Code: CE4T2

II B.Tech - II Semester – Regular/Supplementary Examinations October-2020

GEOTECHNICAL ENGINEERING - I
(CIVIL ENGINEERING)

Duration: 3 hours   Max. Marks: 70

PART – A

Answer *all* the questions.   All questions carry equal marks

11 x 2 = 22M

1.
   a) Define degree of saturation and water content of soil.
   b) Illustrate the three phase soil system.
   c) What does the symbols SW, SP, CH and CI indicate in Indian standard classification of soils?
   d) Explain what is meant by capillary rise.
   e) Distinguish between permeability and seepage.
   f) Explain the concept of Effective stress.
   g) Explain Zero Air-Void line.
   h) Define Over Consolidation Ratio.
   i) What is the relation between Coefficient of volume compressibility, Void ratio and Coefficient of compressibility?
   j) Give the equation of shear strength for sandy soils.
   k) What is meant by the term shear strength?

PART – B

Answer any **THREE** questions.   All questions carry equal marks.

$$3 \times 16 = 48 \text{ M}$$

2. a) A clayey soil has moisture content of 15.8 % and specific gravity of 2.72. Its saturation percentage is 70.8 and soil is allowed to absorb water. After sometime, the saturation increases to 90.8%. Find water content of the soil in the latter phase.   8 M

b) Following are the results obtained from a liquid limit test on a clay sample whose plastic limit is 20% plot the flow curve and obtain the liquid limit, flow index, plasticity index and toughness index.   8 M

No of blows	12	18	22	34
Moisture content (%)	56	52	50	45

3. a) Determine the average horizontal and vertical permeability coefficients of a soil deposit made up of three horizontal strata, each 1m thick, if the coefficients of permeability are 1×10^{-1} mm/s, 3×10^{-2} mm/s, and 8×10^{-3} mm/s respectively for the three layers.   8 M

b) The laboratory test results of a soil sample are given below. Percentage finer than 4.75 mm = 60; percentage finer than 0.075 mm = 30; liquid limit = 35 %; plastic limit = 27 %. Give the classification of soil with justification.   8 M

4. a) Explain quick sand condition.   8 M

b) A load of 1000 kN acts as a point load at the surface of a soil mass. Estimate the stress at a point 3 m below and 4 m away from the point of action of the load by Boussinesq's formula.Compare the value with the result from Westergard's theory.   8 M

5. a) Write factors effecting compaction.   8 M

b) In a consolidation test, the void ratio of soil sample decreases from 1.2 to 1.1 when the pressure is increased from 160 to 320 kN/m^2. Determine coefficient of consolidation if the coefficient of permeability is 8.0×10^{-7} mm/s.   8 M

6. a) Unconfined compressive strength of soil is 150 kN/m^2. A sample of same soil failed at a deviator stress of 200 kN/m^2,when it is tested in triaxial compression test with a cell pressure of 50kN/m^2. Determine the shear strength parameters of soil.   8 M

b) Explain Mohr-Coulomb failure criterion.   8 M