

Reg. No. :

Question Paper Code : 70356

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

Fifth / Sixth Semester

Civil Engineering

CE 8591 — FOUNDATION ENGINEERING

(Common to : Environmental Engineering)

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the different methods of boring?
2. Differentiate between disturbed and undisturbed sample.
3. Define allowable bearing pressure.
4. Name the methods of minimizing differential settlement.
5. Draw a contact pressure distribution of rigid footing on clay and sand.
6. Under what circumstances trapezoidal footing is adopted?
7. Define group efficiency of pile.
8. What is an under reamed pile?
9. Differentiate between Active pressure and Passive pressure.
10. What are the checks to be done for stability analysis of retaining wall?

PART B — (5 × 13 = 65 marks)

11. (a) Describe different types of soil sampler and situations where each is used. Also explain its advantages and disadvantages.

Or

- (b) Explain the Standard Penetration Test. What are the Corrections to be applied?

PART C — (1 × 15 = 15 marks)

12. (a) Compute the safe bearing capacity of a circular footing of diameter 1.5 m located at a depth of 1.2 m in a cohesion less soil layer with an average saturated unit weight of 20 kN/m³ and the angle of internal friction of 20°, the corresponding bearing capacity factors are given as follows, $N_c = 17.7$, $N_q = 7.4$, $N_\gamma = 5$. Take a factor of safety 2.5. Water table is quite deep. What will be the percentage reduction in the value if the water table rises to surface?

Or

- (b) What are the different types of foundation settlement? Explain in detail.
13. (a) Proportion the dimension of a trapezoidal combined footing for two columns of size 600 mm × 600 mm carrying loads of 3500 kN and 2000 kN. The C/C distance between the columns is 4.5 m. Take the allowable soil pressure as 250 kN/m².

Or

- (b) List the various types of foundations. Explain.
14. (a) Explain the Classification of piles with neat sketches.

Or

- (b) In a 16 pile group the pile diameter is 0.4 m and centre to centre spacing of piles in the square group is 1.5 m. If $C = 50$ kN/m², determine whether the failure would occur as a block failure or when the piles act individually. Neglect bearing at the tip of the pile. All piles are 12 m long. Take $m = 0.7$ for shear mobilization around each pile. Also determine the safe load on this group taking factor of safety as 3.
15. (a) Explain in details about the coulombs wedge theory for finding pressure with a neat sketch.

Or

- (b) A retaining wall, 4 m high supports a backfill having cohesion 22 KPa, angle of internal friction 29°, and bulk unit weight 19.25 kN/m³ with horizontal top flushes with top of the wall. The backfill carries a surcharge of 25 kN/m². Draw the lateral earth pressure distribution diagram and compute the total active and passive earth pressure on the wall and their point of application.

16. (a) Design a pile group to carry 3000 kN in a soil of uniform clay to a depth of 5 m underlain by hard rock. Cohesive strength of the clay is 150 kN/m². Adopt a factor of safety of 2.5 against shear failure.

Or

- (b) A square footing located at a depth of 1.5 m below the ground has to carry a safe load of 1000 kN. Find the size of the footing if desired factor of safety is 3. The soil has the following properties $e = 0.55$ at the degree of saturation 50%, $G = 2.67$, $C = 8$ kN/m², $\phi = 30^\circ$, $N_c = 37.2$, $N_q = 22.5$, $N_\gamma = 19.7$.