Reg. No. :

Question Paper Code: 44102

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

Fourth Semester

Civil Engineering

14UCE402 - SOIL MECHANICS

(Regulation 2014)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The minimum size of grains of silts is about

   (a) 0.0002mm (b) 0.002mm (c) 0.02mm (d) 0.2mm

2. The ratio of the volume of voids to the total volume of soil mass is called

   (a) water content ratio   (b) porosity
   (c) void ratio   (d) Degree of saturation

3. A flow net has 4 flow channels and 20 equi-potential drops, the shape factor is

   (a) 1/5   (b) 5   (c) 8   (d) None of these

4. Predict the permeability of soil varies as

   (a) inversely as square of grain size   (b) as square of grain size
   (c) as grain size   (d) inversely void ratio

5. New mark's influence chart can be used for the determination of vertical stress under

   (a) Circular load Area only   (b) Rectangular loaded area only
   (c) Strip load only   (d) Any Shape of loaded Area

6. When Consolidation of a Saturated soil Sample occurs, the degree of Saturation

   (a) increases   (b) decreases
   (c) Remains constant   (d) May increases or decreases

7. When drainage is permitted throughout the triaxial test, the test is known is

    (a) Quick test   (b) Drained Test
    (c) Consolidated undrained test   (d) None of these

8. Assess the Coulomb's equation for shear strength is

    (a) $c = s + \sigma \tan \phi$ (b) $c = s - \sigma \tan \phi$
    (c) $s = c + \sigma \tan \phi$ (d) $s = c - \sigma \tan \phi$

9. Stability of an infinite slope is lowest for

    (a) Partially saturated soil   (b) Dry soil
    (c) seepage parallel to slope   (d) Horizontal seepage

10. The process of maintaining or improving the performance of a soil as a constructional material, usually by the use of admixtures, is known as

    (a) soil exploration   (b) soil stabilization
    (c) soil compaction   (d) consolidation

PART - B (5 x 2 = 10 Marks)

11. Draw three phase diagram of soil.

12. What is Discharge velocity?

13. What is Immediate settlement?

14. Define principle stress 427.

15. List the causes of Non-circular failure surfaces 609 illustrate show designate.

PART - C (5 x 16 = 80 Marks)

16. (a) A soil sample has a mass of 2290 g and a volume of 1.15×10^{-3} m^3. After being completely dried in an oven, the mass of the sample is 2035g. The value of G for the soil is 2.68. Determine the bulk density, unit weight, water content, void ratio, porosity, degree of saturation and air content . (16)

Or

(b) (i) A soil is having a specific gravity of 2.68, maximum dry density of 1.82 g/cm^3 and a water content of 16 %. Calculate the degree of saturation, air content, percentage of air voids for the maximum dry density as well as for dry density corresponding to zero air voids at the optimum water content. (12)

(ii) Illustrate any two factors affecting compaction. (4)

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17. (a) Discuss in detail about field methods for determination of Coefficient of Permeability. (16)

Or

(b) Explain the properties and applications of flow nets. (16)

18. (a) A stratum of normally consolidated clay 7m thick is located at a depth of 12m below ground level. The natural moisture content of the clay is 40.5% and its liquid limit is 48%. The specific gravity of the solid particles is 2.76. The water table is located at a depth of 5m below ground surface. The soil is sand above the clay stratum. The submerged unit weight of the sand is 11 kN/m^3 and the same weighs 18 kN/m^3 above the water table. The average increase in pressure at the centre of the clay stratum is 120 kN/m^2 due to the weight of a building that will be constructed on the sand above the clay stratum. Estimate the expected settlement of the structure. (16)

Or

(b) Discuss the Factors influencing compression behaviour of soils. (16)

19. (a) Describe about Vane shear Test. Give its merits and demerits. (16)

Or

(b) Describe the triaxial shear test and what are the advantages of triaxial shear test over the direct shear test. (16)

20. (a) (i) Describe the types of slope failure with neat sketches. (8)

(ii) Describe the stability of slope of dry soil using friction circle method. (8)

Or

(b) (i) Calculate the factor of safety with respect to cohesion, of a clay slope laid at 1 in 2 to a height of 10m, if the angle of internal friction $\phi = 10°$; c = 25 kN/m^2 and $\gamma = 19$ kN/m³. What will be the critical height of the slope in this soil? (8)

(ii) Describe stability analysis of infinite slopes for cohesion less soil. (8)

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