



SNS COLLEGE OF TECHNOLOGY



AN AUTONOMOUS INSTITUTION

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COIMBATORE

DEPARTMENT OF CIVIL ENGINEERING

**19CEB301 – SOIL MECHANICS
III YEAR / V SEMESTER**

Unit 1 : INTRODUCTION TO SOIL MECHANICS

Topic 2 : Nature of Soil and Problems



Properties of Soil

Index Properties

- a) Specific gravity
- b) Particle Size Analysis
 - i) Sieve Analysis (Dry Method)
 - ii) Hydrometer (Wet Method)
- c) Atterberg's Limits
 - i) Liquid Limit
 - ii) Plastic Limit
 - iii) Shrinkage Limit
- d) Free swell index

Engineering Properties

- a) Permeability
- b) Shear strength
- c) Consolidation



i) Permeability

- a) Constant Head Method (Coarse Grained Soil)
- b) Variable Head Method (Fine Grained Soil)

ii) Shear strength

- a) Direct shear test (Coarse Soil)
- b) Unconfined Compression Strength (Stiff clay)
- c) Vane shear test (Very Soft & Soft clay)
- d) Tri-axial test (Coarse & Fine Soil)

iii) Consolidation (Settlement)

a) One Dimensional Consolidation test

i) Root-t Method

ii) log-t Method



Specific Gravity of Soil:



Pycnometer



Drying Oven



PARTICLE SIZE ANALYSIS

Analysis(Dry Method Method)

Hydrometer Analysis (-----)



Soils

4.75mm

2.36mm

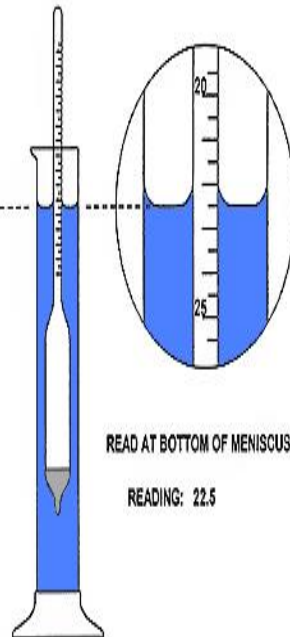
1.18mm

425 μ (0.425mm)

212 μ (0.212mm)



