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Question Paper Code : 60248

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Fourth Semester

Civil Engineering

CE 2251/CE 42/CE 1251/080100018/10111 CE 402 — SOIL MECHANICS

(Regulations 2008/2010)

(Common to PTCE 2251/10111 CE 402 — Soil Mechanics for B.E. (Part–Time) Third Semester – Civil Engineering – Regulations 2009/2010)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Differentiate between void ratio and porosity.

2. The most accurate method for the determination of water content in the laboratory is ——————.

3. What is meant by total stress, neutral stress and effective stress?

4. What is meant by capillary rise in soil and how it affects the stress level in soils?

5. What is the use of influence chart in soil mechanics?

6. Differentiate between Compaction' and 'Consolidation'.

7. What is stress path?

8. What are different types of shear test based on drainage conditions?

9. What are the different types of slope failures?

10. Write about the Taylor's stability Number.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Sandy soil in a borrow pit has unit weight of solids as 25 kN/m³, water content equal to 11% and bulk unit weight equal to 16 kN/m³. How many cubic metre of compacted fill could be constructed of 3500 m³ of sand excavated from the borrow pit, if the required value of porosity in the compacted fill is 30%. Also compute the change in degree of saturation. (8)

   (ii) Discuss various methods available for field compaction. (8)

Or

   (b) (i) A Fine grained soil has liquid limit of 60% and plastic limit of 26%, classify the soil as per IS classification system. (8)

   (ii) In a compaction test on a soil, the mass of wet soil when compacted in the mould was 20 N. The water content of the soil was 16%. If the volume of the mould was 0.945 litres, determine the dry density, void ratio, degree of saturation and % air voids. Take G = 2.68. (8)

12. (a) The water table in a deposit of sand 8 m thick, is at a depth of 3 m below the ground surface. Above the water table, the sand is saturated with capillary water. The bulk density of sand is 19.62 kN/m³. Calculate the effective pressure at 1 m, 3 m and 8 m below the ground surface. Hence plot the variation of total pressure, neutral pressure and effective pressure over the depth of 8 m.

Or

   (b) Write down the procedure for determination of permeability by constant head test in the laboratory.

13. (a) (i) A clay layer 4 m thick is subjected to a pressure of 55 kN/m². If the layer has a double drainage and undergoes 50% consolidation in one year, determine the coefficient of consolidation. Take Time factor as 0.196. If the coefficient of permeability is 0.020 m/yr, determine the settlement in one year. (8)

   (ii) A concentrated load 10 kN acts on the surface of a soil mass. Using Boussinesq analysis find the vertical stress at points (1) 3 m below the surface on the axis of loading and (2) at radial distance of 2 m from axis of loading but at same depth of 3 m. (8)

Or

   (b) (i) A 6 m thick bed of clay is overlain by 9 m thick layer of sand with water table at 4 m below ground surface. The initial void ratio of the clay layer is 1.08 and the compression index is 0.315. For the sand layer the bulk unit weights above and below water table are 18 kN/m³ and 20 kN/m³ respectively. Calculate the settlement of a building constructed on sand layer if it causes an increase in effective vertical stress of 100 kN/m² at the middle of clay layer. (8)

   (ii) Discuss Terzaghi's theory of consolidation, stating the various assumptions and their validity. (8)

14. (a) Explain with neat sketches the procedure of conducting Direct Shear Test. Give its advantages over other methods of finding shear strength of soil. (16)

Or

(b) (i) Write a brief critical note on Unconfined Compression test. (8)

(ii) What are the advantages and disadvantages of Triaxial Compression Test? (8)

15. (a) Explain the Swedish circle method of analysis of slope stability with diagrams. (16)

Or

(b) Explain with neat sketches about the different slope protection measures adopted along with the factors considered in selection of suitable method. (16)

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