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SOIL MECHANICS

CIVIL ENGINEERING

Date of Test : 06/10/2026

ANSWER KEY >

- | | | | | |
|--------|---------|---------|---------|---------|
| 1. (b) | 7. (b) | 13. (d) | 19. (a) | 25. (c) |
| 2. (a) | 8. (c) | 14. (c) | 20. (c) | 26. (b) |
| 3. (b) | 9. (b) | 15. (b) | 21. (d) | 27. (c) |
| 4. (b) | 10. (a) | 16. (a) | 22. (c) | 28. (a) |
| 5. (d) | 11. (a) | 17. (d) | 23. (d) | 29. (d) |
| 6. (a) | 12. (b) | 18. (c) | 24. (a) | 30. (c) |

DETAILED EXPLANATIONS

1. (b)

$$G_{\text{sat}} = 1.90$$

We know $G_{\text{sat}} = \frac{\gamma_{\text{sat}}}{\gamma_w} = \frac{G + e}{1 + e}$

Now $G_{\text{sat}} = \frac{G + e}{1 + e}$

$$1.90 = \frac{G + 0.4G}{1 + 0.4G}$$

$$\left\{ \begin{array}{l} Se = wG \\ (1)e = 0.4G \end{array} \right\}$$

$$\Rightarrow 1.90 + 1.90(0.4G) = 1.4G$$

$$\Rightarrow 1.90 = 0.64G$$

$$\therefore G = 2.97$$

2. (a)

$$(V_w)_{\text{displaced}} = V_{\text{soil}} + V_{\text{wax}}$$

$$\Rightarrow (V_w)_{\text{displaced}} = V_{\text{soil}} + \frac{W_{\text{wax}}}{G_{\text{wax}} \gamma_w}$$

$$\Rightarrow 345 = V_{\text{soil}} + \frac{7}{0.9 \times 1}$$

$$\Rightarrow V_{\text{soil}} = 337.2 \text{ cc}$$

Now, $\gamma_d = \frac{W_{\text{solid}}}{V_{\text{soil}}}$

$$\Rightarrow \gamma_d = \frac{550}{337.2} = 1.63 \text{ g/cc}$$

3. (b)

$$P = 32\%; W_L = 47\%; W_p = 35\%$$

$$a = P - 35 = 32 - 35 = -3 = 0$$

$$b = P - 15 = 32 - 15 = 17$$

$$c = W_L - 40 = 47 - 40 = 7$$

$$d = I_p - 10 = (W_L - W_p) - 10 = (47 - 35) - 10 = 2$$

$$GI = 0.2a + 0.005ac + 0.01bd$$

$$\Rightarrow GI = 0.2(0) + 0.005(0 \times 7) + 0.01(17 \times 2)$$

$$\Rightarrow GI = 0.34$$

4. (b)

$$Q = AKi;$$

$$\Rightarrow Q = AK \frac{\Delta h}{L}$$

Given; $Q = 200 \text{ cc in } 100 \text{ sec}; A = 30 \text{ cm}^2; \Delta h = 20 \text{ cm}; L = 35 \text{ cm}$

$$\therefore \frac{200}{100} = 30 \times K \times \frac{20}{35}$$

$$\Rightarrow K = 0.1167 \text{ cm/sec}$$

$$\Rightarrow K = 1.17 \text{ mm/sec}$$

$$\therefore q_{ns} = \frac{q_u - \gamma D_f}{FOS}$$

$$\Rightarrow q_{ns} = \frac{1050.56 - 19.5(2.0)}{2.5}$$

$$\Rightarrow q_{ns} = 404.62 \text{ kN/m}^2$$

9. (b)

Given:

W = Weight of hammer = 3 tonne $\simeq$ 30 kN

Q_{ap} = 25 tonne $\simeq$ 250 kN

FOS = 6 (for engineering news record formula if allowable)

