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

Question Paper Code : 50537

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2024.

Fourth Semester

Civil Engineering

CE 3404 – SOIL MECHANICS

(Regulations – 2021)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Recall the process by which soil is formed.

2. List the classification of soil as per Indian Standard.

3. State capillary phenomena.

4. Write the Laplace equation for two dimensional flow.

5. List the use of Newmark's influence chart.

6. What are the components of settlement?

7. Define true cohesion.

8. State Liquefaction phenomena.

9. List the types of slope.

10. List the uses of stability number.

PART B — (5 × 13 = 65 marks)

11. (a) Describe the phase relationship of the soil and index properties with neat illustration.

Or

(b) Explain the theory and significance of compaction of soils.

12. (a) Calculate the following for a sand sample of 20 cm long having a cross sectional area of 35 cm^2, tested under a constant head of 60 cm with a discharge of 120 ml in 6 min. Take dry mass of sand used for the test as 1320 g and specific gravity as 2.68.

(i) Coefficient of permeability (4)

(ii) Discharge velocity (4)

(iii) Seepage velocity (5)

Or

(b) Explain the procedure for field measurement of pumping out test in aquifers.

13. (a) Explain the theory of estimation of stress distribution in a soil and Boussinesq's assumptions to derive point load expression.

Or

(b) Calculate the average settlement of a clay layer for a site having a top layer of fine sand upto a depth of 10.6 m and a soft clay layer below for a depth of 7.6 m. The water table is at a depth of 4.6 m below the ground surface. The submerged unit weight of sand is 10.4 kN/m^3 and wet unit weight above the water table is 17.6 kN/m^3. The water content of normally consolidated clay is 40% with a liquid limit of 45% and the specific gravity of the solid particles is 2.78. The proposed construction produce a net stress of 120 kN/m^2 at the centre of clay layer.

14. (a) Compute the shear strength of soil along a horizontal plane at a depth of 4 m in a deposit of sand having angle of internal friction 35°, dry unit weight of 17 kN/m^3, and a specific gravity of 2.7 for the following conditions of ground water table

(i) 2.5 m depth from ground surface (7)

(ii) at the ground surface (6)

Or

(b) Explain the procedure for the measurement of shear strength by direct shear test.

15. (a) Explain the procedure for analysis of slope stability by Bishop's slice method.

Or

(b) Explain the causes for failure of slopes and protection measures of slope.

PART C — (1 × 15 = 15 marks)

16. (a) Illustrate how will you determine the ultimate bearing capacity of a soil to design a foundation for a building structure. (15)

Or

(b) Illustrate the factors influencing permeability of a soil. (15)