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B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Fifth Semester

Civil Engineering

CE 6502 – FOUNDATION ENGINEERING

(Regulation 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. What are the factors influencing in depth of exploration of sub soil?

2. List out the various methods of site exploration.

3. Define net pressure intensity.

4. List out the methods of computing elastic settlements.

5. Define contact pressure.

6. What is floating foundation?

7. What are the methods available to determine Load caring capacity of pile?

8. For a pile designed for an allowable load of 400 kN driven by a Steam hammer (Single acting) with a energy of 221 t-cm, what is the approximate terminal set of pile?

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

10. Draw the force polygon for lateral active earth pressure on wall retaining cohesionless soil according to Coulomb's wedge theory.

PART B — (5 × 13 = 65 marks)

11. (a) Explain wash boring method of advancing borehole with a neat sketch and highlight the limitations of the method.

Or

(b) Describe the principle and procedure of conducting subsoil exploration study using seismic refraction method.

12. (a) (i) Determine the ultimate bearing capacity of a strip footing, 1.5 m wide, with its base at a depth of 1 m, resting on a dry sand stratum. Take $\gamma = 17 kN/m^3$; $\phi = 38°$; Use IS code method. For $\phi = 38°$, $N_q = 48.9$ and $N_\gamma = 56.2$. (6)

(ii) The following data was obtained from a plate load test carried out on a 60 cm square test plate at a depth of 2 m below ground surface on a sandy soil which extends upto a large depth. Determine the settlement of a foundation 3.0 m × 3.0 m carrying a load of 1100 kN and located at a depth of 2 m below ground surface. (7)

Load intensity, kN/m²	50	100	150	200	250	300	350	400
Settlement, mm	2.0	4.0	7.5	11.0	16.3	23.5	34.0	45.0

Or

(b) (i) A strip footing of 1.5 m wide is resting on a sand stratum with its base at a depth of 1m. The properties of the sand are: $\gamma = 17$ kN/m³, $\gamma_{sat} = 20$ kN/m³, $\phi = 38°$ and c' = 0. Determine the ultimate bearing capacity of the footing using Terzaghi's theory if the ground water table is located at a depth of 0.5 m below the base of the footing. For $\phi = 38°$, assuming general shear failure $N_q = 60$ and $N_\gamma = 75$. (7)

(ii) Find the net allowable load on a square footing of 2.5 m × 2.5 m. The depth of foundation is 2 m and the tolerable settlement is 40 mm. The soil is sandy with Standard Penetration Number of 12. Take a factor of safety of 3. The water table is very deep. (6)

13. (a) A trapezoidal footing is to be proportioned to support two square columns of 30 cm and 50 cm sides respectively. Columns are 6 meters apart and the safe bearing capacity of the soil is 400 kN/m². The bigger column carries a load of 5000 kN and the smaller carries a load of 3000 kN. Design a suitable size of the footing so that it does not extend beyond the face of the columns. (13)

Or

(b) Write the IS codal provisions for design of raft foundation. (13)

14. (a) Discuss in detail about the method of estimating the individual and group capacity of piles. (13)

Or

(b) Define pile foundation. Briefly discuss about the type of pile and their functions. (13)

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

Or

(b) Discuss in detail about the Rankine's theory for the following cases of cohesions soil and cohesive soil.

(i) Submerged back fill (6)

(ii) Back fill with sloping surface. (7)

PART C — (1 × 15 = 15 marks)

16. (a) Compute the active earth pressure distribution and the total lateral force for a smooth vertical wall of 5 m with clay backfill

(i) For the short term : $C = 45kN/m^2, \varphi = 0°$ and $\gamma = 18kN/m^3$.

(ii) For the long term : $C = 5kN/m^2, \varphi = 20°$ and $\gamma = 18kN/m^3$.

Or

(b) Explain why the displacement necessary to produce the passive state is much more than that required to produce the active state?