Code No: 115EQ **R13**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech III Year I Semester Examinations, February/March - 2016
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) Define air content, degree of saturation, void ratio and specific gravity. [2]
b) Explain the procedure to determine the water content at liquid limit by using Casagrande's apparatus. [3]
c) Define effective stress, flow net, quicksand condition and capillary rise. [2]
d) Explain about horizontal flow and vertical flow of layered soils [3]
e) Define pressure bulb, maximum dry density, optimum moisture content and isobar. [2]
f) Explain about vertical stress distribution diagrams for horizontal plane and vertical plane. [3]
g) Define over consolidation ratio, compression index, volumetric compression and degree of consolidation. [2]
h) Explain about determination of preconsolidation pressure from the curve e verses log σ. [3]
i) Define shear resistance, dilatancy , critical void ratio and Liquefaction. [2]
j) Explain about shear strength of cohesive soils. [3]

Part-B

(50 Marks)

2. Explain step by step procedure to classify soils as per Indian Standard soil classification system. [10]

OR

3.a) What is the liquidity index and consistency index if a soil has a plastic limit of 25% and plasticity index of 30% and if the natural water content of the soil is 32%.
b) Determine the density index of sand when it has a porosity of 31% and if its dry unit weight of sand in the loosest state is 12kN/m^3 and in the densest state, it is 20kN/m^3. Assume specific gravity as 2.70. [5+5]

4. What is Darcy's Law? Explain about factors effecting permeability. [10]

OR

5. Explain about laboratory determination of coefficient of permeability by constant head test with a neat sketch. [10]

6.a) A circular area on the surface of an elastic mass of great extent carries a uniformly distributed load of 100kN/m^2. The radius of the circle is 2.5m. Compute the intensity of vertical pressure at a point 6m beneath the centre of the circle using Boussinesq's method.
b) A concentrated load of 1000kN acts at the surface of a soil mass. Estimate the stress increment up to 3 m below the ground surface and at 4m away from the point of load by Westergaard's theory. [5+5]

OR

7. Explain about factors effecting compaction on soil properties. [10]

8. Explain Terzaghi's one dimensional consolidation theory with a neat sketch. [10]

OR

9. A clayey soil has a compression index of 0.25 with void ratio of 1.95 at a stress of 90kN/m^2 and its permeability is 3×10^{-5}cm/sec. Determine Change in void ratio if the stress is increased to 120kN/m^2 and time required for 40% consolidation if drainage is one-way. [10]

10. Explain the laboratory procedure to determine the shear strength of soil by using direct shear test. [10]

OR

11. Explain Mohr-Coulomb failure theory with a neat sketch. [10]

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