HYDROMETER



READ AT BOTTOM OF MENISCUS

READING: 22.5



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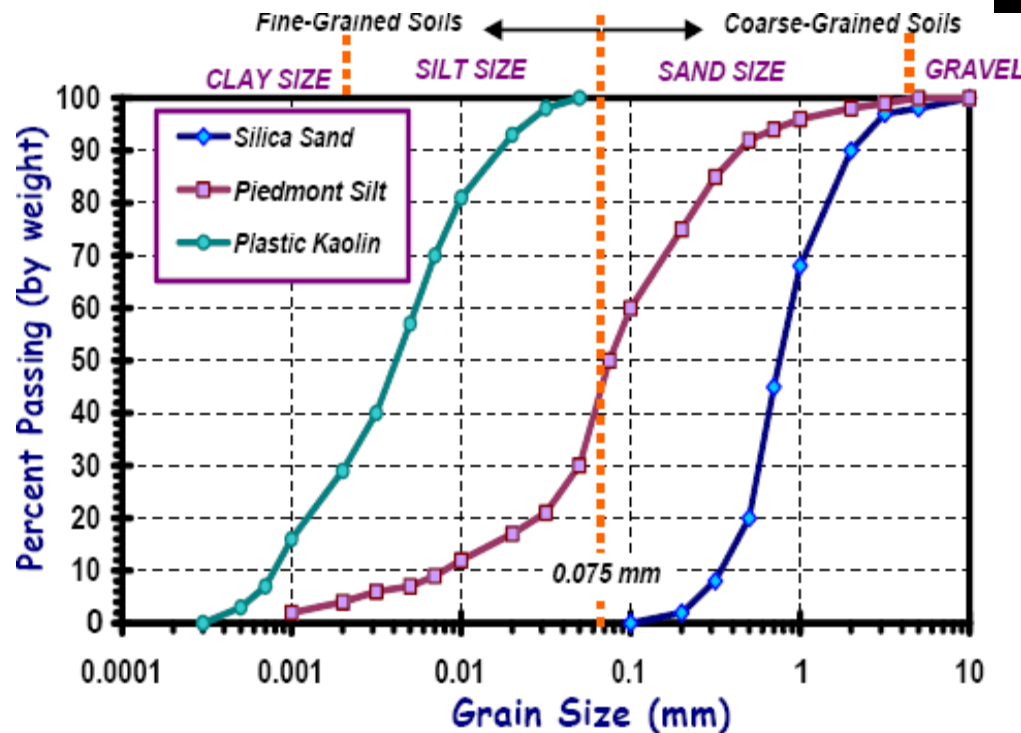
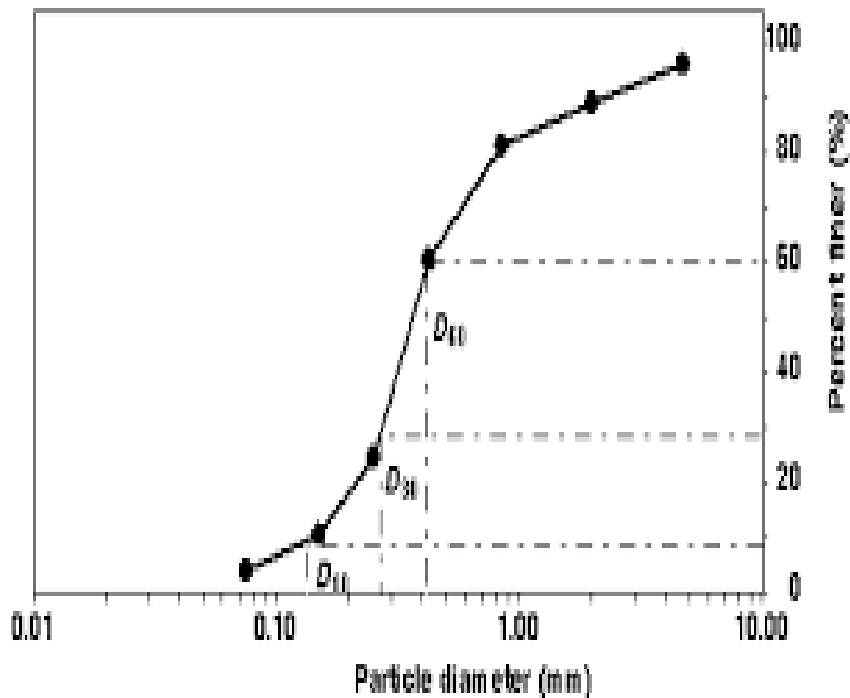


Particle Size Distribution Curve:

Effective Size (C_{10}) - Used to measure hydraulic conductivity & drainage through soil.