C = Combined temporary correction i.e., 0.25 cm for steam hammer

H = Height of all = 100 cm

$$Q_{up} = \frac{WH}{S + C}$$

$$\Rightarrow Q_{ap} = \frac{WH}{(S + C)FOS}$$

$$\therefore 250 = \frac{30 \times 100}{(S + 0.25)6}$$

$$S = 1.75 \text{ cm}$$

10. (a)

$$Q_u = CN_c A_b + \alpha \bar{C} A_s$$

$$\Rightarrow 900 = 40(9)[0.4^2] + \alpha \bar{C} (4 \times 0.4 \times 10)$$

$$\Rightarrow \alpha \bar{C} = 52.65$$

So for pile of cross-section 250 mm $\times$ 250 mm, ultimate load carrying capacity is

$$Q_u = CN_c A_b + \alpha \bar{C} A_s$$

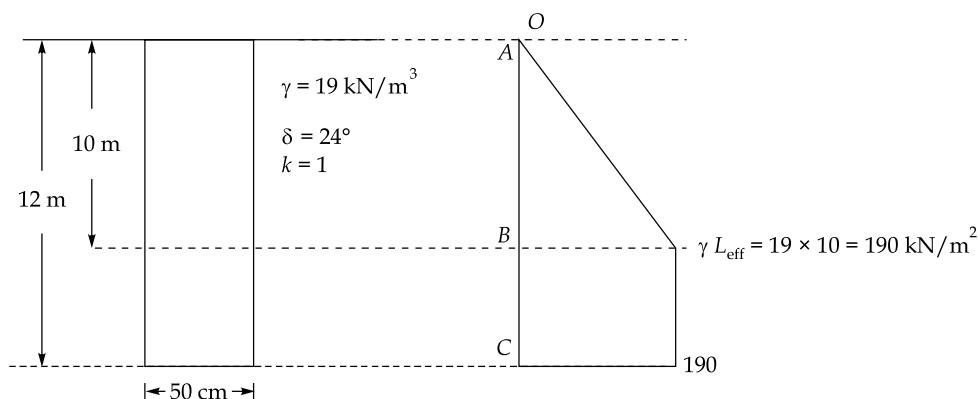
$$\Rightarrow Q_u = 40(9)(0.25^2) + 52.65(4 \times 0.25 \times 18)$$

$$\Rightarrow Q_u = 970.2 \text{ kN} \simeq 970 \text{ kN}$$

11. (a)

As pile is installed in dense sand, so effective length as per Kuching effect is

$$L_{\text{eff}} = 20D = 20(0.5) = 10 \text{ m}$$



we know, after L_{eff} effective stress will remain same.

End bearing resistance,

$$= \gamma L_{eff} N_q = 19 \times 10 \times 78 = 14820 \text{ kN/m}^2 \neq 11000 \text{ kN/m}^2$$

$$Q_{eb} = \gamma L_{eff} N_q A_b = 11000 \times \frac{\pi}{4} \times 0.5^2 = 2160 \text{ kN}$$

Frictional resistance:

For AB $Q_{sf} = K \tan \delta \sigma'_{avg} = (1) \tan(24^\circ) \left[\frac{0 + 190}{2} \right] = 42.30 \text{ kN/m}^2 < 100 \text{ kN/m}^2$

$$\therefore (Q_{sf})_{AB} = 42.30 \times \pi \times 0.5 \times 10 = 664.4 \text{ kN}$$

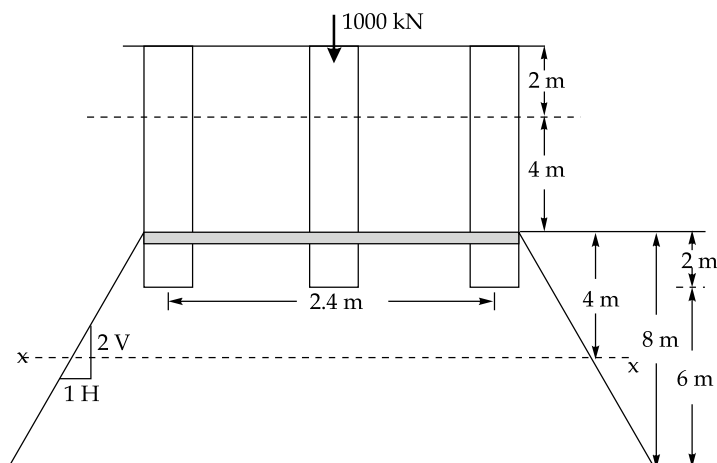
For BC $q_{sf} = K \tan \delta \sigma'_{avg} = (1) \tan(24^\circ) \left[\frac{190 + 190}{2} \right] = 84.6 \text{ kN/m}^2 < 100 \text{ kN/m}^2$

