lecture - 4
6/11/19

# CHAPTER-2

## classification of soil

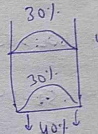
W.B Ques-③

| | | Cumulative Retain | % N |
|---|---|---|---|
| 40% | 4.75 Gravel | 40% | 60 |
| 50% | 0.075 sand | 90% | 10 |
| 10% | 0.002 silt | 100% | 0 |

$C_u = \frac{D_{60}}{D_{10}}$

$= \frac{4.75}{0.075} = 63.3$ option (c)

Ques ②




4.75 G.W

0.075

$C_u > 4$

$(1 \leq C_c \leq 3)$

Ques-④

I) Coarse

II) S(54) > G(36) ⇒ sand

III) % fineness = 10%

5-12% check $C_u, C_c, I_p$

$C_u = \frac{D_{60}}{D_{10}} = \frac{5}{1}$ ∴ C - Poorly

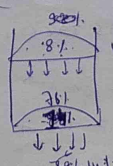
$I_p)_{soil} = \omega_L - \omega_p = 50 - 35 = 15$

$I_p > 7$ → $\omega_L > 29.6$ → check A-line

$(I_p)_{A\ line} = 0.73(\omega_L - 20) = 21.9$

$(I_p)_{soil} < (I_p)_{A\ line}$ → M > C

solution - (T3)



Soil (A)

I) Coarse

II) S(78) > G(8.1) SAND

III) % fineness = 14 %

check $I_p$ : fineness > 12%

$I_p = w_L - w_p = 16 - 8 = 8$

SC $\quad I_p > 7 \longrightarrow w_L < 29.6 \longrightarrow C > M$

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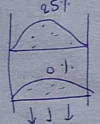
Soil (B)




CH

I) Fine

II) $w_L = 58$ ($\because w_L > 50 \rightarrow$ High)

III) $I_p)_{soil} = w_L - w_p = 58 - 14 = 44$

$I_p)_{A\,line} = 0.73(w_L - 20) = 27.74$

$I_p)_{U\,line} = 0.9(w_L - 8) = 45$

$I_p)_{A\,line} < (I_p)_{soil} < (I_p)_{U\,line}$

day

## CHAPTER-1

W.B. Q(42)

$w_s = \frac{1}{R} - \frac{1}{G}$

$R = \frac{\frac{V_L - V_d}{V_d}}{w_L - w_s} = \frac{23 - V_d}{V_d(0.45 - 0.18)}$

$0.18 = \frac{V_d(0.45 - 0.18)}{23 - V_d} - \frac{1}{2.73}$

$V_d = 15.39\ cc$

W.B Q(43) $\quad w_L = 50 \longrightarrow$ vol$^n$ shrin$^n$ = 42%.

$w_p = 40 \rightarrow$ vol$^n$ shrin$^n$ = 20%.

$P(w_1 - w_f) =$ vol$^n$ shrinkage

$P(50 - w_f) = 42$

$P(40 - w_f) = 28 \quad \text{or} \quad (w_s = 20\%)$

Solution (51)

1) Saturated $\quad G_m = 1.86 = \frac{\gamma_b}{\gamma_w}$, $w = 36\%$.

and $\frac{\gamma_b}{\gamma_w} = \frac{\gamma_{sat}}{\gamma_w} = \left(\frac{G+e}{1+e}\right)\frac{\gamma_d}{\gamma_w} = \frac{G + 0.36G}{1 + 0.36G} = 1.86$

$e = \frac{wG}{S} = \frac{0.36G}{1}$

2) dry $\quad G_m = 1.72 = \frac{\gamma_d}{\gamma_w}$ $\qquad w_s = \frac{1}{R} - \frac{1}{G} = \frac{1}{\left(\frac{\gamma_d}{\gamma_w}\right)} - \frac{1}{G}$

$w_s = \frac{1}{1.72} - \frac{1}{2.69} = 0.2103$

$w_s = 21.03\ \%$

Solution (49)

$\Rightarrow V_p - V_d = 25\%$ of $V_p$

$0.75 V_p = V_d$

$V_p = 1.33 V_d$

$\Rightarrow V_L - V_d = 34\%$ of $V_L$

$0.66 V_L = V_d$

$V_L = 1.5 V_d$

$\Rightarrow \frac{dy}{dx} = \frac{V_L - V_p}{w_L - w_p} = \frac{V_L - V_d}{w_L - w_s} = \frac{V_p - V_d}{w_p - w_s}$ = constant

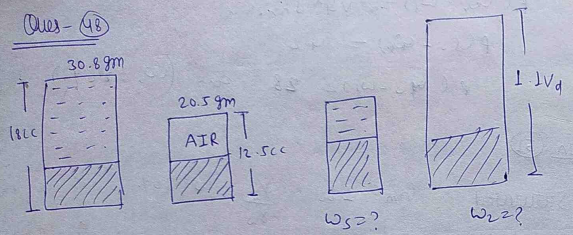
$\frac{1.5V_d - 1.33V_d}{0.33 - 0.25} = \frac{1.5V_d - V_d}{0.33 - w_s}$

$w_s = 0.1033 = 10.33\%$

$R = \frac{\frac{V_L - V_p}{V_d}}{w_L - w_p} = \frac{1.5V_d - 1.33V_d}{\frac{V_d}{0.33 - 0.25}}$

$R = 2.12$

Ques - (48)




(1) $w_s = \dfrac{(M_1 - M_d) - (V_1 - V_d)\rho_w}{M_d}$

$= \dfrac{(30.8 - 20.5) - (18 - 12.5)\,1\ \frac{gm}{cc}}{20.5}$

$= 23.41\%$

(2) $R = \dfrac{\gamma_d}{\gamma_w} = \dfrac{\frac{M_d}{V_d}}{\gamma_w} = \dfrac{\frac{20.5}{12.5}}{1\ \frac{gm}{cc}} = 1.64$

(3) $w_s = \dfrac{1}{R} - \dfrac{1}{G} \Rightarrow 23.4 = \dfrac{1}{1.64} - \dfrac{1}{G}$

$\boxed{G = 2.66}$

(4) $w_2 = w_s + \dfrac{\Delta V \cdot \gamma_w}{M_d} = w_s + \dfrac{(0.1)\,V_d \rho_w}{M_d}$

$= 0.234 + \dfrac{0.1 \times (12.5) \times 1}{20.5}$

$= 0.295 = 29.5\%$ Ans