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

Question Paper Code : 20513

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

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 relationship between void ratio and porosity.
2. Describe uniformity coefficient.
3. Define permeability.
4. Describe confined aquifer.
5. Define consolidation phenomenon.
6. List the assumptions made in Boussinesq's theory for point load expression.
7. Name the conventional test types on clay soil.
8. Describe liquefaction.
9. Recall the causes of Failure of slopes.
10. Describe stability number.

PART B — (5 × 13 = 65 marks)

11. (a) Describe the structure of soil and explain phase relationship.

Or

(b) Explain the methods of field compaction of soil with any one field test carriedout.

12. (a) Discuss the stress distribution in homogenous and isotropic medium for point land using Boussinesq's theory.

Or

(b) Discuss the component of settlement with Terzaghi's one dimensional consolidation theory.

13. (a) Discuss the principle and procedure of tri-axial compression test with a neat sketch.

Or

(b) Compute the net safe bearing pressure using modified Teng and Meyerhof equation for a settlement of 30mm for a square footing of size 4×4 m to be laid at a depth of 2 m below the ground surface in loose to medium dense sand. Take corrected standard penetration test value N=11.

14. (a) Discuss Mohr Coulomb failure theory for direct shear with a neat sketch.

Or

(b) Compute the shear strength parameters of a clay soil having the failure plane at 55° and failure axial stress of 240kN/m^2 an unconfined cylindrical specimen.

15. (a) Explain the types of slopes and causes of failure of slopes with a neat sketch.

Or

(b) Describe slope stability analysis by Bishop's simplified method of slices with a neat sketch.

PART C — ($1 \times 15 = 15$ marks)

16. (a) Examine the effective stress at middle and at the bottom of a clay layer of 8 m thick located at a depth of 6m from the ground surface having moisture content of 56% and G=2.75. The stratum in between ground level and clay is fine sand. The submerged unit weight and moist unit weight of fine sand is 10.5 kN/m^3 and 18.68 kN/m^3. Water level is below 2 m from the ground level. (15)

Or

(b) Examine the total effective pressure on a horizontal plane at a depth of 6 m and 3 m below ground surface for a site having a fine sand layer 8 m thick from ground surface. The soil is having a void ratio of 0.7, G=2.65 and ground water table at 4 m below ground surface. The average saturation of sand above capillary fringe is 50%. The sail gets saturated due to capillary action to a height of 2 m above groundwater table. (15)

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