$$(Q_{sf})_{BC} = 84.6 \times \pi \times 0.5 \times 2 = 265.8 \text{ kN}$$

$$\therefore \text{Total load carrying capacity} = 2160 + 664.4 + 265.8 = 3090.2 \text{ kN} \approx 3090 \text{ kN}$$

12. (b)

For two layer clay layer, equivalent raft will exist at $L/3$ of second layer i.e. $L/3 = 6/3 = 2 \text{ m}$ from bottom of pile or 6 m from Top of pile group.



$$\text{Width of pile group} = 2S + D = 2(1) + 0.4 = 2.4 \text{ m}$$

$$\text{Width of pile group at } x-x \text{ section} = 2.4 + \frac{4}{2} + \frac{4}{2} = 6.4 \text{ m}$$

$$\therefore \Delta \sigma' = \frac{P}{B^2} = \frac{1000}{6.4^2} = 24.41 \text{ kN/m}^2$$

Initial effective stress

$$\sigma' = \gamma'(z)$$

($\because$ WT is upto G/L)

$$\sigma'_{x-x} = (21 - 10)(6 + 4) = 110 \text{ kN/m}^2$$

$$\Delta H = \frac{C_c H_v}{1 + e_0} \log \left[\frac{\sigma'_0 + \Delta \sigma'}{\sigma'_0} \right]$$

$$= \frac{0.21 \times 8000}{1 + 0.68} \log \left[\frac{110 + 24.45}{110} \right] = 86.71 \text{ mm}$$

13. (d)

$$\begin{aligned} Q_{up} &= 9c \frac{\pi}{4} D^2 + \alpha \bar{c} \pi D L \\ &= 9(58) \left(\frac{\pi}{4} \times 0.8^2 \right) + (0.6 \times 58 \times \pi \times 0.8 \times 9) = 1049.5 \text{ kN} \end{aligned}$$

For 16 piles, $nQ_{up} = 16 \times 1049.5 = 16792 \text{ kN}$

$$\begin{aligned} Q_{ug} &= 9CB^2 + \alpha \bar{c} (4BL) \\ &= 9(58)(6.2)^2 + (1)(58)(4 \times 6.2 \times 9) \\ &= 33011.28 \text{ kN} \end{aligned}$$

where

$$B = 3S + D = 3(1.8) + 0.8 = 6.2 \text{ m}$$

$$\alpha = 1 \text{ for pile group}$$

$$\therefore Q_{ag} = \frac{\min\{Q_{ug} \text{ and } n \times Q_{up}\}}{FOS} = \frac{16792}{2.5}$$

$$Q_{ag} = 6716.8 \text{ kN} \simeq 6717 \text{ kN}$$

14. (c)

$$q_u = CN_c + \gamma D_f N_q + \frac{1}{2} \gamma B N_\gamma$$

For local shear failure, $C' = \frac{2}{3}C = \frac{2}{3} \times 36 = 24 \text{ kPa}$

$$\tan \phi' = \frac{2}{3} \tan \phi$$

$$\begin{aligned} \Rightarrow \phi' &= \tan^{-1} \left[\frac{2}{3} \tan \phi \right] \\ &= \tan^{-1} \left[\frac{2}{3} \tan 20^\circ \right] = 13.64^\circ \end{aligned}$$

