E76

B.Tech. EXAMINATION, 2020

(Fifth Semester)

(B Scheme) (Re-appear Only)

(CE)

CE311B

GEO-MECHANICS

Time : 2½ Hours]   [*Maximum Marks : 75*

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks. Missing data, if any, may suitably be assumed and stated, clearly. Supplement your answers with suitable, proportionately drawn neat sketches, wherever required. Use of Scientific Calculator is permitted.

1. (a) Define Plasticity index and Liquidity Index.

   (b) Discuss, in detail, Indian Standard Soil Classification System.

2. (a) Discuss Elastic properties of Rocks.

   (b) What is Particle size distribution curve ? What does it represent ? Show various types of soils on it. Discuss its importance. Describe the term D_{10}, D_{30} and D_{60}, C_u and C_c.

3. (a) Explain Falling Head Permeability Test and derive the formula for the determination of coefficient of permeability.

(b) Define seepage pressure. In which direction, seepage pressure acts ? Derive its relationship with Hydraulic Gradient. Deduce the expression for effective pressure in a soil mass subjected to seepage pressure.

4. (a) Discuss the factors affecting permeability.

   (b) Discuss the phenomenon of piping and heaving.

5. (a) Describe Standard Proctor Test. Discuss Water Content-Dry Density relationship. Also describe Zero Air Void Line, Optimum Moisture Content and Maximum Dry Density. How are these important for highway construction ?

   (b) Discuss, how the compaction curve changes for different types of soils ?

6. (a) Discuss, how Terzaghi has demonstrated the mechanics of consolidation by means of the piston and spring analogy ? On this basis define excess pore pressure, consolidation pressure, equilibrium void ratio, hydrodynamic lag and primary consolidation.

   (b) What is meant by Pre-consolidated Soil and Pre-consolidation Pressure ?

7. (a) By means of Boussinesq Stress Distribution Theory, describe, how would you prepare the Stress Isobar Diagram ? Discuss the concept of Pressure Bulb.

   (b) Prove that the maximum vertical stress on a vertical line at a constant radial distance 'r' from the axis of a vertical load is induced at the point of intersection of the vertical line with a radial line at $\beta = 39° 15'$ from the point of application of concentrated load. What will be the value of vertical stress and shear stress at that point ?

8. (a) What do you mean by Shear Strength of Soil ? Discuss Mohr Coulomb failure theory.

   (b) Discuss briefly Direct Shear Test and its test results.