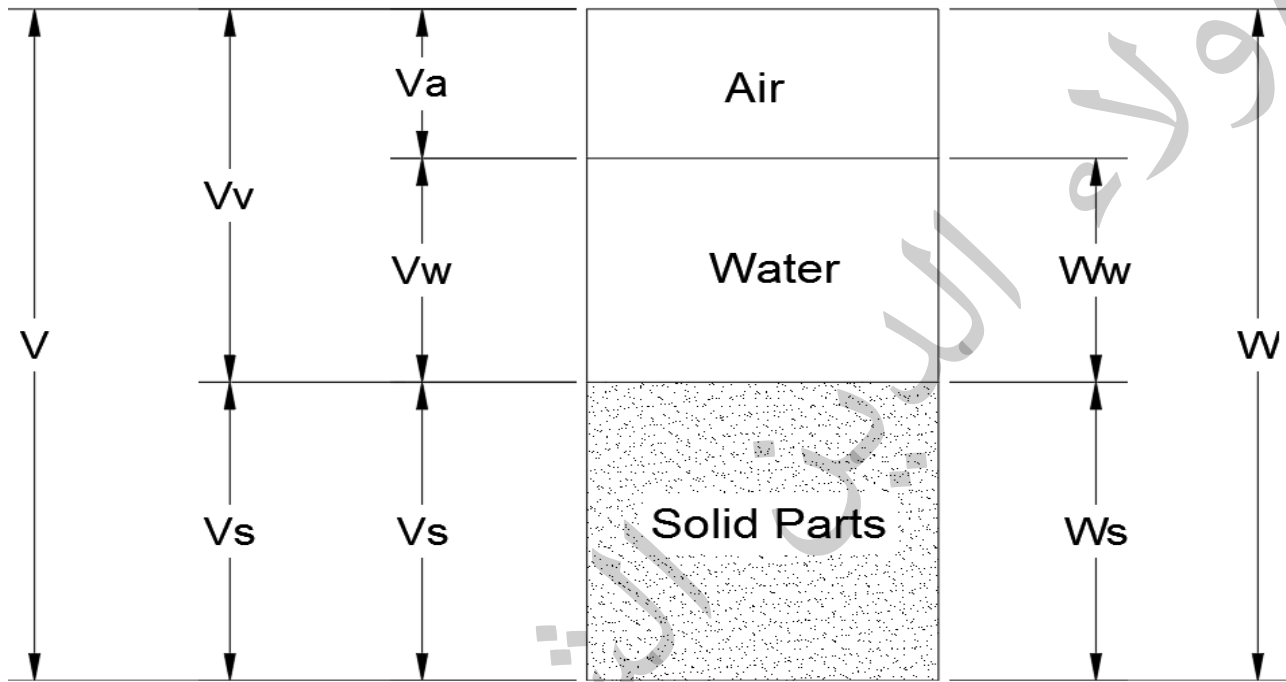


Answer Of Question # 1: (20 points(A=6 Points , B= 4 Points , C=10 Points))

A- Draw 3-phase diagram and define each of the following

Degree of saturation - Bulk Density - Specific Gravity – Submerged Density



$$s = \frac{V_w}{V_v} \text{ (1.5 Point) } , G_s = \frac{W_s}{V_s} \text{ (1.5 Point) } , \gamma_b = \frac{W_b}{V} \text{ (1.5 Point) } , \gamma_{Sub} = \frac{W_{Sub}}{V} \text{ (1.5 Point) }$$

B-Prove The Following : $\gamma_{Sub} = \gamma_{Sat} - 1$

$$\gamma_{Sub} = \frac{W_{Sub}}{V} = \frac{W_{Sat} - \gamma_w V}{V} = \gamma_{Sat} - 1 \text{ (4 Points)}$$

C- A soil sample has a volume of 160 cm^3 and weight of 304 gm when partially saturated and 269.28 gm when dry , the specific gravity of the soil particles is 2.64 .

Determine the Porosity , Void Ratio , Water Content And Degree Of saturation , Draw 3 Phase Diagram

$V = 160 \text{ cm}^3$, $W_b = 304 \text{ gm}$, $W_s = 269.28 \text{ gm}$, $G_s = 2.64$

