A 1108

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2007.

Sixth Semester

Civil Engineering

CE 340 — FOUNDATION ENGINEERING

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. A sampler of inner diameter 35mm and wall thickness 1mm is used for sampling. Comment on the quality of sample.

2. How would you decide the depth of exploration?

3. What are the requirements to be satisfied for locating a footing in sloping ground?

4. Write various components of settlement.

5. State the conditions warrant for the footings to be combined.

6. What is floating raft foundation?

7. For identical soil conditions, the load permitted on bored pile is lesser than driven pile of identical shape and dimensions, why?

8. State whether the following statement is true or false. Justify your answer. "Settlement of pile group having average load on each pile equals the single pile load is higher than single pile".

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

10. Make an estimate of lateral earth pressure coefficient on a basement wall supports soil to a depth of 2m. Unit weight and angle of shearing resistance of retained soil are 16kN/m^3 and 32° respectively.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the arrangements and operation of stationary piston sampler. (8)

(ii) Explain wash boring method of advancing bore hole. (8)

Or

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

(ii) Describe the salient features of a good sub soil investigation report? (8)

12. (a) (i) Compute the safe bearing capacity of a continuous footing 1.8m wide, and located at a depth of 1.2m below ground level in a soil with unit weight 20kN/m^3, cohesion 20kN/m^2 and angle of shearing resistance 20°. Assume a factor of safety of 2.5. Terzaghi's bearing capacity for $\phi = 20°$ are $N_c = 17.7$, $N_q = 7.4$ and $N_\gamma = 5.0$, what is the permissible load per metre run of the footing? (10)

(ii) A 30cm square bearing plate settles by 8mm in the plate load test on cohesionless soil, when the intensity of loading is 180 kN/m^2. Estimate the settlement of a shallow foundation of 1.6m square under the same intensity of loading. (6)

Or

(b) (i) A footing rests at a depth of 1m has a size of 3m × 1.5m and it causes a pressure increment of 200 kN/m^2 at its base. The soil profile at the site consists of sand for the top 3 m, which is underlined by a clay layer of 3m. Water table is at a depth of 2.5m from the ground surface. The unit weight of sand layer above and below water table are 16kN/m^3 and 18kN/m^3 respectively. The unit weight of clay is 15kN/m^3. The initial void ratio is 0.8 and compression index is 0.3. Determine the consolidation settlement at the middle of the clay layer. Assume 2:1 pressure distribution and consider the variation of pressure across the depth of the clay layer. (12)

(ii) Discuss various methods of minimising settlement. (4)

13. (a) (i) What are different types of shallow foundations? Explain with the help of sketches. (6)

(ii) Find the size and thickness of square reinforced concrete footing for the following data. Column load = 800kN; Allowable soil pressure = 200kN/m^2 ; Size of column = 0.4m × 0.4m. (10)

Or

(b) (i) Derive the relations between the dimensions of trapezoidal combined footing and unequal column loads Q_1 and Q_2. (10)

(ii) What are different types of raft foundation. (6)

14. (a) (i) A pile is driven with a single acting steam hammer of weight 15kN with a free fall of 900mm. The final set, the average of the last three blows, is 27.5mm. Find the safe load using the Engineering News Formula. (6)

(ii) A group of 16 piles of 50cm diameter is arranged with a center to center spacing of 1.0 m. The piles are 9m long and are embedded in soft clay with cohesion 30kN/m. Bearing resistance may be neglected for the piles. Adhesion factor is 0.6. Determine the ultimate load capacity of the pile group. (10)

Or

(b) A 30 cm diameter pile of length 12m was subjected to a pile load test and the following results were obtained.

Load, KN	0	500	1000	1500	2000	2500
Settlement during loading, cm	0	0.85	1.65	2.55	3.8	6.0
Settlement during unloading, cm	4.0	4.6	5.2	5.5	5.8	6.0

Determine the allowable load. (16)

15. (a) A retaining wall, 7.5m high, retains a cohesionless backfill. The top 3m of the fill has a unit weight of 18kN/m^3 and angle of shearing resistance of 30° and the rest has unit weight of 24kN/m^3 and angle of shearing resistance of 20°. Determine the pressure distribution on the wall. Find also the point of application of the lateral earth pressure. (16)

Or

(b) Determine the factor of safety against sliding and overturning of an L shaped retaining wall of total height 5.6m and uniform thickness 0.6m. Width of base slab is 3.1m. Depth of bottom of slab from the dredge line is 1m. The wall retains a cohesionless horizontal backfill weighs 20kN/m^3 and has an angle of shearing resistance of 32°. Ignore the passive pressure. (16)
