

DEPARTMENT OF CIVIL ENGINEERING
19CEB301 – SOIL MECHANICS
UNIT I – SOIL CLASSIFICATION AND COMPACTION

STUDENT'S WORKSHEET - 1
BASIC RATIOS

MATCH THE FOLLOWING

- | | | |
|-------------------------|---|--|
| 1. VOID RATIO | - | VOLUME OF VOIDS/TOTAL VOLUME OF SOIL |
| 2. DEGREE OF SATURATION | - | VOLUME OF VOIDS/VOLUME OF SOLIDS |
| 3. WATER CONTENT | - | UNIT WEIGHT OF SOLIDS/UNIT WEIGHT OF WATER |
| 4. POROSITY | - | VOLUME OF WATER/VOLUME OF VOIDS |
| 5. SPECIFIC GRAVITY | - | WEIGHT OF WATER/WEIGHT OF SOLIDS |

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**STUDENT'S WORKSHEET – 2
RELATIONSHIP BETWEEN BASIC RATIOS**

- 1. Derive an expression for the relationship between void ratio e , specific gravity of solids G , water content w and degree of saturation S .**

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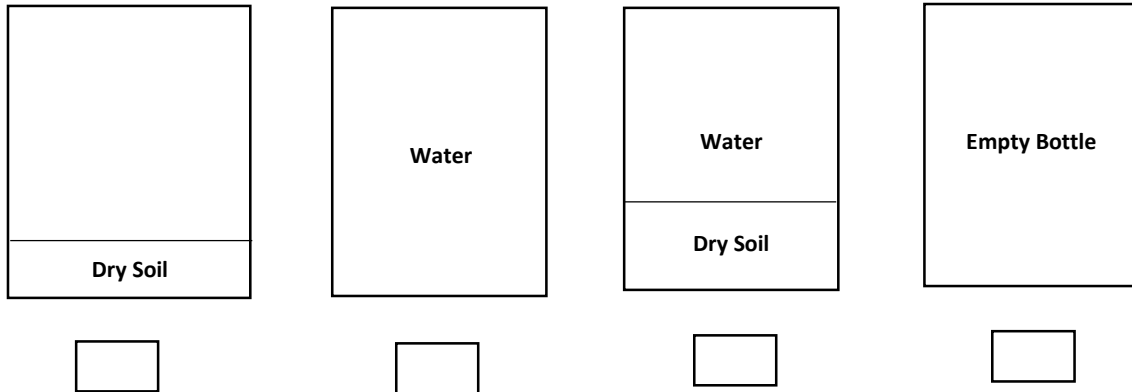
**STUDENT'S WORKSHEET – 3
RELATIONSHIP BETWEEN BASIC RATIOS**

- 1. Derive an expression for the bulk unit weight γ , saturated unit weight γ_{sat} , specific gravity of solids G , Unit weight of water γ_w and void ratio e .**

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STUDENT'S WORKSHEET – 4
INDEX PROPERTIES OF SOIL

Find out which one is taken as W_1 , W_2 , W_3 & W_4 and Also write the formula to find out specific gravity of soil



Specific Gravity of Soil $G =$ -----

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STUDENT'S WORKSHEET – 5

INDEX PROPERTIES OF SOIL

Classify the type of given soil by Sieve Analysis with Given Data

Weight of Soil Sample Taken = 300 g

S.No	Particle Size D in mm	Weight Retained in g	% retained	Cumulative % Retained	Cumulative % Finer N
1	4.75	20.00			
2	2.36	80.00			
3	1.18	75.00			
4	0.600	60.00			
5	0.425	3.00			
6	0.300	2.00			
7	0.150	25.00			
8	0.075	20.00			
9	<0.075	15.00			

Calculations

1. Percentage retained on any sieve = $\frac{\text{Mass of soil retained}}{\text{Total Soil Mass}} \times 100$

2. Cumulative percentage retained on any sieve = Sum of percentage retained on all coarse sieves.

3. Percentage finer than any sieve size N= 100% - Cumulative percentage retained

4. Coefficient of Uniformity $C_u = \frac{D_{60}}{D_{10}} = \dots\dots\dots$

5. Coefficient of Curvature $C_c = \frac{D_{30}^2}{D_{60} \times D_{10}} = \dots\dots\dots$

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STUDENT'S WORKSHEET – 6

INDEX PROPERTIES OF SOIL

Rearrange the Jumbled Sentence

1. The cup is given blows by manual operation of handle. The number of blows required to close the groove is noted. The above steps are repeated to get atleast 4 concurrent sets of number of blows and water content.
2. The height of fall of a cup is adjusted to 1 cm. Using standard grooving tool the soil sample is cut.
3. The graph is plotted between water content on natural scale and number of blows on logarithmic scale to obtain flow curve. From the plot the liquid limit is obtained as water content corresponding to 25 blows.
4. About 100 ml of soil sample passing through 425 μ sieve is taken in porcelain dish.
5. Some quantity of distilled water is added and mixed thoroughly and uniformly. Sample is then placed in casagrande apparatus using spatula.

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**STUDENT'S WORKSHEET – 7
SOIL CLASSIFICATION AND DESCRIPTION**

CLASSIFY THE TYPE OF SOIL WITH GIVEN DATA

- 1. The analysis of soil sample indicated that it has 40% clay, 40% silt and 20% sand. How would you classify the soil according to textural classification given by Modified Triangular Chart.**

- 2. Using plasticity chart for classifying the soils in ISC system classify the soil A,B & C with the following properties**
 - 1. Soil A : Liquid Limit $w_L = 38\%$, Plastic Limit $w_p = 20\%$**
 - 2. Soil B : Liquid Limit $w_L = 18\%$, Plastic Limit $w_p = 12\%$**
 - 3. Passing 4.75 mm IS sieve = 70%**
 - Passing 0.075 mm IS Sieve = 8%**
 - Uniformity Coefficient $C_u = 7$**
 - Coefficient of Curvature $C_c = 3$**
 - Plasticity Index $I_p = 3$**

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STUDENT'S WORKSHEET – 8

SOIL COMPACTION

PLACE THE WORDS

Compaction is defined as the process by which the soil particles are artificially rearranged & packed together into a state of closer contact by mechanical means in order to decrease its & thereby increase its It is achieved by

Compaction provides for many structures. Compaction results in reduction of & Expulsion of The main objective of compaction is to increase the of soil & is to reduce of the soil.

(Compressibility, Tamping, Rolling & Vibration, shear strength, porosity, dry density, foundation support, pore air, volume)

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STUDENT'S WORKSHEET – 9

SOIL COMPACTION – FIELD COMPACTION METHODS

FIND OUT THE NAME OF IMAGE AND EXPLAIN IT WITH FEW WORDS

