

A

Reg. No. :

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

Question Paper Code: 54105

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

Fourth Semester

Civil Engineering

15UCE405-SOIL MECHANICS

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The ratio of the unit weight of the soil solid to that of water is called CO1- R
(a) Void ratio (b) Porosity
(c) Specific gravity (d) Degree of saturation
2. Which of the following range is for Clay? CO1- R
(a) 30mm (b) 0.002 - 0.075mm (c) 0.075 – 4.75 mm (d) < 0.002 mm
3. Constant head permeameter is used for CO2- R
(a) Coarse grained soil (b) Silty soil (c) Clayey soil (d) Organic soil
4. The point load in Bousinesq analysis, influence coefficient value for the ratio of radial distance to depth (r/z) is zero CO2- R
(a) 1 (b) 0.3328 (c) 0.4775 (d) 2
5. The coefficient of compressibility of soil, is the ratio of CO3 R
(a) strain to stress
(b) stress to settlement
(c) rate of loading to that of settlement
(d) stress to strain
6. The rate of consolidation is more in single drainage than double drainage CO3- R
(a) Isochrones (b) Critical height (c) Quick-sand condition (d) Loss of Head

7. Give an example of cohesion less soil CO4- R
 (a) Sand (b) Clay (c) Silt (d) Moorum
8. The shear test one which used to find out the shear strength of collapsible clay soil is CO4- R
 (a) Direct Shear (b) UCC (c) Triaxial (d) Vane Shear
9. Felineus Method is useful to find out the CO5- R
 (a) Centre of critical slip circle (b) Infinite slope
 (c) Finite slope (d) All the above
10. If the failure of a finite slope occurs through the toe, it is known as CO5- R
 (a) slope failure (b) base failure (c) toe failure (d) face failure

PART – B (5 x 2= 10Marks)

11. Define after berg limits.. CO1- R
12. What is flow net? What are its properties? CO2- R
13. Distinguish between compaction and cosolidation. CO3- U
14. List out the various types of triaxial shear tests based on drainage conditions. CO4- U
15. List out different modes of slope failure CO5- R

PART – C (5 x 16= 80Marks)

16. (a) A natural soil deposit has a bulk unit weight of 18.44 KN/ m^3 , water content of 5 % . Calculate the amount of water required to the added to 1 m^3 of soil to raise the water content to 15%. Assume the void ratio to remain content .What will then be the degree of saturation? Assume $G= 2.67$. CO1- App (16)
- Or
- (b) (i) List out the purpose of soil classification. CO1- U (8)
 (ii) Write limitations in the use of Stock's law in sedimentation analysis. CO1- U (8)
17. (a) A sand deposit is 10m thick overlies a bed of soft clay. The water table is 3m below the ground surface. If the sand above the ground water table has a degree of saturation of 45%. Plot the diagram showing the variation of total stress, pore water pressure and also effective stress. The void ratio of sand is 0.7. Take $G = 2.65$ CO2- App (16)

Or

- (b) An annular ring footing of external and internal radii of 8m and 4m respectively transmits a pressure of 100 kN/m^2 . Compute the vertical stresses at a depths 0.50m, 1.0m, 2.0m and 4.0m below centre. Draw the stress distribution curve with depth. CO2- App (16)
18. (a) Explain with a neat sketch the Terzaghi's one dimensional consolidation theory CO3- U (16)
- Or
- (b) (i) In a consolidation test void ratio decreased from 0.7 to 0.65 when the load was changed from 50 kN/m^2 to 100 kN/m^2 . Compute compression index and coefficient of volume change. CO3- App (8)
- (ii) In a laboratory a 2cm thick soil sample takes 25 minutes to reach 30% of consolidation. Find the time taken for a 5 m thick clay layer in the field to reach 40% consolidation. Assume double drainage CO3- App (8)
19. (a) A series of shear test was performed on a soil. Each test was carried out until the soil sample sheared and the principal stresses for test are as follows: Determine the shear strength parameters by Mohr circle method CO4- App (16)

σ_3 (Minor principal stress) kN/m^2	300	400	500
σ_1 (Major principal stress) kN/m^2	875	1160	1460

Or

- (b) The following results was obtained from a consolidated undrained test on normally consolidated clay. Plot the strength envelope in terms of total stress and effective stress and determine strength parameters. CO4- App (16)

Sample No.	Cell pressure kN/m^2	Deviator stress kN/m^2	Pore water pressure kN/m^2
1	250	152	120
2	500	300	250
3	750	455	350

20. (a) Discuss the friction circle method for stability analysis of slope. CO5- U (16)
- Or
- (b) (i) State the utility of stability number in the analysis of stability of slope CO5- U (8)
- (ii) What are the types of slope failures and write remedial measures to safeguard the slope failures. CO5- U (8)