$$\therefore N_c = 11, N_q = 4, N_\gamma = 1.6$$

$$q_u = 24(11) + 20(2)(4) + \frac{1}{2} (20)(2)(1.6)$$

$$\Rightarrow q_u = 456 \text{ kN/m}^2$$

$$\therefore q_{\text{safe}} = \frac{q_u - \gamma D_f}{FOS} + \gamma D_f$$

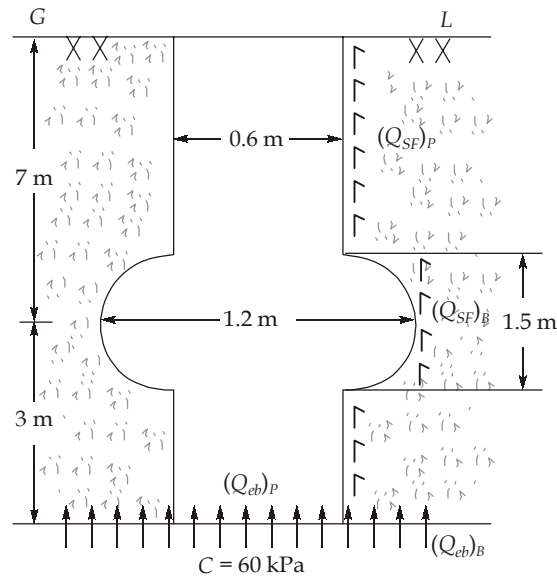
$$\Rightarrow q_{\text{safe}} = \frac{456 - 20(2)}{2.5} + 20(2)$$

$$\Rightarrow q_{\text{safe}} = 206.4 \text{ kN/m}^2$$

$$\therefore Q_{\text{safe}} = 206.4 \times (2 \times 1)$$

$$\Rightarrow Q_{\text{safe}} = 412.8 \text{ kN} \simeq 413 \text{ kN}$$

15. (b)



$$Q_{up} = (Q_{eb})_{\text{Pile without bulb}} + (Q_{sf})_{\text{Pile without bulb}} + (Q_{eb})_{\text{Bulb}} + (Q_{sf})_{\text{Bulb}}$$

$$\Rightarrow \quad Q_{up} = 9C \frac{\pi}{4} D^2 + \alpha \bar{c} \pi D (L - L_b) + 9c \frac{\pi}{4} (D_b^2 - D^2) + \alpha \bar{c} \pi D_b L_b$$

$$\Rightarrow Q_{up} = 9(60)\frac{\pi}{4}(0.6)^2 + 0.6(40)(\pi \times 0.6) \times (10 - 1.5) \\ + 9(40)\frac{\pi}{4}(1.2^2 - 0.6^2) + 1(40)(\pi \times 1.2 \times 1.5)$$

$$\Rightarrow Q_{up} = 1070 \text{ kN}$$

16. (a)

$\sigma_3 = 1000 \text{ kPa}$, $\sigma_3' = \sigma_3 - u$; $\sigma_d = 1600 \text{ kPa}$; $\sigma_1' = \sigma_1 - u$; $\sigma_1 = 2600 \text{ kPa}$; as ($\sigma_1 = \sigma_3 + \sigma_d$)
We know,

$$\sigma_1' = \sigma_3' \tan^2\left(45 + \frac{\phi'}{2}\right) + 2c' \tan\left(45 + \frac{\phi'}{2}\right)$$

$$(\sigma_1 - u) = (\sigma_3 - u) \tan^2 \left(45 + \frac{\phi'}{2} \right) + 2c' \tan \left(45 + \frac{\phi'}{2} \right)$$

$$\Rightarrow (2600 - u) = (1000 - u) \tan^2 \left(45 + \frac{25}{2} \right) + 2(220) \tan \left(45 + \frac{25}{2} \right)$$

