

Reg. No. :

--	--	--	--	--	--	--	--	--	--

Question Paper Code: 44102

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

1. If the pores of a soil are completely filled with air, the soil is said to be
 - (a) Wet soil
 - (b) dry soil
 - (c) fully saturated soil
 - (d) partially saturated soil
2. Toughness index is the ratio of
 - (a) Flow index and plasticity index
 - (b) plasticity index and flow index
 - (c) liquidity index and flow index
 - (d) flow index and liquidity index
3. The rate of expulsion of pore fluid is directly dependent on the _____ of the soil.
 - (a) Shear strength
 - (b) void ratio
 - (c) permeability
 - (d) flow net
4. The possibility of quick sand condition will be there when flow of water to soil is
 - (a) Horizontal
 - (b) upwards
 - (c) downwards
 - (d) laterals
5. Compaction of a soil is measured in terms of
 - (a) dry density
 - (b) specific gravity
 - (c) compressibility
 - (d) permeability

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. The failure occurs by rotation along a slip surface by downward and outward movement of the soil mass is
- (a) Rotational Failure (b) Wedge Failure
(c) Compound Failure (d) Translational Failure
10. Method useful for Stability analysis of slopes made of homogeneous soils
- (a) Friction Circle (b) Swedish Circle
(c) Fellenius method (d) None of these

PART - B (5 x 2 = 10 Marks)

11. Define liquid limit.
12. What are the steps in the construction of a flownet?
13. What is Immediate settlement?
14. Write a short note on shear.
15. What is the main cause of slope failure?

PART - C (5 x 16 = 80 Marks)

16. (a) A soil sample has a mass of 2290 g and a volume of $1.15 \times 10^{-3} \text{ m}^3$. 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)

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) Detail about Boussinesq theory of stress distribution. Give its limitations. (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) A specimen of clean, dry, cohesion less sand is tested in shear box and the soil failed at a shear stress of 40 kN/m^2 when the normal load on the specimen was 50 kN/m^2 . Determine

(i) the angle of shearing resistance,

(ii) the principal stress during failure,

(iii) the direction of the principal planes with respect to the direction of the plane of shearing. (16)

Or

(b) Explain direct shear test with sketches. (16)

20. (a) Explain in detail the friction circle method of stability analysis for slopes with neat sketch. (16)

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)
-