Reg. No. :

Question Paper Code: 34102

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2018

Fourth Semester

Civil Engineering

01UCE402 – SOIL MECHANICS

(Regulation 2013)

Duration: Three hours   Maximum: 100 Marks

(Nessam chart and data may be permitted)

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. Define percentage air voids.

2. State the various classification systems of soils.

3. Mention the two field methods for determining the permeability of soils.

4. Express the relation between discharge velocity and seepage velocity.

5. Illustrate the vertical stress distribution on horizontal plane and vertical plane due to point load on soil mass.

6. List any two assumptions of Terzaghi's theory of one dimensional consolidation.

7. Write the use of Mohr's circle.

8. State Mohr's coulomb theory.

9. Distinguish finite and infinite slopes.

10. Sketch the different types of slope failures.

PART - B (5 x 16 = 80 Marks)

11. (a) (i) Prove the relation $Se = wG$, where S=degree of saturation, e=void ratio, w=water content, G= specific gravity. (8)

(ii) Derive the relation between γ, G, w, e and γ_w (8)

Or

(b) Explain the factors affecting compaction of soils. (16)

12. (a) (i) A saturated sand layer over a clay stratum is 5m in depth. The water is 1.5m below ground level. If the bulk density of saturated sand is 19.66 kN/m^3, calculate the effective and neutral pressure on the top of the clay layer. (8)

(ii) Derive the equation to determine the value co – efficient of permeability 'K' from a falling Head permeability test in detail. (8)

Or

(b) (i) A falling head permeability test was performed on a sample of clean uniform sand. The initial hydraulic head was 900mm, the final head was 400mm and 60 seconds were required for the water level in the stand pipe to fall. The cross sectional area of the stand pipe was 100mm^2.The sample was of 40 mm diameter, and had a length of 180mm. Determine the coefficient of permeability as per Darcy's law. (8)

(ii) Give the properties and uses of flow net. (8)

13. (a) (i) A reinforced concrete water tank of size 6m x 6m and resting on ground surface carries a uniformly distributed load of 200kN/m^2. Estimate the maximum pressure at a depth of 12 meters vertically below the centre of the base. (8)

(ii) Explain Terzaghi's theory of one dimensional consolidation. (8)

Or

(b) (i) Explain Newmark's influence chart and its uses. (8)

(ii) A 10m thick clay layer settles by 80mm in 2 years under single drainage condition. The coefficient of consolidation is 5 x 10^{-3} cm^2/s. Calculate the ultimate consolidated settlement and find how long it will take to undergo 90% of this settlement. (8)

14. (a) (i) A sample of cohesionless soil in a direct shear test fails under a shear stress of 170 kN/m^2 when the normal stress is 200 kN/m^2. Find the angle of shearing resistance and the major principal stress at failure. (8)

(ii) Describe triaxial compression test. (8)

Or

(b) Explain the procedure involved in the tri-axial compression test with neat sketch. (16)

15. (a) Indicate how the stability of a slope is affected by seepage of water. (16)

Or

(b) Explain the procedure involved in the friction circle method with neat sketch. (16)

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