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Question Paper Code : 31006

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Fifth Semester

Civil Engineering

080100029 — FOUNDATION ENGINEERING

(Regulation 2008)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Name the soil properties that can be found from disturbed samples.

2. Name the indirect methods of soil exploration.

3. What is the influence of size on bearing capacity of a surface continuous footing resting on a purely cohesive soil as per IS 6403?

4. Say true or false and justify your answer: In Terzaghi's bearing capacity theory, as the shearing resistance above the base of the footing is ignored, the bearing capacity is independent of depth of footing.

5. When do you provide trapezoidal combined footing?

6. A one-storey wood frame house is to be built on a site that is underlain by clay with a plasticity index of 40%. Might this house be prone to distress due to expansive soils? Why or why not?

7. What are the differences between a working pile and a test pile?

8. Say true or false and justify your answer: The efficiency of pile group driven in loose sand may be even more than 100%.

9. State the assumptions made in Rankine's earth pressure theory.

10. State the assumptions made in Coulomb's Wedge theory.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Discuss in detail different methods of exploration. (8)

(ii) Discuss in detail about the selection of spacing and depth of bores for various projects. (8)

Or

(b) (i) Why are SPT values recorded in sand at different depths corrected for overburden and submergence? How are these corrections applied? (8)

(ii) Discuss in detail the selection of foundation based on soil condition. (8)

12. (a) (i) Distinguish between "local shear failure" and "general shear failure" in relation to design of foundations in sands. Where would you expect each of them to occur? What corrections you would incorporate in Terzaghi's bearing capacity equation to work out bearing capacity when foundation does not fail by general shear but fails by local shear? (8)

(ii) A loading test was conducted with a 300mm square plate at a depth of 1m below the ground surface in a pure clay deposit. The water table is located at a depth of 4m below the ground level. Failure occurred at a load of 45kN. What is the safe bearing capacity of a 1.5m wide strip footing at 1.5m depth in the same soil? Assume $\gamma = 18kN/m^3$ above the water table and a factor of safety of 2.5. (8)

Or

(b) (i) Compute the safe bearing capacity of a square footing 1.5m x 1.5m, located at a depth of 1m below the ground level in a soil of average unit weight 20kN/m³. $\phi = 20°, N_C = 17.7, N_q = 7.4$, and $N_\gamma = 5.0$.

Assume a suitable factor of safety and that the water table is very deep. Also compute the reduction in safe bearing capacity of the footing if the water table rises to the ground level. (8)

(ii) Two load tests were performed at a site-one with a 50cm square plate and the other with a 75cm square plate. For a settlement of 15mm, the loads were recorded as 50 kN and 90 kN, respectively in the two tests. Determine the allowable bearing pressure of the sand and the load which a square footing, 1.5m size; can carry with the settlement not exceeding 25mm. (8)

13. (a) (i) Explain the significance of contact pressure distribution? Explain the factors that affect the distribution of contact pressure. (5)

(ii) Explain with necessary sketches, the concept of proportioning of footings. (5)

(iii) Explain the need for floating foundations with case examples. (6)

Or

(b) (i) Explain the ill-effects of black cotton soil on a non-engineered building. (8)

(ii) Explain the precautions to be taken during construction of foundation in a black cotton soil. (8)

14. (a) (i) It is proposed to transfer the total load of 1830 kN of a structure through 12.5m long driven piles in a deep deposit of clay of unconfined compressive strength of 65 kPa. The design diameter of the pile is 300 mm. Estimate the number of piles required adopting a factor of safety of 2.5. Also, suggest the arrangement of piles. Take adhesion factor as 0.7. (10)

(ii) Discuss the limitations of dynamic formulae used for determining the load carrying capacity of piles. (6)

Or

(b) (i) A pile group of 3 rows with 3 piles in a row is made in a uniform clay deposit extending for a large depth with an unconfined compressive strength of 150 kPa. The diameter and length of the piles are 500 mm and 12 m respectively, The c/c spacing of the piles is 1.5 m in both the directions, The adhesion factor can be taken as 0.4. Find the load carrying capacity of the pile group by Converse Labarre's formula and Terzaghi's approach. (10)

(ii) Explain with a sketch how a driven cast in-situ pile is made. (6)

15. (a) Explain the Culmann's graphical method for evaluating the active earth pressure. Also justify its application on account of line loads running parallel to the retaining walls.

Or

(b) Briefly explain the Coulomb's Wedge theory and the determination of active earth pressure.