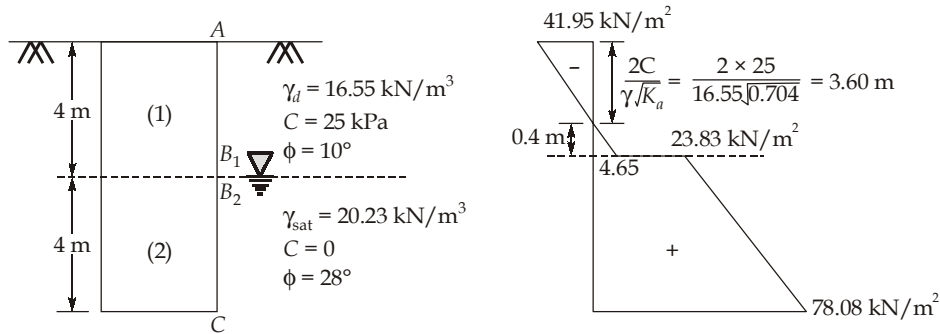
$$\Rightarrow (2600 - u) = (1000 - u)(2.463) + 691$$

$$\Rightarrow 2600 - u = 2463 - 2.463u + 691$$

$$\Rightarrow 1.463u = 2463 + 691 - 2600$$

$$\Rightarrow u = 378.67 \text{ kPa} \simeq 378 \text{ kPa (say)}$$

17. (d)



$$K_{a1} = \frac{1 - \sin 10^\circ}{1 + \sin 10^\circ} = \frac{0.826}{1.174} = 0.704$$

$$K_{a2} = \frac{1 - \sin 28^\circ}{1 + \sin 28^\circ} = 0.36$$

$$(\gamma_d)_{\text{clay}} = \frac{G\gamma_w}{1+e} = \frac{2.7 \times 9.81}{1+0.6} = 16.55 \text{ kN/m}^3$$

$$(\gamma_{\text{sat}})_{\text{sand}} = \frac{G+e}{1+e} \gamma_w = \frac{2.7+0.6}{1+0.6} \times 9.81 = 20.23 \text{ kN/m}^3$$

$$(P_a)_A = -2C\sqrt{K_a} = -2(25)\sqrt{0.704} = -41.95 \text{ kPa}$$

$$\begin{aligned} (P_a)_{B_1} &= -2C\sqrt{K_{a1}} + \gamma z_1 K_{a1} \\ &= -41.95 + 16.55(4)(0.704) = 4.65 \text{ kPa} \end{aligned}$$

$$(P_a)_{B_2} = \gamma_d z_1 K_{a2} = 16.55(4)(0.36) = 23.832 \text{ kPa}$$

$$\begin{aligned} (P_a)_C &= \gamma_d z_1 K_{a2} + \gamma' z_2 K_{a2} + \gamma_w z_2 \\ &= 23.832 + (20.23 - 9.81)(4)(0.36) + 9.81(4) \\ &= 78.08 \text{ kPa} \end{aligned}$$

Total active earth pressure on wall = Area of positive portion in earth pressure variation.

$$\begin{aligned} &= \frac{1}{2}(0.4)(4.65) + \frac{1}{2}(23.83 + 78.08)(4) \\ &= 204.75 \text{ kN/m} \simeq 205 \text{ kN/m (say)} \end{aligned}$$

18. (c)

When slope is dry

$$\gamma_d = \frac{G\gamma_w}{1+e} = \frac{2.75 \times 9.81}{1+0.52} = 17.75 \text{ kN/m}^3$$

$$\text{FOS} = \frac{C + (\gamma_d H \cos^2 i) \tan \phi'}{\gamma H \cos i \sin i}$$

$$= \frac{25 + (17.756 \times \cos^2 26^\circ) \tan 16^\circ}{17.75(6) \cos 26^\circ \sin 26^\circ}$$

$$= 1.184$$

When slope is subjected to seepage

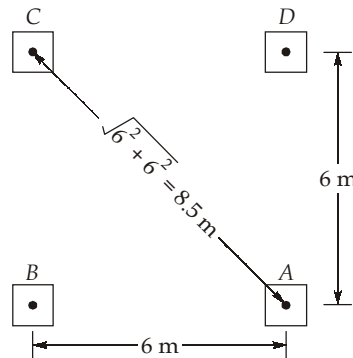
$$\text{FOS} = \frac{C}{\gamma_{\text{sat}} H \sin i \cos i} + \left(\frac{\gamma'}{\gamma_{\text{sat}}} \right) \frac{\tan \phi}{\tan i}$$

$$\gamma_{\text{sat}} = \frac{G + e}{1 + e} \gamma_w = \frac{2.75 + 0.52}{1.52} \times 9.81 = 21.10 \text{ kN/m}^3$$

$$\therefore \text{FOS} = \frac{25}{21.10(6) \sin 26^\circ \cos 26^\circ} + \left(\frac{21.10 - 9.81}{21.10} \right) \frac{\tan 16^\circ}{\tan 26^\circ}$$

$$\Rightarrow \text{FOS} = 0.816$$

19. (a)