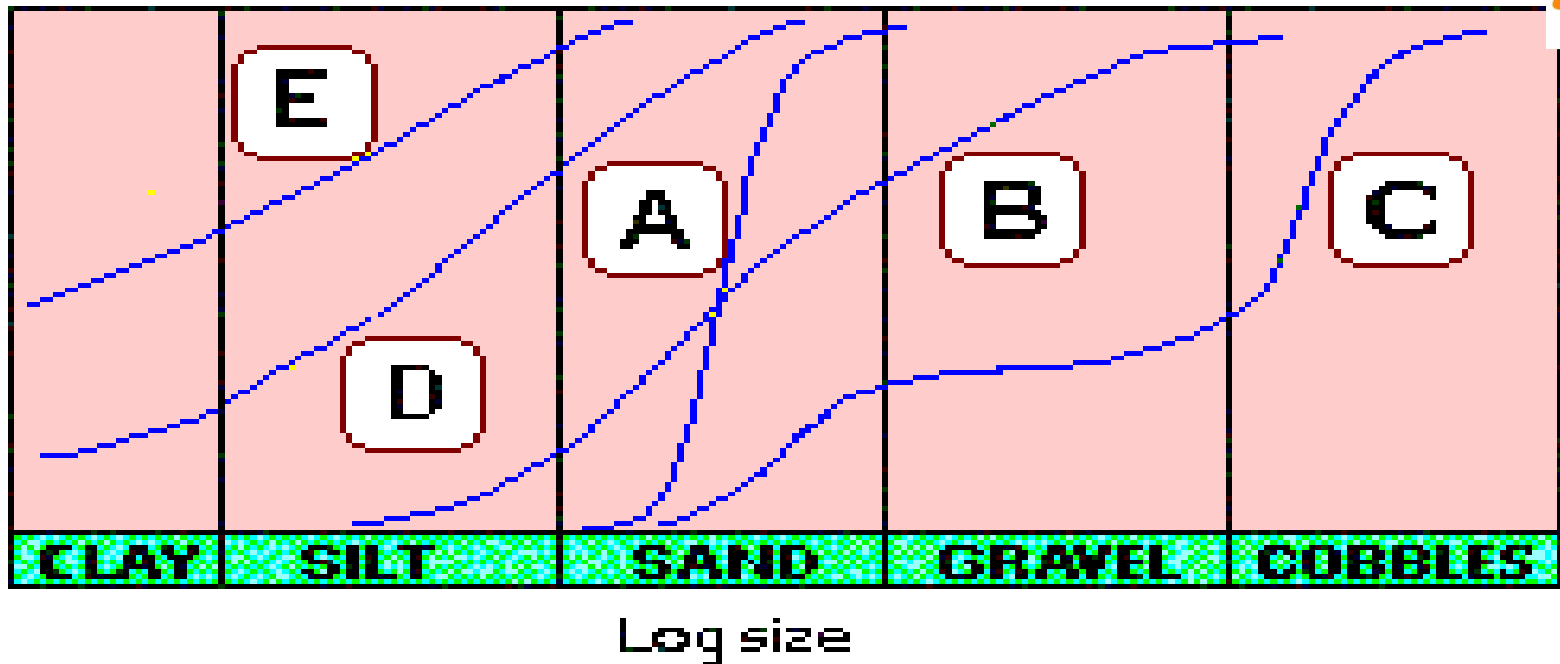
b) Uniformity Co-efficient (C_u) = D_{60} / D_{10}

