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B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2014

CIVIL ENGINEERING BRANCH

FIFTH SEMESTER

CE 373 / CE 9303 – Foundation Engineering

(Regulation 2004/2008)

Time: 3 Hours

Answer ALL Questions

Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. Differentiate disturbed and undisturbed samples.
2. What is bore log?
3. What are the factors affecting bearing capacity?
4. A rectangular footing (4m×3m) exerts a pressure of 150kN/m² on a cohesive soil ($E_s=5 \times 10^4$ kN/m² and $\mu=0.50$). Determine the immediate settlement at the center assuming influence factor as 1.4.
5. When do you provide trapezoidal combined footing?
6. What is floating raft?
7. List the types of pile based on their function.
8. Write Converse-Labarre formula to get the group efficiency of piles?
9. Draw the force polygon to represent passive earth pressure using Coloumb's wedge theory.
10. Compare Coloumb's wedge theory with Rankines theory.

Part – B (5 x 16 = 80 marks)

11. i) Discuss in detail the selection of depth and spacing of bore holes. (8)
ii) Explain the operating principle of Piston Sampler with neat sketch. State its advantages over other samplers. (8)
12. a(i) Determine the net allowable load and gross allowable load for a square footing of 2m side and having a depth of foundation 1.0m. Use Terzaghi's theory and assume local shear failure. Take a factor of safety of 3.0. The soil at the site has unit weight, $\gamma=18$ kN/m³, Cohesion, $c=15$ kN/m²; Angle of shearing resistance $\phi=25^\circ$; For $\phi=25^\circ$, $N'_c=14.8$; $N'_q=5.6$ and $N'_\gamma=3.2$. (8)
a(ii) Discuss the determination of bearing capacity from plate load test. (8)

OR

- b(i) A layer of soft clay is 6m thick and lies under a newly constructed building. The weight of sand overlying the clay layer produces a pressure of 260kN/m² and the new construction increases the pressure by 100kN/m². If the compression index is 0.5 and void ratio is 1.06, compute the settlement. (8)
- b(ii) Discuss the determination of bearing capacity from Standard Penetration Test. (8)

13. ● A trapezoidal footing is to be provided to support two square columns of 30cm and 50cm sides respectively. Columns are 6m apart and the safe bearing capacity of the soil is 400kN/m^2 . The bigger column carries 5000kN and the smaller 3000kN. Design a suitable size of the footing so that it does not extend beyond the faces of the columns. (10)

a(ii) What are different types of shallow foundations? Explain with the help of sketches. (6)

OR

b(i) What are different types of raft foundations? Discuss the conventional method of design of raft foundation. (10)

b(ii) Describe the procedure to proportion footings for equal settlement. (6)

14. a(i) A pile is driven with a single acting steam hammer of weight 15kN with a free fall of 900mm. The final set, the average of the last three blows, is 27.5mm. Find the safe load using the Engineering News Formula. (6)

a(ii) A group of 16 piles of 50cm diameter is arranged with a center to center spacing of 1.0m. The piles are 9m long and are embedded in soft clay with cohesion 30kN/m^2 . Bearing resistance may be neglected for the piles. Adhesion factor is 0.6. Determine the ultimate load capacity of the pile group. (10)

OR

b(i) A square pile group of 16 piles penetrates through a filled up soil of 3m depth. The pile diameter is 250mm and pile spacing is 0.75m. The unit cohesion of the material is 18kN/m^2 and the unit weight of the soil is 15kN/m^3 . Compute the negative skin friction on the pile group. Take $\alpha=0.4$. (10)

b(ii) Discuss the method of obtaining ultimate load and also allowable load on a single pile from pile load test. (6)

15. a(i) Explain Culmann's graphical construction for the determination of active earth pressure. (10)

a(ii) Explain with neat sketch the relationship between lateral strain and lateral earth pressure coefficients. (6)

OR

b(i) A wall with smooth vertical back, 10m high supports a purely cohesive soil with cohesion as 10kN/m^2 and unit weight as 18kN/m^3 . Determine (a) total Rankine's active pressure against the wall; (b) position of zero pressure; (c) distance of the centre of pressure above the base. (12)

b(ii) What are different modes of failure of retaining wall? (4)
