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Question Paper Code : 90331

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

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 is meant by Area ratio? What its significance?
2. List the factors affecting selection of foundation.
3. Define Safe Bearing Capacity.
4. What are the different methods of minimizing settlement?
5. Draw a contact pressure distribution of rigid footing on clay.
6. Under what circumstances mat footing is adopted.
7. How does a pile group behave in cohesionless soil and cohesive soil?
8. How to control Negative skin friction
9. Difference between active pressure and passive pressure.
10. Write an assumptions in Coulomb's wedge theory.

PART B — (5 × 13 = 65 marks)

11. (a) Explain in detail about different methods of boring for the soil exploration.

Or

- (b) Explain Standard Penetration Test and Standard Cone Penetration Test.
12. (a) Compute the Safe Bearing Capacity of a square footing 2 m × 2 m located at a depth of 1.5 m below the ground level in a soil of unit weight 18 kN/m³, $\phi = 20^\circ$, $N_c = 17.7$, $N_q = 7.4$, $N_\gamma = 5$. Assume a Factor of Safety is 2.5 and the water table is very deep. Also compute the reduction in safe bearing capacity of the footing if the water table rises to the ground level.

Or

- (b) Define differential settlement. What are the causes? Explain the remedial measures to be taken to minimize the differential settlement.
13. (a) Two adjacent columns are to be supported by trapezoidal combined footing. The heavier column carries a load of 4000 kN and size of 450 mm × 450 mm. The lighter column carries a load of 3500 kN with a size of 350 mm × 350 mm. The columns are 5 m centre to centre. Taking Safe bearing capacity as 250 kN/m². Assume the heavier column is on the property line. Proportion a suitable foundation.

Or

- (b) Explain the various types of shallow foundation and under what circumstances these foundation types are preferred?
14. (a) A group of 16 piles of 40cm diameter is arranged with a centre to centre spacing of 1 m. The piles are 10 m long and are embedded in soft clay with cohesion of 25 kN/m². Bearing resistance may be neglected for the piles. Adhesion factor is 0.7. Determine the ultimate load carrying capacity of the pile group.

Or

- (b) Explain the type of piles and their function.

15. (a) Explain in details about the Culmann's graphical method for finding active pressure with a neat sketch.

Or

- (b) A retaining wall is 5 m high. Its back is vertical and it has sandy backfill upto its top. The top fill is horizontal and carries a uniform surcharge of 80 kN/m². Determine the active earth pressure on the wall per meter length of the wall. Water table is 1.5 m below the top of fill, $\gamma_d = 19 \text{ kN/m}^3$, Moisture content above the water table is 13%, $\phi = 30^\circ$, $G = 2.5$ and $n = 25\%$. The wall friction may be neglected.

PART C — (1 × 15 = 15 marks)

16. (a) Design a pile group to carry 2000 kN in a soil of uniform clay to a depth of a 5 m underlain by hard rock. The unconfined compressive strength of the clay is 30 kN/m². Adopt a factor of safety of 3 against shear failure.

Or

- (b) A cantilever retaining wall retains dry sand to a depth of 5.5 m as shown in figure. Q. 16(b) Check the stability of retaining wall and pressure. Safe bearing capacity is 250 kN/m².

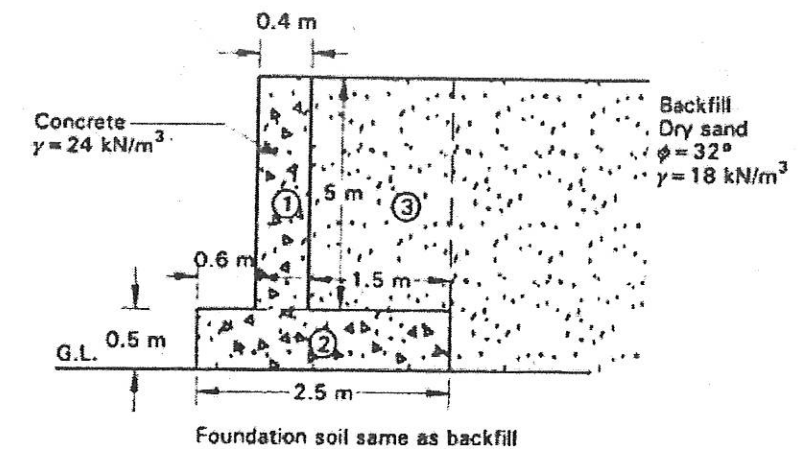


Fig. Q 16 (b).