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B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2013

CIVIL ENGINEERING BRANCH

FIFTH SEMESTER

CE9303 - Foundation Engineering

(Regulation 2008)

Time: 3 Hours

Answer ALL Questions

Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. What are different objectives of site investigation?
2. What are the factors affecting quality of samples?
3. How the depth of foundation is decided?
4. What are different components of settlement?
5. Draw the contact pressure distribution diagram below rigid footings resting on clay and sand.
6. When do you provide strap footing?
7. What are different types of piles based on their function?
8. When does negative skin friction develop?
9. Draw the Mohr circles with strength envelope to represent active and passive states.
10. Compare Coloumb's wedge theory with Rankines theory.

Part – B (5 x 16 = 80 marks)

11. i) Explain in detail about the salient features of bore log report. (8)
ii) Discuss in detail about the selection of depth and spacing of bore holes for various projects. (8)
 12. a(i) A rectangular footing has a size of 1.8m×3m has to transmit the load of a column at a depth of 1.5m. Calculate the safe load which the footing can carry at a factor of safety of 3 against shear failure. Use IS code method. The soil has following properties: Porosity, $n = 40\%$; Specific Gravity, $G = 2.67$; water content, $w = 15\%$; Cohesion, $c = 8\text{kN/m}^2$; Angle of shearing resistance $\phi = 32^\circ$; For $\phi = 32^\circ$, $N_c = 36$; $N_q = 23$ and $N_\gamma = 30$. (12)
a(ii) A 30cm square bearing plate settles by 8mm in the plate load test on cohesionless soil, when the intensity of loading is 180kN/m^2 . Estimate the settlement of a shallow foundation of 1.6m square under the same intensity of loading. (4)
- OR**
- b(i) A square footing of size 4×4 m is founded at a depth of 2m below the ground surface in loose to medium dense sand. The corrected standard penetration test value $N = 11$. Compute the net safe bearing pressure for a settlement of 40mm. (8)

13. (ii) 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/m^2 and the new construction increases the pressure by 100kN/m^2 . If the compression index is 0.5 and void ratio is 1.06, compute the settlement. (8)

13. a(i) 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) Describe the procedure to proportion footings for equal settlement. (6)

OR

b(i) What are different types of raft foundations? Discuss the procedure for the design of a raft foundation. (10)

b(ii) Discuss different types of shallow foundation with its suitability. (6)

14. a) A 30cm diameter pile of length 12m was subjected to a pile load test and the following results were obtained.

Load, kN	0	500	1000	1500	2000	2500
Settlement during loading, cm	0	0.85	1.65	2.55	3.8	6.0
Settlement during unloading, cm	4.0	4.6	5.2	5.5	5.8	6.0

Determine the allowable load. (16)

OR

b(i) A precast concrete pile was driven in sand, using a 40kN hammer having a free fall of 1.0m. If the penetration of the pile in the last blow of the hammer was noted as 8mm, determine the load carrying capacity of the pile in kN using Engineering News Formula. (6)

b(ii) It is proposed to provide pile foundation for a heavy column; the pile group consisting of 4 piles, placed at 2m center to center, forming a square pattern. The underground soil is clay, having c_u at surface as 60kN/m^2 and at depth 10m, as 100kN/m^2 . Compute the allowable column load on the pile cap, if the piles are circular having diameters 0.5m each and length as 10m. (10)

15. a(i) A vertical excavation was made in a clay deposit having weight of 20kN/m^3 . It caved in after the depth of digging reached 4 meters. Taking the angle of internal friction to be zero, calculate the value of cohesion. If the same clay is used as a backfill against a retaining wall, upto a height of 8meters, calculate (i) total active earth pressure (ii) total passive earth pressure and their point of application. Assume that the wall yields far enough to allow Rankine deformation conditions to establish. (12)

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

OR

b) A retaining wall of smooth vertical back face of 4m height supports a level backfill of sand of unit weight 15kN/m^3 and angle of shearing resistance of 32° . Determine the total lateral active pressure per meter length of the wall, if the angle of critical failure surface is 29° to the vertical using Culmann's graphical construction. Compare the results with Rankine's method. (16)
