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Question Paper Code : 80245

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Fourth Semester

Civil Engineering

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

(Regulations 2008/2010)

(Common to PTCE 2251 for B.E. (Part-Time) Third Semester – Civil Engineering –
Regulations 2009)

Time : Three hours

Maximum : 100 marks

(Assume suitable data if found necessary)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are all the atterberg limits for soil and why it is necessary?
2. Define sieve analysis and sedimentation analysis and what is the necessity of these two analysis.
3. What are the different types of soil water?
4. List out the methods of drawing Flow net.
5. What is mean by effective stress of a soil?
6. Define secondary consolidation.
7. List out the demerits of Triaxial test.
8. Write whether the following statement is true or false.
On the failure plane, the shear stress is maximum.
9. What is tension crack?
10. Differentiate infinite slope and finite slope.

PART B — (5 × 16 = 80 marks)

11. (a) The mass of wet soil when compacted in a mould was 19.55 kN. The water content of the soil was 16%. If the volume of the mould was 0.95 m³ determine : (i) dry unit weight (ii) void ratio (iii) degree of saturation and (iv) percent air voids. Take $G = 2.68$. (16)

Or

- (b) In a hydrometer analysis, the corrected hydrometer reading in a 1000 ml uniform soil suspension at the start of sedimentation was 28. After a lapse of 30 minutes, the corrected hydrometer reading was 12 and the corresponding effective depth 10.5 cm. The specific gravity of the solids was 2.68. Assuming the viscosity and unit weight of water at the temperature of the test as 0.001 Ns/m² and 9.81 kN/m³ respectively. Determine the weight of solids mixed in the suspension, the effective diameter corresponding to the 30 minutes reading and the percentage of particle finer than this size. (16)
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. (16)

Or

- (b) Write down the procedure for determination of permeability by constant head test in the laboratory.
13. (a) Derive Terzaghi's one dimensional consolidation equation. (16)

Or

- (b) With neat sketches explain the procedure of determination of effective stress by Newmark chart method. (16)
14. (a) The stress on a failure plane in a drained test on a cohesionless soil are as under:
Normal stress (σ) = 100kN/m²
Shear stress (τ) = 40kN/m².
- (i) Determine the angle of shearing resistance and the angle which the failure plane makes with the major principal plane.
- (ii) Find the major and minor principal stresses. (16)

Or

- (b) What is the Mohr's strength theory for soil? Derive the expression relating major and minor principal stresses and shear strength parameters of soil. (16)

15. (a) Write explanatory note on :
- (i) Taylor's stability number (5)
 - (ii) Stability of infinite slope (5)
 - (iii) Stability of slopes of an earthen dam. (6)

Or

- (b) Discuss in detail about different modes of finite slope failure and different methods of analyzing factor of safety of finite slopes.
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