

GEOTECHNICAL ENGINEERING – I

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

PART – A
(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- (a) Derive the relation between void ratio and porosity.
 - (b) Write briefly about various consistency limits.
 - (c) Discuss about capillary rise.
 - (d) Write about characteristics of flow nets.
 - (e) Write assumptions of Boussinesq's theory for stress distribution in soils.
 - (f) Discuss about relative compaction.
 - (g) Explain determination of preconsolidation pressure.
 - (h) Write about stress history of clay using e Vs σ curves.
 - (i) Discuss about Liquefaction.
 - (j) Explain about determination of shear strength using vane shear test.

PART – B
(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

- 2 Determine the consistency of a soil having plastic limit of 22% and a plasticity index of 32. The natural water content of the soil is 36%. Also, determine the liquidity index and consistency index of the soil.

OR

- 3 Explain step by step procedure to classify soils as per I.S. Classification of soils.

UNIT – II

- 4 Explain the permeability of layered soils for vertical flow and horizontal flow.

OR

- 5 Explain about factors affecting permeability of soils.

UNIT – III

- 6 A load 500 kN acts as a point load at the surface of a soil mass. Estimate the vertical stress at a point 4 m below and 3m away from the point of load using Boussinesq's and Westergaard's theory.

OR

- 7 Explain the laboratory procedure to determine maximum dry density and optimum moisture content by using standard compaction test.

UNIT – IV

- 8 Explain Casagrande's logarithm of Time fitting method to estimate coefficient of consolidation with a neat sketch.

OR

- 9 A clay layer of 6m thick is situated with sand on top and impervious rock at the bottom. In a consolidation test conducted in the laboratory on an undisturbed specimen of 20 mm thick clay sample, 90% settlement was reached in 3 hours. Estimate the time in years for the building on this deposit to reach 90% of its final settlement.

UNIT – V

- 10 Explain the merits and demerits of direct shear test when compared with the other laboratory tests to determine the shear strength of soil.

OR

- 11 Explain about shear strength of sands with a neat sketch.