For footing A, B, C, D, the $\frac{r}{Z}$ ratios are 0, $\frac{6}{3}$, $\frac{6}{3}$ and $\frac{8.5}{3}$ respectively.

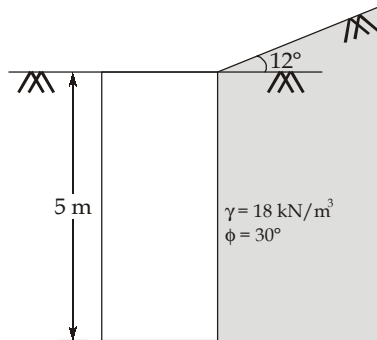
$$\sigma_z = \frac{3}{2\pi} \left[\frac{1}{1 + \left(\frac{r}{Z} \right)^2} \right]^{5/2} \frac{Q}{Z^2}$$

$$\therefore \sigma_z = \frac{3Q}{2\pi Z^2} \left[\left(\frac{1}{1 + (0)^2} \right)^{5/2} + 2 \left(\frac{1}{1 + \left(\frac{6}{3} \right)^2} \right)^{5/2} + \left(\frac{1}{1 + \left(\frac{8.5}{3} \right)^2} \right)^{5/2} \right]$$

$$\Rightarrow \sigma_z = \frac{3 \times 600}{2\pi(3)^2} [1.0398]$$

$$\Rightarrow \sigma_z = 33.09 \text{ kN/m}^2 \simeq 33 \text{ kN/m}^2$$

20. (c)



$$\text{Active pressure on wall} = \frac{1}{2} K_a \gamma H^2$$

$$K_a = \cos i \left[\frac{\cos i - \sqrt{\cos^2 i - \cos^2 \phi'}}{\cos i + \sqrt{\cos^2 i - \cos^2 \phi'}} \right]$$

$$\Rightarrow K_a = \cos 12^\circ \left[\frac{\cos 12^\circ - \sqrt{\cos^2 12^\circ - \cos^2 30^\circ}}{\cos 12^\circ + \sqrt{\cos^2 12^\circ - \cos^2 30^\circ}} \right]$$

$$\Rightarrow K_a = 0.357$$

$$\therefore \text{Active pressure on wall} = \frac{1}{2} \times 0.357 \times 18 \times 5^2 = 80.325 \text{ kN/m} \approx 80.23 \text{ kN/m}$$

21. (d)

$$\gamma_d = \frac{G \gamma_w}{1 + \left(\frac{wG}{S} \right)}$$

$$\Rightarrow 17 = \frac{2.6 \times 10}{1 + \frac{0.10 \times 2.6}{S}}$$

$$\Rightarrow S = 0.4911$$

$$\therefore e = \frac{wG}{S} = \frac{0.10 \times 2.6}{0.4911} = 0.5294$$

$$\therefore n = 0.346$$

At full compaction ($S = 1$)

$$\therefore e = wG$$

$$\therefore e_{\min} = 0.10 \times 2.6 = 0.26$$

$$n_{\min} = \frac{e}{1 + e} = 0.206$$

$$\% \Delta n = \frac{0.346 - 0.206}{0.346} \times 100$$

$$\Rightarrow \% \Delta n = 40.46\%$$

22. (c)

$$G = 2.7; S = 0.40; w = 0.105;$$

$$\text{We know, } Se = wG$$

$$\Rightarrow e = \frac{0.105 \times 2.7}{0.40} = 0.71$$

$$\therefore \gamma_1 = \frac{G\gamma_w}{1+e}(1+w) = \frac{2.7 \times 9.81}{1+0.71}(1+0.105)$$

