Code No: 115EQ

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, March - 2017
GEOTECHNICAL ENGINEERING
(Common to CE, CEE)

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(25 Marks)

1.a) Explain the formation of soil. [2]
b) Explain any two field tests to identify silts from clays. [3]
c) What is adsorbed water? [2]
d) What is Darcy's law and under what conditions it is valid. [3]
e) What are the factors affecting contact pressure? [2]
f) Differentiate between compaction and consolidation. [3]
g) What is secondary consolidation? [2]
h) What do you understand by normally consolidated, over consolidated and under consolidated clays. [3]
i) What is the Mohr-Coulomb theory of failure? [2]
j) State the limitations of direct shear test. [3]

PART - B

(50 Marks)

2. An oven dry soil sample of volume 300 cc weighs 450 g. If the specific gravity of solids is 2.65, what is the water content when the soil becomes fully saturated without any change in its volume? What will be the water content which will fully saturate the soil sample and also cause an increase in volume equal to 15% of the original dry volume? [10]

OR

3. Explain step by step procedure to classify soils as per I.S. Classification of soils. [10]

4. Derive an expression to determine coefficient of permeability of soil by laboratory falling head permeability test. [10]

OR

5. In a deposit of silty soil, the water table which was at originally at a depth of 1 m below ground level was lowered to 3m below ground level. The bulk and saturated unit weight of silty soil was 18kN/m^3 and 20kN/m^3 respectively. What is the change in effective pressure at a depth of 1.0m and 3.0m. [10]

6.a) Write the differences between standard and modified proctor compaction test.
b) Briefly explain factors affecting compaction of soil. [5+5]

OR

7. Find the intensity of vertical pressure at a point 4m directly below a 20 kN point load acting at a horizontal ground surface. What will be the vertical pressure at a point 2 m horizontally away from the axis of loading but at the same depth of 4m and directly under the load at a depth of 3 m? [10]

8. A normally consolidated clay layer 2m thick is sandwiched between two sand layers. The average overburden stress at the middle of clay layer can be taken as 160kN/m^2. Due to construction of a structure there is an increase in effective vertical stress of 40kN/m^2 at the middle of clay layer. The liquid limit of clay layer is 60% and the initial void ratio is 0.9. Estimate the primary settlement. [10]

OR

9.a) Explain how you will determine void ratio of the sample by change in void ratio method. Also explain how do you find coefficient of volume change?
b) Explain square root of time fitting method for determination of coefficient of consolidation. [5+5]

10. Differentiate between conventional failure envelope and modified failure envelope with the neat sketches. Define stress path, and draw typical stress paths (TSP, TSSP, ESP) for a drained test and undrained test on normally consolidatd clay, and on over-consolidated clay. [10]

OR

11.a) Discuss Skempton's pore pressure parameters.
b) In a direct shear test the major and minor principal stresses were found to be 500 kN/m^2 and 300 kN/m^2, respectively. Determine the normal and shear stresses on a plane inclined at 30^0 to the major principal plane in a clock-wise direction. [5+5]

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