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B.E./B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2011

CIVIL ENGINEERING BRANCH

FIFTH SEMESTER

(1)

CE373 - FOUNDATION ENGINEERING

(REGULATIONS 2004)

Time : 3 hr Max Mark: 100

Instructions: 1. Use of IS:6403 (1981) code is not permitted

Answer ALL Questions

Part - A (10 × 2 = 20 Marks)

1. Differentiate disturbed and undisturbed samples.
2. What is bore log?
3. How do you decide the depth of foundation?
4. What are different modes of failure of shallow foundations?
5. When do you provide strap footing?
6. Draw the contact pressure distribution diagram below flexible footings resting on clay and sand.
7. List various types of pile foundations.
8. State two examples where negative skin friction would develop?
9. What are different states in which a soil mass can exist?
10. What is the effect of tension crack on lateral earth pressure?

Part -B (5 × 16 = 80 Marks)

11. a(i) Discuss in detail the selection of depth and spacing of bore holes. (8)

a(ii) Explain the operating principle of Piston Sampler. State its advantages over other samplers. (8)

12. a. Calculate the net ultimate bearing capacity of a rectangular footing 1.8m×3.6m in plan founded at a depth of 1.6m below the ground surface. The load on the footing acts at an angle of 16° to the vertical and is eccentric in the direction of width by 15cm. The unit weight of the soil is 18kN/m^3. The rate of loading is slow and hence the effective shear strength parameters can be used in the analysis, having c'= 15kN/m^2 and ϕ'=30°. Natural water table is at a depth of 2m below the ground surface. Use IS code method. For ϕ'=30°, N_c=30.1; N_q=18.38 and N_γ=22.4. (16)

or

b. A plate load test was carried out on a ground having a uniform sand stratum up to sufficient depth. The size of the plate used was 30cm×30cm.

Load (kN)	4.5	9	18	27	36	45	54
Settlement (mm)	0.75	1.25	2.0	3.5	5.38	7.75	10.75

Determine the bearing capacity and load that can be taken by a column footing of size 1.2m×1.2m in this soil, for an allowable settlement of 2cm. (16)

13. a. Proportion a rectangular combined footing for a uniform pressure under dead load plus reduced live load, with the following data:

Allowable soil pressure: for DL+reduced LL=180kN/m^2; for DL+LL = 270kN/m^2

Column loads	Column 1	Column 2
DL	500 kN	600 kN
LL	450 kN	800 kN

c/c distance of columns is 5m, Projection beyond column 1 not to exceed 0.5m. (16)

or

b(i) Explain the conventional method of design of raft foundation. (10)

b(ii) Discuss the principle behind the design of floating foundation. (6)

14. a(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)

a(ii) 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 soil is 15kN/m^3. Compute the negative skin friction of the group. (10)

or

b. Design a friction pile group to carry a load of 3000kN including the weight of the pile cap at a site where the soil is uniform clay to a depth of 20m underlain by rock. Average unconfined compressive strength of the clay is 70kN/m^2. The clay may be assumed to be of normal sensitivity and normally loaded with liquid limit 60%. A factor of safety of 3 is required against shear failure. (16)

15. a. 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. (16)

or

b(i) The backfill behind a retaining wall above the water table consists of sand of unit weight 17kN/m^3 having angle of shearing resistance of 37°. The height of the wall is 6m and the surface of the backfill is horizontal. Determine the total active thrust on the wall according to Rankine's theory. If the wall is prevented from yielding, what is the approximate value of the thrust on the wall? (10)

b(ii) Establish an equation to show the safety of a retaining wall against sliding. (6)

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