$$\Rightarrow \gamma_1 = 17.12 \text{ kN/m}^3$$

$\therefore$ Weight of soil will be = 17.12 kN per m^3 of natural soil

Now bulk density at w (= 18%) is given by,

$$\gamma_2 = \frac{G\gamma_w}{1+e}(1+w_2)$$

$$\Rightarrow \gamma_2 = \frac{2.7 \times 9.81}{1+0.71}(1+0.18)$$

$$\Rightarrow \gamma_2 = 18.28 \text{ kN/m}^3$$

Increment in bulk unit weight, is due to addition of weight of water in order to increase its water content upto 18%.

$$\therefore \gamma_2 - \gamma_1 = \frac{\Delta w_w}{V_{\text{soil}}}$$

$$\Rightarrow \Delta w_w = (18.28 - 17.12) \times 1 = 1.16 \text{ kN}$$

Means 1.16 kN of water is needed to be added per m^3 of soil or per 17.11 kN of natural soil and so water to be added for 100 kN soil will be

$$= \frac{1.16}{17.12} \times 100 = 6.78 \text{ kN}$$

$\therefore$ Volume of water to be added

$$\Delta V_w = \frac{6.78}{9.81} \times 1000 = 691 \text{ litre per 100 kN of soil}$$

23. (d)

As per result of falling head permeability test

$$K = 2.303 \frac{al}{At} \log \frac{h_o}{h_1}$$

$$a = \frac{\pi}{4} d^2 = \frac{\pi}{4} \times (2 \times 10^{-2})^2 = 3.14 \times 10^{-4} \text{ m}^2$$

$$A = \frac{\pi}{4} D^2 = \frac{\pi}{4} \times (6 \times 10^{-2})^2 = 2.83 \times 10^{-3} \text{ m}^2$$

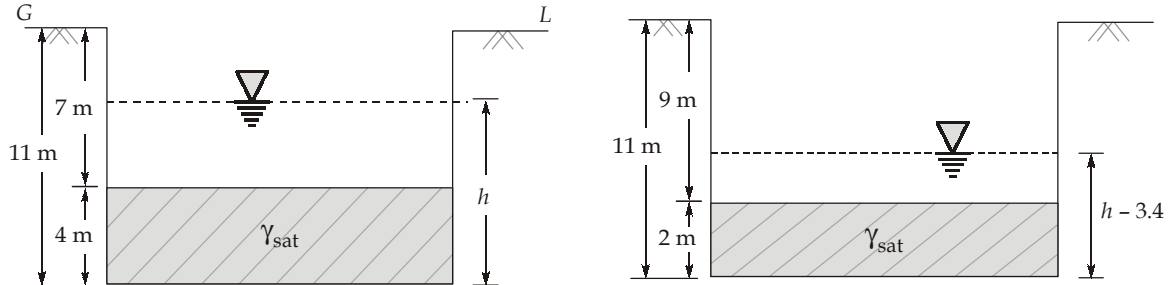
$$L = 0.15 \text{ m}; h_o = 0.45 \text{ m}; h_1 = 0.30 \text{ m}; t = 120 \text{ sec}$$

$$K = 2.303 \times \frac{3.14 \times 10^{-4}}{2.83 \times 10^{-3}} \times \frac{0.15}{120} \times \log \left(\frac{0.45}{0.30} \right)$$

$$\Rightarrow K = 5.62 \times 10^{-5} \text{ m/s} = 5.62 \times 10^{-5} \times (24 \times 60 \times 60) \text{ m/day}$$

$$\Rightarrow K = 4.86 \text{ m/day}$$

24. (a)



$$\gamma_{\text{sat}}(4) = \gamma_w(h)$$

$$\gamma_{\text{sat}}(2) = \gamma_w(h - 3.4)$$

$$\Rightarrow \gamma_{\text{sat}} = \frac{10h}{4} \quad \dots(i) \quad \Rightarrow \gamma_{\text{sat}} = \frac{10(h - 3.4)}{2} \quad \dots(ii)$$

