Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 20271

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Fifth Semester

Civil Engineering

CE 6502 — FOUNDATION ENGINEERING

(Regulations 2013)

(Common to : PTCE 6502 – Foundation Engineering for B.E. (Part-Time) Fifth Semester – Civil Engineering – Regulations 2014)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Distinguish between representative sample and undistributed sample.

2. List out the factors deciding the depth of soil exploration.

3. What is meant by zero settlement foundation?

4. State the requirements of good foundation.

5. Furnish the situations under which combined footing will be adopted.

6. Calculate the efficiency of nine member square pile group as per Converse-Labarre's formula if the centre to centre spacing is 2.5 times that of diameter of pile.

7. Define negative skin friction.

8. Define group efficiency.

9. What are the conditions to be satisfied to ensure the stability of retaining wall?

10. State the assumptions made in Rankine's earth pressure theory.

PART B — (5 × 13 = 65 marks)

11. (a) Describe with neat sketches different types drilling adopted in soil exploration works.

Or

(b) Write a detailed notes on :

(i) Soil samplers

(ii) Bore log

(iii) Geophysical methods of soil exploration

(iv) Factors deciding number and depth of boreholes. (3 + 3 + 3 + 4)

12. (a) With the help of a neat sketch, describe how plate load test can be performed? How bearing capacity and settlements of foundations are arrived in? What are the limitations of this test?

Or

(b) Compute the safe bearing capacity of a circular footing 2.5 m diameter, located at a depth of 2.0 m below the ground level in a soil with unit weight $\gamma = 19.5\,kN/m^3$, cohesion c = 22.5 kN/m², angle of shearing resistance $\Phi = 26°$, factor of safety 2.5. Bearing capacity factors for $\Phi = 26°$ as Nc = 22.604, Nq = 12.208 and Nr = 13.182. Find the permissible load per meter run when the water table is at great depth, at footing level and at ground level. Use IS 6403 procedure.

13. (a) Critically discuss the choices of different shallow foundations with different site conditions. State the merits and demerits of each foundation type.

Or

(b) Two adjacent columns are to be supported by a trapezoidal combined footing. The heavier column carries a load of 5000 kN and size of 500 mm × 500 mm. The lighter column carries a load of 3500 kN with a size of 350 mm × 350 mm. The columns are 5.30 m c/c. Take allowable bearing capacity as $320\,kN/m^2$. Assume the heavier column is on the property line. Proportion a suitable foundation.

14. (a) Design a pile group to carry a load of 4200 kN including the weight of the pile cap at a site where the soil is uniform clay to a depth of 25 m, underlain by rock. Average UCC strength of the clay is 68 kN/m². The factor of safety may be assumed as 3 against shear failure. Also compute the settlement of the group assuming the load to be transferred at 2/3 length of pile.

Or

(b) Describe with neat sketch, the procedure for pile-load test and explain how pile capacity can be determined using the test.

15. (a) 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/m^3 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.

Or

(b) Describe in details about

(i) Assumptions made in Coulomb's wedge theory. (4)

(ii) Culmaan's graphical method (5)

(iii) Stability analysis of retaining wall. (4)

PART C — (1 × 15 = 15 marks)

16. (a) The pile load test data of a 300 mm diameter and 15 m long pile is as follows. Design a pile group system to carry a load of 4000 kN. Compute the settlement of the pile group for the designed load.

Load in kN	0	500	1000	1500	2000	2500
Settlement in mm	0	8.5	16.5	25.5	38.0	60.0

Or

(b) Design a retaining wall for a 8 m sandy soil backfill with unit weight as $17.5\,kN/m^3$ and angle of internal friction 30 degrees. Check the stability of the designed retaining wall.