$$W_w = W_b - W_s = 304 - 269.28 = 34.72$$

$$V_s = \frac{W_s}{G_s} = \frac{269.28}{2.64} = 102 \text{ cm}^3$$

$$V_w = 34.72 \text{ cm}^3$$

$$V_a = 160 - 102 - 34.72 = 23.28 \text{ cm}^3$$

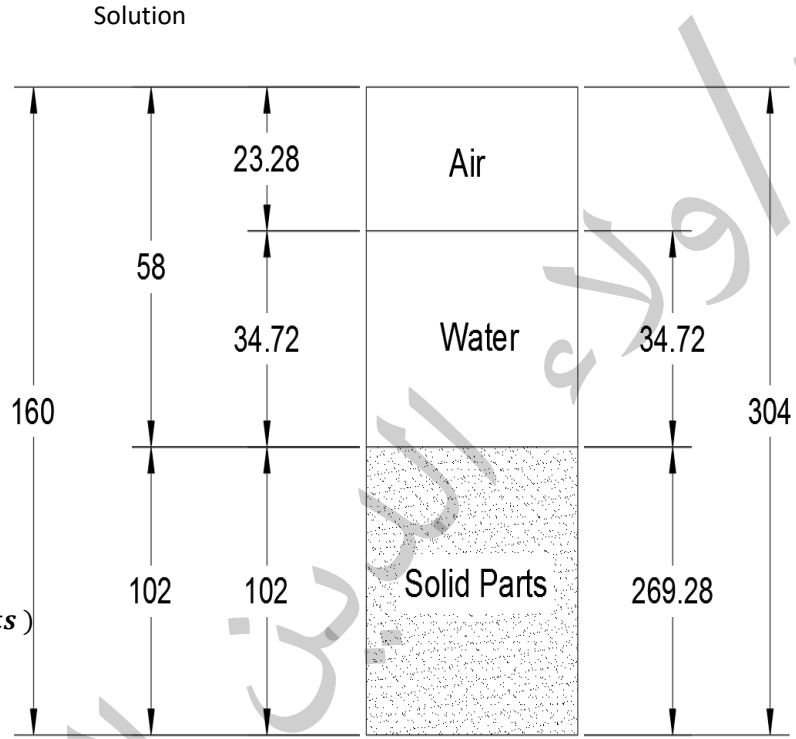
$$V_v = V_w + V_a = 34.72 + 23.28 = 58 \text{ cm}^3$$

$$n = \frac{V_v}{V} = \frac{58}{160} = 0.36 \text{ (2 Points)}$$

$$e = \frac{V_v}{V_s} = \frac{58}{102} = 0.57 \text{ (2 Points)}$$

$$W_c = \frac{W_w}{W_s} = \frac{34.72}{269.28} = 0.129 \text{ (2 Points)}$$

$$S = \frac{V_w}{V_v} = \frac{34.72}{58} = 0.598 \text{ (2 Points)}$$



(2 Points)

Answer Of Question # 2: (20 points(A=5 Points ,B=5 Points , C=10 Points))

A-How to determine Water content in lab.

وضح بالتجربة كيفية تعيين المحتوى المائي بالمعمل

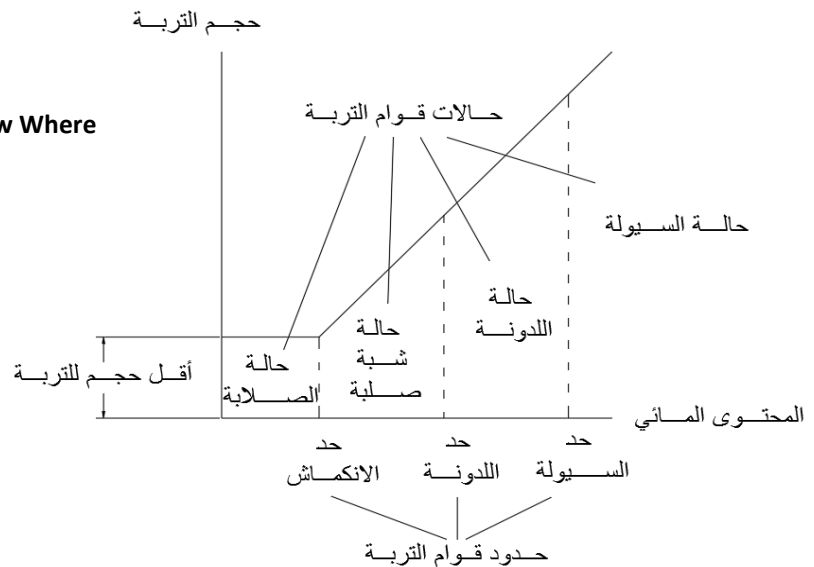
نحضر علبه من معدن خفيف ونوزنها وليكن وزنها W_1 , نوضع عينة التربة داخل العلبه ونوزن W_2 , نوضع العلبه داخل فرن في درجة حرارة من $105 - 110$ لمدة 24 ساعه , نوزن العينة بعد تجفيفها في الفرن W_3

$$W_c = \frac{W_2 - W_3}{W_3 - W_1} \times 100 \text{ (5 Points)}$$

B-Draw W_c , V Chart For Clay Soil and Show Where

is States Of Soil and It's limits

(5 Points)



C- A Sample of Soil has a wet weight 53 gm and it's weight after drying is 37 gm the soil has plastic limit 25 % and liquid limit 70% determine :

Plasticity index

Consistency index

Liquidity index

Solution

$$W_c = \frac{W - W_s}{W_s} = \frac{53 - 37}{37} = 0.43 \text{ (2.5 Points)}$$

$$P.I. = L.L. - P.L. = 0.70 - 0.25 = 0.45 \text{ (2.5 Points)}$$

$$I_c = \frac{L.L. - W_c}{L.L. - P.L.} = \frac{0.70 - 0.43}{0.70 - 0.25} = 0.6 \text{ (2.5 Points)}$$

$$I_L = \frac{W_c - P.L.}{L.L. - P.L.} = \frac{0.43 - 0.25}{0.70 - 0.25} = 0.4 \text{ (2.5 Points)}$$