Roll No. | | | | | | | | | | | | | **Total No. of Pages : 02**

Total No. of Questions : 08

M.Tech. (Soil Mechanics & Foundation Engineering) (Sem.–3)

ANALYSIS OF SETTLEMENTS OF SOILS AND FOUNDATION

Subject Code : CESE-5

M.Code : 37213

Date of Examination : 19-12-22

Time : 3 Hrs. **Max. Marks : 100**

INSTRUCTIONS TO CANDIDATES :

1. **Attempt any FIVE questions out of EIGHT questions.**
2. **Each question carries TWENTY marks.**

1. a) Derive the equilibrium equation in terms of total and effective stresses in a 3-D form for a saturated body.

   b) What is coefficient of consolidation? What is its use in Settlement analysis? (14+6)

2. a) Derive a relation between principal stresses at the failure *w.r.t.* Triaxial Shear Test.

   b) Discuss Skempton-Bjerrum's Theory for calculating settlement. Take into account the effect of lateral strains. (10+10)

3. A clay layer 5.1 m thick is consolidated with the help of drain well 300 cm in diameter and spaced at 2.5 m centre to centre. Determine the influence of wells on the average degree of consolidation at the time when the degree of consolidation of clay without wells would be equal to 20%. The wells may be assumed to be arranged in a square pattern. The soil may be assumed to be isotropic. The value of time factor for radial flow Tr (corresponding to n = 10) for degree of consolidation 30% is 0.07 and for degree of consolidation 35% is 0.085. (20)

4. Sub-surface exploration at the site of a proposed building reveals the existence of a 2.3 m thick layer of soft clay below a stratum of coarse sand which is 3.3 m thick and extends from the ground surface up to the top of clay layer. The ground water table is at 3.4 m below the ground surface. The natural water content of the clayey soil is 37 %, liquid limit = 40% and specific gravity 2.72. The unit weights of the sand below and above the water table are respectively 20kN/m^2 and 18kN/m^2. The unit weight of clay is 19.5 kN/m^2. Estimate the consolidation settlement of the clayey layer, if the construction is likely going to increase the average vertical pressure on the clayey layer by 95 kN/m^2.

5. What are functions of sand drains? How are they installed in the field? Draw neat sketches to support your answer. (20)

6. a) Explain the concept of Floating raft. Discuss the situations, in which, you will recommend the use of floating raft? Also discuss the design considerations.

   b) What is negative skin friction? What is its effect on the pile? (13+7)

7. Show, the diagrammatic sketch of Plate load test. Explain the procedure to get settlement from this test. (20)

8. Write short notes on :

   a) Contact pressure distribution.

   b) Analysis of soil-foundation system.

   c) Shear modulus of soil. (7+7+6)

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.