Q 8338

M.E. DEGREE EXAMINATION, MAY/JUNE 2006.

Second Semester

Structural Engineering

ST 1652 — DESIGN OF SUB STRUCTURES

(Regulation 2005)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the reasons for providing inside and outside clearance in sampling tubes?

2. What is bore log? List the information normally given in a bore log.

3. Why the depth of foundation should be greater than the frost penetration depth?

4. Explain the significance of the seat of settlement with sketch.

5. Compare the load transfer mechanism of single under reamed pile with that of double under reamed pile with sketches.

6. List the forces for which a pile cap is normally designed.

7. Differentiate between drilled shaft foundation and caisson foundation.

8. Briefly explain the most common type of foundation used for steel towers with sketches.

9. Briefly explain the various criteria considered in dynamic analysis of machine foundations.

10. What are the reasons for using piles in machine foundations?

PART B — (5 × 16 = 80 marks)

11. (i) A mat foundation 20 × 30 m is placed in a sandy soil at a depth of 2.5 m below the ground level. A compressible clay layer of 6 m thick is also available at 12 m below the ground level. Total load carried by the mat is 125 kN/m^2. Properties of sand layer are Y_d = 16 kN/m^3, Y_{SAT} = 21 Kn/M^3, E_s = 12500 MPa and μ = 0.30. Properties of clay layer are Y_{SAT} = 21.5 kN/m^3, natural moisture content 39%, liquid limit 48%. Estimate the total settlement of the raft due to the lowering of water table from 2 m to 11.5 m below the ground level. (12)

(ii) With neat sketches, explain the critical sections for bending moment, one way shear and punching shear for an isolated footing. (4)

12. (a) (i) Explain in detail along with necessary sketches, the procedure involved in conducting plate load test. (10)

(ii) Briefly explain the limitations of plate load test and the techniques of over coming the same. (6)

Or

(b) (i) Explain different types of soil samples in detail. (6)

(ii) List the precautions to be exercised while sampling of soil. (6)

(iii) Explain with sketch the importance of area ratio of a sampler. (4)

13. (a) (i) Explain the procedure to obtain optimum spacing in a pile group to get maximum efficiency. (10)

(ii) Comment on the engineering news formulae. (6)

Or

(b) (i) Find the efficiency of a 3 × 4 pile group by Feid's method. (6)

(ii) Find the failure mode and group efficiency of a group of friction piles 17 m long arranged in 5 × 4 pattern and spaced at 1.2 m apart. Assume the unconfined compressive strength of soil as 90kN/m^2. (10)

14. (a) (i) Explain different types of drilled shaft foundation in detail with sketches. (6)

(ii) A drilled pier 1.2 m diameter is anchored 1.50 m into bedrock. The allowable bearing pressure of the same is 4000 kN/m^2. The layer above the bedrock is loose sand - silt - clay deposit with frictional resistance of 30kN/m^2. Find the allowable load for the pier, if the factor of safety is 5 . (10)

Or

(i) Explain the necessity of anchors. Also explain in detail about any two types of anchor with sketch. (8)

(ii) Discuss the following :

(1) Difference between the failure mechanisms of retaining walls and bracings of excavations. (4)

(2) Design procedure for bracings of excavations. (4)

(a) (i) Explain the theory of free vibration of spring-mass system with damping. (8)

(ii) Briefly explain the types of machine foundation with sketches. (8)

Or

(b) (i) Explain the design procedure or block foundation for forge nammer. (8)

(ii) Explain the vibration isolation techniques in detail with sketches. (8)
