A **Reg. No. :** | | | | | | | | | | |

Question Paper Code: 54105

B.E. / B.Tech. DEGREE EXAMINATION, MAY 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 volume of voids to the total volume of soil is CO1- R

   (a) Void ratio (b) Degree of saturation (c) Porosity (d)Air content

2. The maximum size of clay particle is CO1- R

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

3. Constant head permeameter is used for CO2- R

   (a) Coarse grained soil (b) Silty soil (c) Clayey soil (d) Organic soil

4. The stress developed at a point in soil exactly below a point load at the surface is CO2- R

   (a) Proportional to depth of point

   (b) Proportional to square of depth of point

   (c) Inversely Proportional to depth of point

   (d) Inversely Proportional to square of depth of point

5. Consolidation is CO3- R

(a) Removal of air (b) Expulsion of water (c) Settlement (d) Removal of cracks

6. The water content corresponding to maximum dry density is CO3- R

(a) Optimum moisture content (b) Minimum water content

(c) Maximum water content (d) Zero water content

7. Give an example of cohesion less soil CO4- R

(a) Sand (b) Clay (c) Silt (d) Moorum

8. Which of the test which can used in field for determining shear strength CO4- R

(a) Vane shear test (b) Direct shear test (c) Triaxial test (d) UCC

9. The number of forces considered to be acting on the sliding soil mass in friction circle method is CO5- R

(a) 2 (b) 3 (c) 4 (d) 5

10. As the friction angle increases for an earth fill the taylor stability number for slope CO5- R

(a)Increases (b) Decreases (c) May increase or decrease (d) Remains same

PART – B (5 x 2= 10Marks)

11. Define after berg limits.. CO1- R
12. State Darcy's law. CO2- R
13. List out the factors influencing compaction. CO3- R
14. List out any two advantages of direct shear test. CO4- R
15. List out different modes of slope failure CO5- R

PART – C (5 x 16= 80Marks)

16. (a) A moist soil sample weighs 3.52 N. After drying in oven its weight is reduced to 2.9 N. The specific gravity of solids and mass specific gravity are respectively 2.65 and 1.85. Determine the water content, void ratio, porosity and degree of saturation. CO1- App (16)

Or

(b) Discuss in detail the Indian standard classification system for soil. CO1- U (16)

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 Ana (16)

Or

(b) (i) State the various factors that affect permeability of soil CO2 U (8)

(ii) Determine the vertical stress at a point P which is 3m below and at a radial distance of 3m from the vertical load of 100kN. Use Westergards solution. CO2 Ana (8)

18. (a) The following results were obtained from a standard proctor test on soil sample. Obtain the maximum dry density and optimum moisture content, CO3 Ana (16)

Water content%	12	14	16	18	20	22
Mass of soil in kg	1.68	1.85	1.97	1.87	1.87	1.75

Or

(b) (i)State the assumptions made in Terzaghis theory of consolidation. CO3 U (8)

(ii) A 3m thick clay layer beneath a building is overlain by a permeable structure and is underlain by an impervious rock. The coefficient of consolidation of clay was found to be $0.025cm^2/min$. How much time will it take for 80% of total settlement to take place? CO3 App (8)

19. (a) (i)State the merits and demerits of triaxial test. CO4-U (6)

(ii) A series of direct shear tests was conducted on a soil, each test was carried out till sample failed. The following results were obtained. Determine the cohesion intercept and angle of shearing resistance. CO4- App (10)

Sample No.	Normal stress kN/m^2	Shear stress kN/m^2
1	15	18
2	30	25
3	45	32

Or

(b) The following results was obtained from a consolidated undrained test on normaly consolidated clay. Plot the strength envelope in terms of total stress and effective stress and determine strength parameters. CO4- Ana (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) Explain different slope protection methods. CO5- U (8)