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**Question Paper Code: 44102**

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

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)

- Identify for which the particle size distribution curve with hump is obtained for
  - Uniform soil
  - Well graded soil
  - Gap-graded soil
  - Poor graded soil
- Predict the range of optimum water content for standard proctor test for clay soil is
  - 6 to 10 %
  - 8 to 12 %
  - 12 to 15 %
  - 14 to 20 %
- A flow net has 4 flow channels and 20 equi-potential drops, the shape factor is
  - 1/5
  - 5
  - 8
  - None of these
- The possibility of quick sand condition will be there when flow of water to soil is
  - Horizontal
  - upwards
  - downwards
  - laterals
- Compaction of a soil is measured in terms of
  - dry density
  - specific gravity
  - compressibility
  - permeability
- When Consolidation of a Saturated soil Sample occurs, the degree of Saturation
  - increases
  - decreases
  - Remains constant
  - 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. The shear strength of a Cohesionless Soil is
- (a) proportional to the angle of Shearing Resistance  
(b) Inversely proportional to the angle of Shearing Resistance  
(c) proportional to the tangent of the angle of shearing resistance  
(d) None of these
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. Identify incorrect statement, the stability of a slope is decreased by
- (a) removal of a part of slope excavation (b) shock caused by an earthquake  
(c) pore water pressure in the soil (d) providing a berm at toe

PART - B (5 x 2 = 10 Marks)

11. Define void ratio.
12. Write about bulking of sand.
13. List the assumption made in Boussineq theory.
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) Discuss methods of Compaction used in field. (16)

Or

- (b) (i) A soil is having a specific gravity of 2.68, maximum dry density of  $1.82 \text{ g/cm}^3$  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)

17. (a) The water table in a certain area is at a depth of 4m below the ground surface. To a depth of 12m, the soil consists of very fine sand having an average voids ratio of 0.7. Above the water table the sand has an average degree of saturation of 50%. Calculate the effective pressure on a horizontal plane at a depth 10m below the ground surface. What will be the increase in the effective pressure if the soil gets saturated by capillarity upto a height of 1m above the water table? Assume  $G = 2.65$ . (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  $11 \text{ kN/m}^3$  and the same weighs  $18 \text{ kN/m}^3$  above the water table. The average increase in pressure at the centre of the clay stratum is  $120 \text{ kN/m}^2$  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) Explain with a neat sketch Newmark's influence chart for determining vertical stress at any point under uniformly distributed load. (16)

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

Or

- (b) Explain direct shear test with sketches. (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) Predict the value of factor safety with respect to cohesion for a clay slope at 1 in 2 to a height of 12m. If the angle of internal friction  $\phi = 10^\circ$ ,  $c = 25 \text{ kN/m}^2$  and  $\gamma = 19 \text{ kN/m}^3$ , what will be the critical height of the slope in this soil? (8)

- (ii) Discuss the stability number and curves. (8)

