

Assignment # 4

1. Following data were obtained from a consolidation test on a clay sample with double drainage conditions:
Void ratio at 100 kPa = 1.37
Void ratio at 200 kPa = 1.25
Thickness of the soil sample at 100kPa = 20mm
Coefficient of permeability = 5×10^{-7} mm/sec
Calculate
 - (i) Compression index
 - (ii) Coefficient of volume change
 - (iii) Coefficient to consolidation in mm²/year
2. In a consolidation test voids ratio decreased from 0.70 to 0.60 when the load was changed from 50 kN/m² to 100 kN/m². Compute coefficient of compressibility and coefficient of volume change.
3. In a consolidation test the void ratio of soil sample decreases from 1.20 to 1.10 when the pressure is increased from 160 to 320 kN/m². Calculate the coefficient of consolidation if the coefficient of permeability is 8.0×10^{-7} mm/sec.
4. Find the time required for 50% consolidation in a soil stratum, 9.0 m thick with a pervious strata on top and bottom. Also determine the co-efficient of consolidation given that $k = 10^{-9}$ m/sec, $e_0 = 1.5$, $av = 0.003$ m²/KN, Time factor = 0.2.

Assignment # 5

1. A square footing 2.5 m X 2.5 m is built on a homogeneous bed of sand of density 19 kN/m³ having an angle of shearing resistance of 36°. The depth of foundation is 1.5 m below the ground surface. Calculate the safe load that can be applied on the footing with a factor of safety of 3. Take bearing capacity factors as $N_c = 27$, $N_q = 30$, $N_r = 35$.
2. A strip footing 2 m wide carries a load intensity of 400 kPa at a depth of 1.2 m in sand. The saturated unit weight of sand is 19.5 kN/m³ and unit weight above water table is 16.8 kN/m³. If $c = 0$ and $\phi = 35^\circ$, determine the factor of safety with respect to shear failure for the following locations of water table.
 - a. Water table is 4 m below Ground Level
 - b. Water table is 1.2 m below Ground Level
 - c. Water table is at Ground Level
3. A square footing located at a depth of 1.3 m below ground has to carry a safe load of 800 kN. Find the size of footing if the desired factor of safety is 3. Use Terzaghi's analysis for general shear failure. Take $c = 8$ kPa, $N_c = 37.2$, $N_q = 22.5$, $N_r = 19.7$.
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4. A square footing 2.8 m X 2.8 m is built on a homogeneous bed of sand of density 18 kN/m³ and $\phi = 36^\circ$. If the depth of foundation is 1.8 m, determine the safe load that can be applied on the footing. Take $F = 2.5$, $N_c = 27$, $N_q = 36$, $N_r = 35$.