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Question Paper Code: 41142

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2016

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 porosity.
2. State the various classification systems of soils.
3. Mention the two field methods for determining the permeability of soils.
4. Distinguish total stress and effective stress in soils.
5. Define isobar.
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. Mention the four types of slope failures.

PART - B (5 x 16 = 80 Marks)

11. (a) (i) A natural soil deposit has a bulk unit weight of 18 kN/m^3 and water content 5%. Calculate the amount of water required to be added to 1 m^3 of soil to raise the water content to 15%. Assume the void ratio to remain constant. What will then be the degree of saturation? Assume $G = 2.67$. (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) Explain the method of determining the co-efficient of permeability using the falling head permeameter test with neat sketch. (16)

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) Discuss the factors affecting settlements. (16)

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 $5 \times 10^{-3} \text{ cm}^2/\text{s}$. 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) (i) Discuss methods for finding the stability of slopes and derive an expression for finding the factor of safety of slopes in cohesive soils. (8)
- (ii) Indicate how the stability of a slope is affected by seepage of water. (8)

Or

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