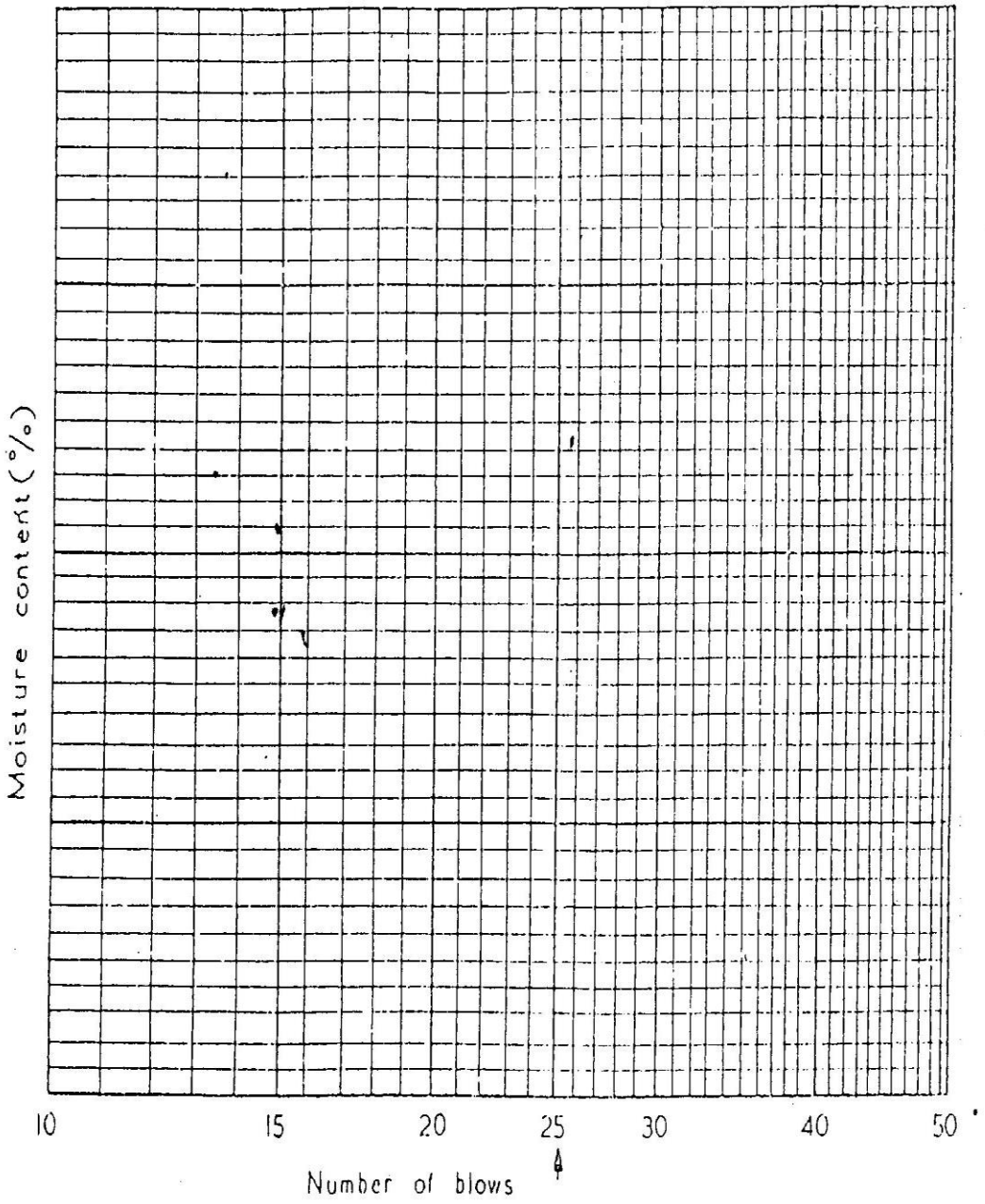
(a) Explain the derivation of characteristic sizes from a grading curve. (6 Marks)

(b) In a grading test, the following results were obtained:

SIEVE SIZE	MASS RETAINED (GRAMMES)
2.36 mm	20
1.18 mm	40
0.850 mm	60
0.600 mm	100
0.425 mm	150
0.300 mm	200
0.212 mm	300
0.150 mm	350
0.075 mm	50
Pan	10

The total sample tested was 1280 g. Using Figure 2, plot the grading curve and classify the soil. (14 Marks)

†Type of test: Natural moisture content (w), Liquid limit (LL),



Results. Liquid limit (LL):

Plastic limit (PL): Soil classification

Plasticity index (PI):

