

*Note: All questions are compulsory. Marks are indicated against each question in square brackets.*

- Q1.** A clay soil specimen when tested in unconfined condition gave an unconfined compressive strength of  $100 \text{ kN/m}^2$ . A specimen of the same clay with same initial condition is subjected to UU triaxial test under a cell pressure of  $100 \text{ kN/m}^2$ . What is the axial stress in  $\text{kN/m}^2$  at failure. (CO1, CO2) [4]
- Q2.** A rigid retaining wall 19.69 ft high has a saturated backfill of soft clay soil. The properties of the clay soil are  $\gamma_{sat} = 111.76 \text{ lb/ft}^3$ , and unit cohesion  $c_u = 376 \text{ lb/ft}^2$ . Determine
- The expected depth of tensile crack in the soil. Given:  $\gamma_w = 62.4 \text{ lb/ft}^3$ .
  - The active earth pressure before the occurrence of the tensile crack.
  - The active earth pressure after the occurrence of the tensile crack. Neglect the effect of water that may collect in the tensile crack. (CO1, CO2) [1+2+1 = 4]
- Q3.** A layer of clay 2 m thick is subjected to a loading of  $0.5 \text{ kg/cm}^2$ . One year after loading, the average consolidation is 50%. The layer has double drainage,
- What is the coefficient of consolidation?
  - If the coefficient of permeability is 3 mm/year, what is the settlement after one year?
  - How much time will the layer take to reach 90% consolidation? (CO1) [1+1+2 = 4]
- Q4.** With the help of the Mohr circles, bring out the difference between Unconfined Compressive Strength test and Unconsolidated Undrained test. (CO1, CO2) [3]