R 8149

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2006.

Sixth Semester

Civil Engineering

CE 340 — FOUNDATION ENGINEERING

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Determine the area ratio of a seamless tube sampler of inner diameter 48 mm and outer diameter 51 mm and comment on the nature of samples to be obtained in the sampler.

2. What is bore log?

3. What are the various factors to be considered in fixing the depth of foundations? Specify the minimum depth of foundation as per IS codal provision.

4. Specify maximum permissible settlement for isolated and raft foundation on sand and clayey soil.

5. List various types of foundations.

6. What is buoyant raft?

7. State various situations under which negative skin friction is developed.

8. Define group efficiency of piles. Can it be greater than 1?

9. Draw the variation of earth pressure with the wall movement.

10. What is the effect of rise in the level of water table behind the retaining wall on active and passive pressures?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the working principle of piston sample. Bring out its merits and demerits. (8)

(ii) Write short notes on geophysical methods of soil exploration. (8)

Or

(b) (i) The field N value in a deposit of fully submerged fine sand was 40 at a depth of 6 m. The average saturated unit weight of the soil is 19 kN/m^3. Calculate the corrected N value. (8)

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

12. (a) (i) A square footing located at a depth of 1.5 m from the ground surface carries a column load of 150 kN. The soil is submerged having an effective unit weight of 11 kN/m^3 and an angle of shearing resistance of 30°. Find the size of the footing using Terzaghi's theory, if factor of safety is 3 ; for $\phi = 30°$, $N_q = 10$ and $N_\gamma = 6.0$. (10)

(ii) Plate load test was performed on dense sand. Size of plate is 0.2 m × 0.2 m. Find the settlement of a footing of size 3 m × 3 m under the pressure of 20 kN/m^2 if the plate settles by 5 mm under this pressure. (6)

Or

(b) A footing 2 m square, rests on a soft clay soil with its base at a depth of 1.5 m from ground surface. The clay stratum is 3.5 m thick and its underlain by a firm sand stratum. The clay soil has liquid limit of 30%, specific gravity is 2.7, water content at saturation is 40%, cohesion is 50 kN/m^2 ($\phi = 0$). It is known that the clay stratum is normally consolidated. Compute the settlement that would result if the load intensity equal to safe bearing capacity of soil were allowed to act on the footing. Natural water table is quite close to the ground surface. For given conditions, bearing capacity factor (N_c) is obtained as 6.9. Take factor of safety as 3. Assume load spread 2 (vertical) to 1 (horizontal). (16)

) Brief the design procedure of isolated footing. (16)

Or

(b) Explain the conventional method of design of raft foundation. (16)

(a) (i) A reinforced concrete pile weighing 30 kN (inclusive of helmet and dolly) is driven by a drop hammer weighing 40 kN and having an effective fall of 0.8 m. The average set per blow is 1.4 cm. The total temporary elastic compression is 1.8 cm. Assuming the co-efficient of restitution as 0.25 and a factor of safety of 2, determine the ultimate bearing capacity and the allowable load for the pile. (8)

(ii) A 450 mm wide, square in section concrete pile, 15 m long, is driven in a deep deposit of uniform clay. Laboratory unconfined compression tests on undisturbed samples indicate an average unconfined compressive strength of 75 kN/m^2. Calculate the ultimate load capacity of the pile. Take adhesion factor as 0.8 and N_c as 9. (8)

Or

(b) (i) In a 16 pile group, the pile diameter is 45 cm and centre to centre spacing of the square group is 1.5 m. If cohesion is 50 kN/m^2, determine whether the failure would occur with the pile acting individually, or as a group? Neglect bearing at the tip of the pile. All piles are 10 m long. Take m = 0.7 for shear mobilisation around each pile. (10)

(ii) A group of 4 × 4 piles is driven to bear in a dense sand layer 2.5 m thick. Pile spacing is 1.0 m c/c, diameter is 0.4 m. Total load on top is 3000 kN. A compressible layer of clay, 2 m thick exists below dense sand. Clay is underlined by rock. Find the settlement of pile group if coefficient of volume compressibility of clay layer is 1.5×10^{-4} m^2/kN. (6)

15. (a) A smooth vertical retaining wall of 9 m high retains for a top 4.5 m so with cohesion 0 and internal friction 30° ; The unit wt. of soil 19 kN/m^3. For the bottom 4.5 m, the soil has cohesion of 0 and interna friction 35°. The unit weight of soil is 20 kN/m^3. Top surface of soil horizontal. Find resultant pressure and its point of application. (1

Or

(b) (i) Discuss briefly, the Culmann's graphical method to obtain activ earth pressure. (1

(ii) Discuss briefly the stability analysis of retaining walls. (