FIG-1

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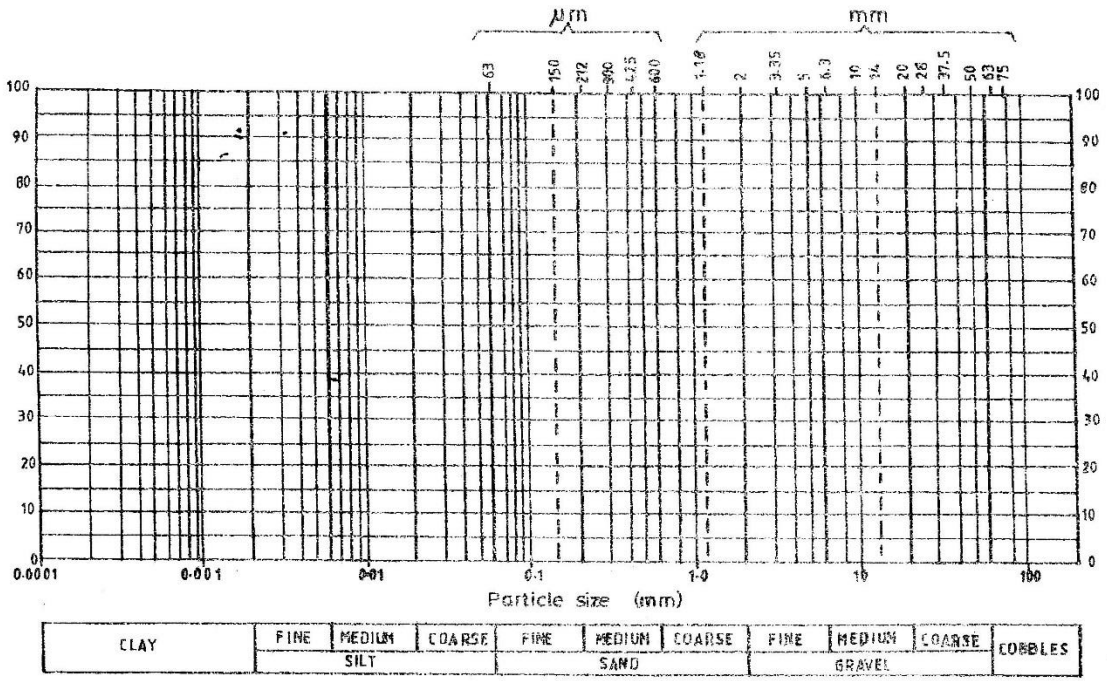
Chart 1



Particle size distribution chart

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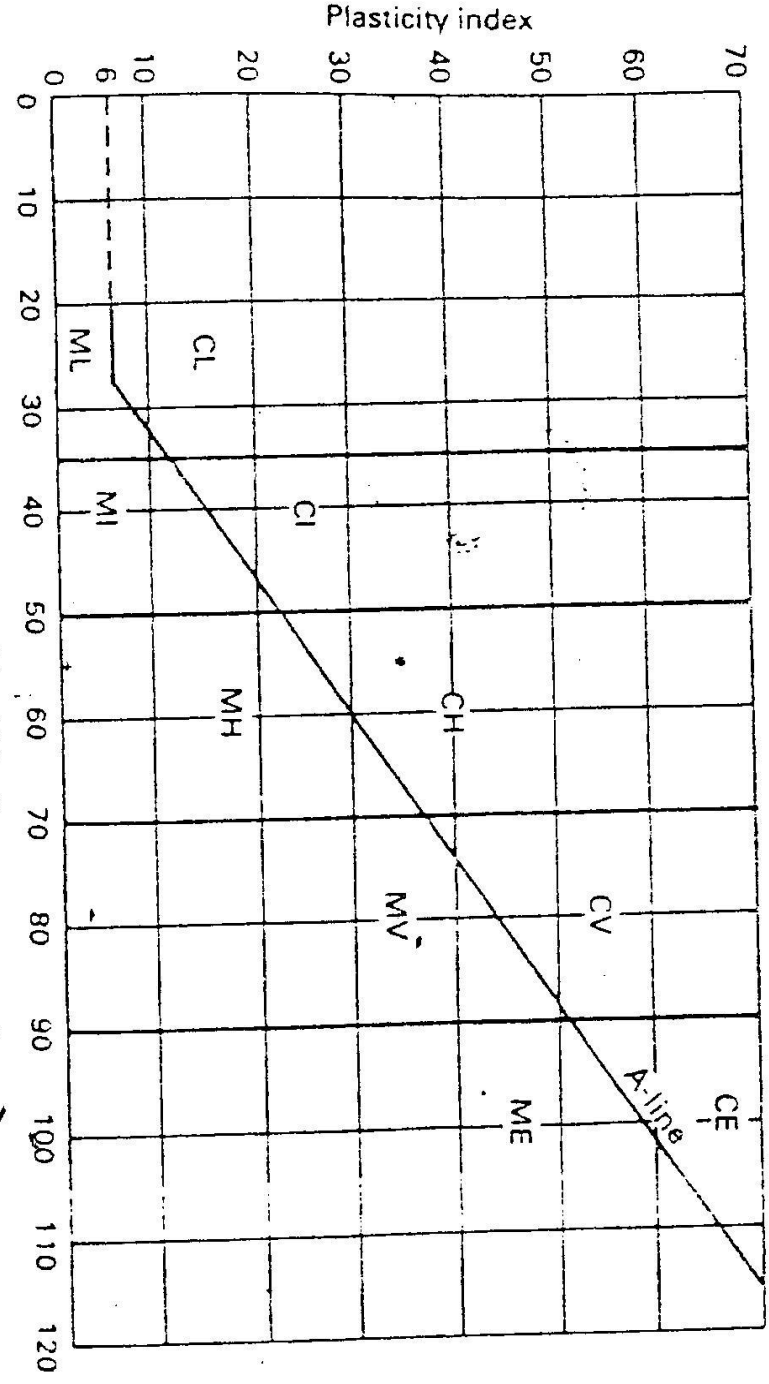

Plasticity chart: British system. (BS 5930: 1981)

FIG. 2