

(5)

(b) Given:-

$$N = 16$$

$$d = 570 \text{ cm} = 0.57 \text{ m}$$

$$S = 1.2 \text{ m}$$

$$D = 9 \text{ m}$$

$$c = 30 \text{ kN/m}^2$$

$$q_{p0} = 0$$

$$\alpha = 0.9$$

$$B = \frac{d}{2} + 3S + \frac{d}{2}$$

$$= 3S + d = 3 \times 1.2 + 0.57$$

$$= 4.17 \text{ m}$$

For single pile.

$$Q_u = q_{p0} \times A_p + \alpha \times c \times P \times D$$

$$A_p = \pi/4 \times d^2 = \frac{\pi}{4} \times 0.57^2 = 0.258 \text{ m}^2$$

$$P = \pi d = \pi \times 0.57 = 1.80 \text{ m}$$

$$Q_u = 0.9 \times 30 \times 1.80 \times 9$$

$$= 440.1 \text{ kN}$$

$$Q_g(u) = N \times Q_u$$

$$= 16 \times 440.1 = 7041.6 \text{ kN}$$

For group pile.

$$A_g = B^2 = 4.17 \times 4.17 = 17.38 \text{ m}^2$$

$$P_g = 4 \times B = 4 \times 4.17 = 16.68 \text{ m}$$

$$Q_g(u) = q_{p0} \times A_g + \alpha \times c \times P_g \times 1.2$$

$$Q_g(u) = 0 \times 30 \times 17.38 \times 1.2 = 5446.44 \text{ kN}$$

$$\rightarrow 6104.16 \text{ kN}$$

∴ Ultimate load capacity of pile group is 5446.44 kN