01

QP code: 39714

Solution to GE-2 - Held in May 2018

Q.1 (C) $L = 3m$, $d = 0.25\,m$, $s = 0.25m$, $c = 18$, $\gamma = 15$

$\alpha = 0.4$.

$Q_{nsf} = \pi D \times \alpha c L$

$= \pi \times 0.25 \times 0.4 \times 18 \times 3 = 28.43\ KN$

$(Q_{nsf})_g = 25.45 \times 16 = 407.2\ KN$

$Q_{ng} = \gamma L_c A_p = 15 \times 3 \times 2.5^2 = 281.25$

$\therefore Q_{nsf} = 281.25\ KN$

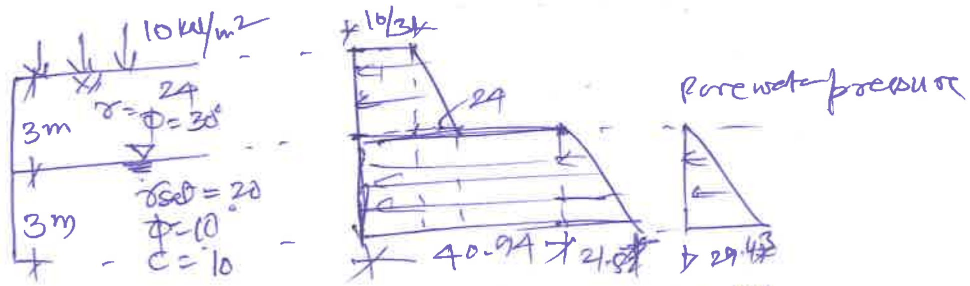
Q.2(A) Step 1: Draw the slope to the scale

2. Determine the weight of soil above failure surface
3. Locate the weight at given condition.
4. Find value of α, $\alpha > \gamma$
5. Locate the resultant cohesive force,
6. Form intersection point [of cohesive & wt] draw the reaction line, which is tangential to friction circle.
7. Draw the force triangle, and find the Cm, then FOS

Q 2(C) $Q_u = \frac{W h \eta}{(S + C)}$ $W = 30\,KN$, $h = 2m$, $\eta = 0.7$ for drop hammer

$S = 6mm$, $C = 2.54$ for drop hammer

Q 3(A)



$Ka_1 = 1/3$, $\sigma_h = \frac{1}{3} \times 10 + \frac{1}{3} \times 24 \times z$, when $z = 0$, $\sigma_h = 10/3$

$z = 3m$, $\sigma_h = 10/3 + 24 =$

$Ka_2 = \frac{1 - \sin 10}{1 + \sin 10} = 0.704$ $\sigma_h = (10 \times + 24 \times 3) Ka_2 + Ka_2 \gamma z - 2C\sqrt{Ka_2}$

$z = 0$ from interface

$= 57.73 - 2 \times 10 \times \sqrt{0.704} = 40.94$

Resultant = Area of active earth pressure diagram

$z = 3m$, $= 40.94 + 0.704 \times (20 - 9.81) \times 3$

$= 40.94 + 21.52$

Q4(A) Using Rankine's theory, determine active force [Magnitude & location]

→ Determine Resisting Moment & overturning Moment

→ Determine balance moment, total vertical load

→ $\bar{x} = \Sigma M / \Sigma V$ → $e = b/2 - \bar{x}$,

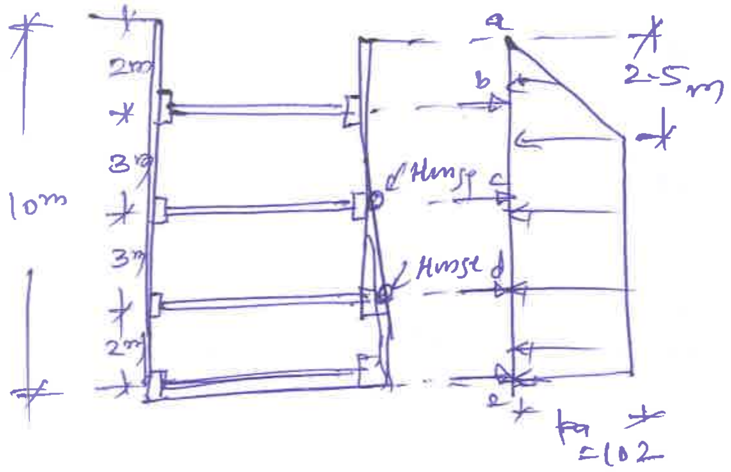
→ $\sigma_{max}/\sigma_{min} = \frac{\Sigma V}{B}(1 \pm 6e/B)$ → Also find FOS w.r.t overturning, sliding.

B. Capacity.

02

Q 4(B)

Find $\frac{\gamma H}{C_e} = 8.63 > 4$ soft clay



$p_a = \gamma H - 4C$
$= 19 \times 10 - 4 \times 22$
$= 102.$

$p_a = 0.3 \times 19 \times 10$
$= 57$, Adopt $p_a = 102$

By considering the FBD of beam abc, cd, & de, determine the reactions, & multiply it with Horizontal spacing, will give the force in struts.

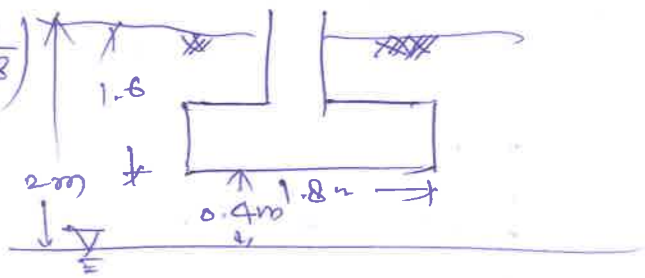
Q 5(A)

B = 1.8, L = 3.6. D_f = 1.6 m γ = 18, c = 15, $\phi = 30^\circ$

$R_w = 1$

$R_w' = \frac{1}{2}\left(1 + \frac{0.4}{1.8}\right) = 0.61$

A_r = given γ



Fals code method $i_c = i_q = i_\gamma = 1.0$

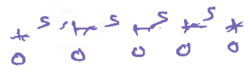
$s_c = 1 + 0.2 \times 1.8/3.6 = 1.1, = s_q$, $s_\gamma = 1 - 0.4 \times \frac{1}{2} = 0.8$

$d_c = 1 + 0.2 \times \frac{1.6}{1.8} \times \tan(45 + 15) = 1.31$

$d_q = d_\gamma = 1 + 0.1 \times 1.6/1.8 \tan(60) = 1.15$

put the all values properly in eq^n given below

$Q_{nu} = cN_c s_c d_c i_c' + q(N_q - 1) s_q d_q i_q' + 0.5 B \gamma N_\gamma s_\gamma d_\gamma i_\gamma' R_w'$



Q 6(A)

25, 5×5, $B = 4 \times s + d$
$= (4s + d)$

$Q_u = cN_c A_b + \alpha c A_s$
$= 0.7 \times C \times \pi \times 0.$