Reg. No.: | | | | | | | | | | | | |

Question Paper Code : 50270

B.E/B.Tech. DEGREE EXAMINATION, NOV/DEC 2017.

Fourth Semester

Civil Engineering

CE 6405 – SOIL MECHANICS

(Regulation 2013)

Time: Three hours Maximum: 100 marks

PART – A **(10 x 2= 20 marks)**

1. Define Liquid Limit.
2. List out the various factors influencing compaction.
3. Define flow net. Draw a neat sketch.
4. Write the various type of field permeability test.
5. What is the use of consolidation test data?
6. Find the compression index of remoulded soil sample with liquid limit of 40%
7. What do you meant by Thixotrophy?
8. Write the advantages of direct shear test.
9. Define Finite slope.
10. Write the formula for finding factor of safety with respect to cohesion and friction.

Part – B (5 x 13 = 65 marks)

11. (a) (i) A soil mass in its natural state is partially saturated having a water content of 17.5% and void ratio of 0.87. Determine the degree of saturation, total unit weight, dry unit weight. What is the weight required to make a mass of $10m^3$ volume to get saturated assume G=2.69 (10)

(ii) Write the formula for flow index and plasticity index. (03)

(OR)

(b) 500 gms of dry soil was used for sieve analysis the masses of soil retained on each sieve is given by:

I.S.SIEVE	MASS in gms
2.00 mm	10
1.40 mm	18
1.00 mm	60
500 μ	135
250 μ	145
125 μ	56
75 μ	45

Plot the grain size distribution curve and compute the following:

(a) Percentage of gravel, coarse sand, medium sand, fine sand and silt as per IS 1498

(b) Uniformity coefficient

(C) Coefficient of curvature, classify the soil (13)

12. (a) A sand stratum 10m thick. The water table is 2m below the ground level. The unit weight of sand layer above and below water table are 17kN/m^3 and 21kN/m^3 respectively. The capillary rise above the water table is 1m. Draw the effective stress, pore pressure and total stress diagram for the sand stratum **(13)**

(Or)

(b) Briefly explain about the laboratory method of permeability test with neat sketch **(13)**

13. (a) Derive the equation of Terzaghi's theory of one dimensional consolidation with a neat sketch. **(13)**

(Or)

(b) Discuss in detail about the Boussineq's analysis to find the vertical stress and the horizontal shear stress for point load **(13)**

14. (a) Briefly discuss about the various types of tri-axial shear test based on various drainage condition **(13)**

(Or)

(b) The following table gives data obtained from triaxial compression test conducted under undrained condition on two specimens of same soil sample. The diameter and height are 40mm and 80mm respectively for both the samples.

Specimen No	**1**	**2**
Cell pressure, kN/m^3	100	200
Deviator load @ failure, N	637	881
Increase in volume at failure, ml	1.1	1.5
Axial compression, mm	5	7

Find the C_u and Φ_u by graphical method. **(13)**

15. (a) Explain the stability analysis of finite slope using friction circle method with neat sketch. **(13)**

(Or)

(b) A canal with a depth of 5m has its banks with slope 1:1 the properties of the soil are $C=20kN/m^2$, $\Phi = 15^0$, e=0.7, G=2.6. Calculate the factor of safety with respect to cohesion.
(i) When canal runs full
(ii) it is suddenly and completely emptied **(13)**

Part – C (1 x 15 = 15 marks)

16. (a) A 5m thick saturated soil stratum has a compression index of 0.25 and the coefficient of permeability 3.2×10^{-3} mm/sec. if the void ratio is 1.9m at vertical stress of $0.15N/mm^2$. Compute the void ratio when the vertical stress is increase to $0.2N/mm^2$ also calculate settlement due to above stress increase and time required for 50% consolidation and 90% consolidation **(15)**

(Or)

(b) In vane shear test conducted in a soft clay deposit failure occurred at a torque of 42Nm afterwards. The vane was allowed to rotate rapidly and test was repeated in the remoulded soil. The torque at failure in the remoulded soil was 17Nm. Calculate the sensitivity of soil. In both the cases the vane was completely pushed in to the soil. The height of vane and diameter across blades are 100mm and 80mm respectively. What will be the change in above results if the top of vane is not in contact with soil. **(15)**