

15CV45

Module-3

- 5 a. Define Darcy's law. Derive an expression to relate discharge velocity and seepage velocity. (06 Marks)
- b. Explain the following terms:
 i) Total stress ii) Neutral stress
 iii) Effective stress iv) Quick sand condition (06 Marks)
- c. An earthen dam is built on a impervious foundation with a horizontal filter under the downstream slope. The horizontal and vertical permeability of the soil material in the dam are respectively 4×10^{-5} m/sec and 1×10^{-5} m/sec. Full reservoir level is 20m above downstream filter. Flow net consists of 4 flow channels and 15 equipotential drops. Estimate the seepage loss per meter length of the dam. (04 Marks)

OR

- 6 a. List the properties and use of flow nets. (04 Marks)
- b. In a falling head permeameter test, the initial head is 300 m it drops by 1 cm in 3 minutes. How much longer should the test to be continued, if the head is to drop to 180 m? (04 Marks)
- c. Explain with neat sketch the method of locating the phreatic line in a homogenous earth dam with horizontal filter. (08 Marks)

Module-4

- 7 a. Explain mass-spring analogy of consolidation of soils. (08 Marks)
- b. In a consolidation test, the void ratio of soil sample decreases from 1.20 to 1.10 when the pressure increases from 160 to 320 kN/m². Determine the coefficient of consolidation, if the coefficient of permeability is 8×10^{-7} mm/sec. (08 Marks)

OR

- 8 a. Explain under consolidated, normally consolidated and over consolidated soil. (06 Marks)
- b. How preconsolidation pressure is determined by Casagrande's method? (06 Marks)
- c. A soil sample 2 cm thickness take 20 minutes to reach 20% consolidation. Find the time for a clay layer 6 cm thick to reach 40% consolidation. Assume double drainage in both cases. (04 Marks)

Module-5

- 9 a. Briefly explain Mohr-Coulomb's shear strength theory. (06 Marks)
- b. In a direct shear test on sand, sample failed at a shear strength of 70 kN/m² when normal stress was 100 kN/m². Determine angle of internal friction. Draw Mohr circle at failure. Mark major and minor principal planes. What are the values of major and minor principal stresses? (10 Marks)

OR

- 10 a. Mention the advantages and disadvantages of direct shear test. (04 Marks)
- b. Classify shear tests based on drainage conditions. (03 Marks)
- c. A soil has unconfined compression strength of 120 kN/m². In triaxial compression test, specimen of same soil (under similar conditions) when subjected to cell pressure of 40 kN/m², failed at an additional stress of 160 kN/m². Determine:
 i) Shear strength parameters
 ii) Angle made by failure plane with axial stress direction in case of triaxial test. (09 Marks)
