Reg. No. : | | | | | | | | | | |

Question Paper Code: 34102

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2019

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. Differentiate compaction and consolidation.
6. Find the intensity of vertical stress at a point 6m below the vertical load of 30 *kN*.
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) Sandy soil in a borrow pit has unit weight of solids as 25.8 kN/m^3, water content equal to 11% and bulk unit weight equal to 16.4 kN/m^3. How many cubic meter of compacted fill could be constructed of 3500 m^3 of sand excavated from borrow pit, if required value of porosity in the compacted fill is 30%. Also calculate the change in degree of saturation. (16)

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) How will you find the permeability of clay in laboratory? Explain the procedure to determine the co-efficient of permeability. (16)

13. (a) Discuss the factors affecting settlements. (16)

Or

(b) (i) A clay layer, whose total settlement under a given load is expected to be 250*mm*, settles by 50*mm* in 15 days after the application of a load increment. How many days will be required for it to reach a settlement of 125*mm*.How much settlement will occur in 300 days? The layer has double drainage. (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) Briefly explain about direct shear test. State the advantages and limitations of this test. (16)

Or

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

14. (a) Briefly explain about direct shear test. State the advantages and limitations of this test. (16)

Or

(b) (i) A canal with a depth of 5*m* has banks with slope 1:1.The properties of soil are: Cohesion =20kN/m^2, Angle of internal friction (Φ) =15°, e =0.7, G=2.6.Calculate factor of safety with respect to cohesion when (a) canal runs full (b) it is suddenly and completely emptied. (8)

(ii) Write a note on slope protection measures? (8)