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Question Paper Code : 21257

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

Fifth Semester

Civil Engineering

CE 2305/CE 54/10111 CE 505 – FOUNDATION ENGINEERING

(Regulations 2008/2010)

(Common to PTCE 2305/10111 CE 505 – Foundation Engineering for
B.E. (Part-Time) Fifth Semester, Civil Engineering – Regulations 2009/2010)

Time : Three hours

Maximum : 100 marks

Note : IS 6403 – 1981 Code book may be permitted.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Differentiate : Non representative and undisturbed samples.
2. How do you decide the depth of exploration? List the factors you will consider.
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. What is safe bearing pressure?
6. What is total settlement of a footing?
7. How are piles classified based on method of installation?
8. What are the limitations of the dynamic pile load formula?
9. What is surcharge angle?
10. What is earth pressure at rest?

PART B — (5 × 16 = 80 marks)

11. (a) Explain with neat sketches about SPT and SCPT. (16)

Or

- (b) With neat sketches briefly discuss seismic method and electric resistivity method of soil exploration. (16)

12. (a) Explain the plate load test to determine the bearing capacity of soil. (16)

Or

- (b) Determine the depth at which a circular footing of 3 m diameter be found to provide a factor of safety of 3, if it has to carry a safe load of 1500 kN. The foundation soil has $c=10 \text{ kN/m}^2$, $\gamma=18 \text{ kN/m}^3$. Use Terzaghi's analysis.

13. (a) (i) A combined footing is to Support two Columns 250 mm × 250 mm and 300 mm × 300 mm carrying loads of 300 kN and 450 kN respectively The columns are spaced at 4 m c/c. The allowable bearing capacity of the soil is 150 kPa Find the plan dimensions of the footing if

(1) The first column alone is on the boundary line

(2) Both the columns are on the boundary line. (10)

- (ii) Draw the contact pressure distribution diagram for flexible and rigid footings resting on sand and Clay respectively. (6)

Or

- (b) (i) Proportion a strap footing to carry loads of 750 kN and 400 kN through columns of sizes 400 mm × 400 mm and 250 mm × 250 mm respectively. The columns are spaced at 5 m c/c and the second column is on the boundary line. The width of the footing could be assumed as 2.2 m. The allowable bearing capacity of the soil is 250 kPa. (6)

- (ii) What is meant by floating foundation? Where is it adopted? Find the factor of safety for such a foundation against shear failure. Also find the theoretical settlement of the foundation. (10)

14. (a) (i) Group the Pile foundation based on method of installation and its effect on ground. (6)
- (ii) In a two-layered cohesive soil, bored Piles of 400 mm are installed. The top layer has a thickness of 5 m and the bottom one is of Considerable depth. The shear strength of the top clay layer is 45 kN/m² and that of the bottom is 100 kN/m². Determine the length of the bored pile requirement to carry a safe load of 380 kN, allowing a factor of safety 2.5.

Or

- (b) (i) What is meant by under-reamed pile. When and where they are used. Why? Discuss. (8)
- (ii) A 4 × 3 Pile group has the following details :

Diameter of each pile, $d = 350$ mm

Centre-to-centre spacing of pile = 1,050 mm

Capacity of a single pile = 400 kN

Determine the efficiency of the free-standing pile group. (8)

15. (a) Explain the Rankine's theory for the cases of Cohesionless backfill.

Or

- (b) Explain the Coulomb's wedge theory of earth pressure with a neat sketch.