Equate both equation (i) and equation (ii)

$$\frac{10h}{4} = \frac{10(h - 3.4)}{2}$$

$$\Rightarrow 2h = 4h - 13.6$$

$$\Rightarrow h = 6.8 \text{ m}$$

$$\therefore \gamma_{\text{sat}} = \frac{10 \times 6.8}{4} = 17 \text{ kN/m}^3$$

$$\therefore \gamma' = \gamma_{\text{sat}} - \gamma_w$$

$$\therefore \gamma' = 17 - 10 = 7 \text{ kN/m}^3$$

25. (c)

As per given data:

$$t = 1 \text{ year}$$

$$C_V = 0.2 \text{ mm}^2/\text{s} = 0.2 \times 10^{-6} \times 365 \times 86400 = 6.30 \text{ m}^2/\text{year}$$

$$d = 5 \text{ m}$$

$$\Rightarrow T_V = \frac{C_V t}{d^2} = \frac{6.30 \times 1}{(5)^2}$$

$$T_V = 0.25 < 0.28$$

$$\therefore U < 0.6$$

$$\therefore T_V = \frac{\pi}{4} U^2$$

$$\Rightarrow T_V = \frac{\pi}{4} \left(\frac{\Delta h}{\Delta H} \right)^2$$

$$\Rightarrow 0.25 = \frac{\pi}{4} \left(\frac{50}{\Delta H} \right)^2$$

$$\Rightarrow \Delta H = 88.62 \text{ mm}$$

$$\text{Now for } \Delta h = 50 \text{ mm} + 20 \text{ mm} = 70 \text{ mm}$$

$$U = \frac{\Delta h}{\Delta H} = \frac{70}{88.62} = 0.79 > 0.6$$

$$\therefore T_v = -0.9332 \log_{10} (1 - U) - 0.0851 = -0.9332 \log (1 - 0.79) - 0.0851 = 0.547$$

Now,

$$T_v = \frac{C_v t}{d^2}$$

$$\Rightarrow 0.547 = \frac{6.30 \times t}{(5)^2}$$

$$\Rightarrow t = 2.17 \text{ years}$$

26. (b)

For test 1

$$\sigma_3 = 200 \text{ kPa}; \sigma_d = 600 \text{ kPa}; \sigma_1 = 200 + 600 = 800 \text{ kPa}$$

For test 2

$$\sigma_3 = 350 \text{ kPa}; \sigma_d = 1050 \text{ kPa}; \sigma_1 = 350 + 1050 = 1400 \text{ kPa}$$

We know

$$\sigma_1 = \sigma_3 \tan^2 \left(45 + \frac{\phi}{2} \right) + 2C \tan \left(45 + \frac{\phi}{2} \right)$$

$$\sigma_1 = \sigma_3 \tan^2 \alpha + 2C \tan \alpha$$

Let $\tan \alpha = X$

$$\therefore \sigma_1 = \sigma_3 X^2 + 2CX$$

$$800 = 200 X^2 + 2CX \quad \dots(1)$$

$$1400 = 350 X^2 + 2CX \quad \dots(2)$$

$$\frac{1400}{-600} = \frac{350 X^2 + 2CX}{-200 X^2 - 2CX} \Rightarrow X = 2$$

$$\therefore \tan \left(45 + \frac{\phi}{2} \right) = 2$$

$$\therefore \phi = 36.87^\circ$$

$$\therefore C = 0$$

At X-X section

$$\tau = C + \sigma' \tan \phi$$

$$\Rightarrow \tau = 0 + [(17.5 \times 2) + (21.5 - 9.81)(3)] \tan 36.87^\circ$$

$$\Rightarrow \tau = 52.55 \text{ kPa}$$

27. (c)

28. (a)

The all round pressure (confining pressure) is zero in an unconfined compression test and the Mohr's circle passes through the origin.

29. (d)

Phenomenon of quick sand can occur in the sands or silts and can not occur in gravel.

30. (c)

The phreatic line at the entrance goes downward.

