

(1)

Paper II Foundation

ID " 13928

Exam " mid

Program " B. Tech (Civil)

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A1:-

Sol:-

$$D.L = 500 \frac{KN}{m}$$

$$L.L = 300 \text{ KN/m}$$

$$D = 0.7 \text{ m}$$

$$c = 0$$

$$\phi = 40^\circ$$

$$N\alpha = 8.2 \quad , \quad N\gamma = 100.4$$

$$F.O.S = 3.0$$

$$\gamma = 17 \text{ KN/m}^3$$

$$\gamma_{sat} = 20 \text{ KN/m}^3$$

$$FOS = \frac{Q_u}{Q_{app}}$$

$$Q_u = FOS \times Q_{app} = 3 \times \frac{800}{B}$$

$$= \frac{2400}{B}$$

For $\phi = 40^\circ$ the γ_{c} and γ_{q} are

$$\gamma_c = 1.3$$

$$\gamma_q = 1.4$$

$$Q_u = c N_c + \gamma D N_q + \frac{1}{2} \gamma B N_\gamma$$

Use bulk unit weight (17 kN/m^3)

in 2nd term and submerged unit w

$$\gamma = \gamma_{sat} - \gamma_w$$

$$= 20 - 9.8 = 10.2 \text{ kN/m}^3$$

in 3rd term of B_c equation

$$Q_u = 0 + (17 \times 0.7 \times 81.3) + (0.5 \times 10.2 \times B \times 100.4)$$

$$Q_u = 967.47 + 512 B$$

$$\frac{2400}{B} = 967.47 + 512B$$

$$2400 = 512B^2 + 967.5B$$

$$512B^2 + 967.5B - 2400 = 0$$

By Quadratic equation

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-967.5 \pm \sqrt{(967.5)^2 - 4(512)(2400)}}{2(512)}$$

$a = 512$
 $b = 967.5$
 $c = -2400$

$$= \frac{-967.5 \pm \sqrt{936056.25 + 4915200}}{1024}$$

$$x = \frac{-967.5 \pm 2418.93}{1024}$$

$$x = \frac{-967.5 + 2418.93}{1024} \text{ or } x = \frac{-967.5 - 2418.93}{1024}$$

(4)

$$x = \frac{1451.43}{1024}$$

$$x = \frac{-3386.43}{1024}$$

$$x = 1.42$$

$$x = -3.3$$

$$B = 1.42$$

Ans

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