c) Co-efficient of Gradation (C_c) = $D_{30}^2 / (D_{60} \times D_{10})$





Percentage finer



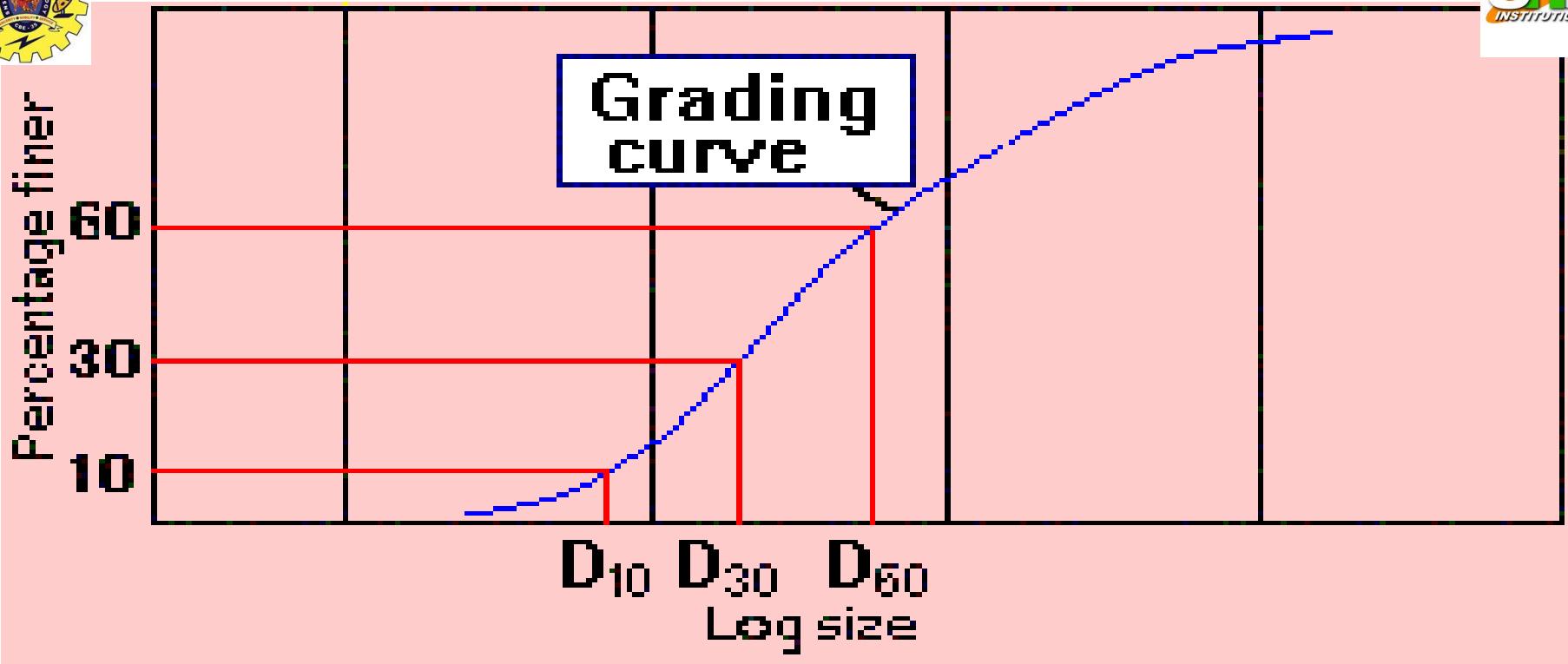
Curve A - a poorly-graded medium SAND

Curve B - a well-graded GRAVEL-SAND (i.e. having equal amounts of gravel and sand)

Curve C - a gap-graded COBBLES-SAND

Curve D - a sandy SILT

Curve E - a silty CLAY (i.e. having little amount of sand)



Obtain the grading characteristics, three points are located first on the grading curve.

D_{60} = size at 60% finer by weight

D_{30} = size at 30% finer by weight

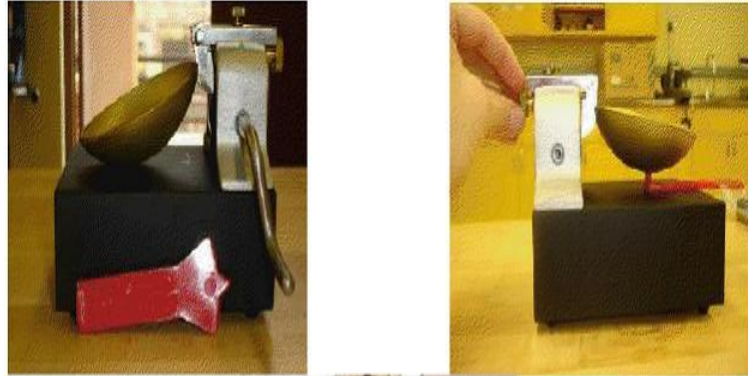
D_{10} = size at 10% finer by weight



Atterberg's Limits (Consistency Limits):



Liquid Limit



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Plastic Limit

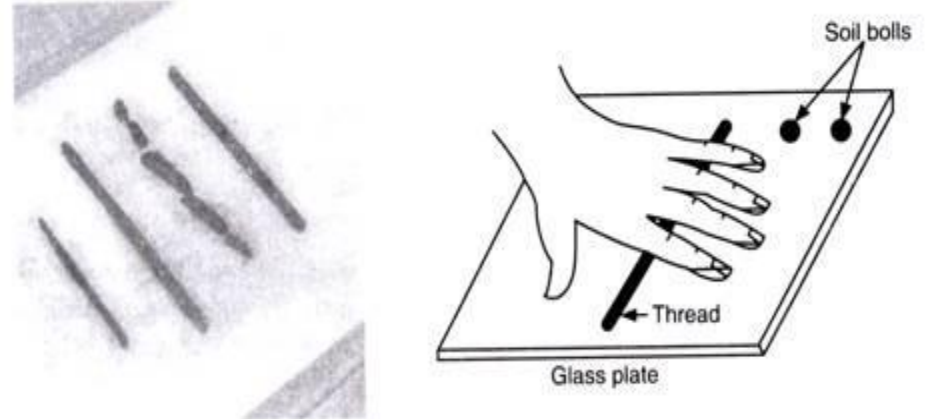


FIG. E7.1 Plastic limit test

