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Question Paper Code : 98012

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

Fifth Semester

Civil Engineering

080100029 — FOUNDATION ENGINEERING

(Regulations 2008)

Time : Three hours Maximum : 100 marks

(Use of any IS code is not permitted)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the factors affecting quality of samples?

2. What is the criterion to decide the spacing of bore holes?

3. How is the depth of foundation decided?

4. How would you estimate the immediate settlements of foundations on clay?

5. Differentiate shallow foundation from deep foundations.

6. Under what circumstances mat foundations are used.

7. List the soil properties and field factors that initiate negative skin friction.

8. What are the beneficial effects induced by a pair of under-reams in a pile?

9. State the assumptions made in Rankine's theory of earth pressures.

10. Make an estimate of lateral earth pressure coefficient on a basement wall supports soil to a depth of 2 m. Unit weight and angle of shearing resistance of retained soil are 16 kN/m^3 and 32° respectively.

PART B — (5 × 16 = 80 marks)

11. (a) Explain with neat sketches the open excavations and boring methods of exploration of soil.

Or

(b) Explain with neat sketches of any three types of samplers.

12. (a) (i) Distinguish between "local shear failure" and "general shear failure" in relation to design of foundations in sands. Where would you expect each of them to occur? What corrections you would incorporate in Terzaghi's bearing capacity equation to work out bearing capacity when foundation does not fail by general shear but fails by local shear? (8)

(ii) A loading test was conducted with a 300mm square plate at a depth of 1 m below the ground surface in a pure clay deposit. The water table is located at a depth of 4m below the ground level. Failure occurred at a load of 45kN. What is the safe bearing capacity of a 1.5m wide strip footing at 1.5m depth in the same soil? Assume $\gamma = 18kN/m^3$ above the water table and a factor of safety of 2.5. (8)

Or

(b) (i) Compute the safe bearing capacity of a square footing 1.5m × 1.5m, located at a depth of lm below the ground level in a soil of average unit weight 20kN/m³. $\phi = 20°$, $N_C = 17.7$, $N_q = 7.4$, and $N_\gamma = 5.0$. Assume a suitable factor of safety and that the water table is very deep. Also compute the reduction in safe bearing capacity of the footing if the water table rises to the ground level. (8)

(ii) Two load tests were performed at a site-one with a 50 cm square plate and the other with a 75 cm square plate. For a settlement of 15 mm, the loads were recorded as 50 kN and 90 kN, respectively in the two tests. Determine the allowable bearing pressure of the sand and the load which a square footing, 1.5m size; can carry with the settlement not exceeding 25 mm. (8)

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

Allowable soil pressures : 180 kN/m² for DL + reduced LL; 270 kN/m² for DL + LL;

	Column A	Column B
Dead Load (DL)	500 kN	660 kN
Live Load (LL)	400 kN	840 kN

Distance c/c of columns = 5 m; Projection beyond Column A is not to exceed 0.5 m. (16)

Or

(b) (i) Discuss the concept of floating foundation. (6)

(ii) Explain in detail about the foundations on expansive soil. (10)

14. (a) Design a pile group to carry 300kN at place where the soil is of uniform clay to a depth of 18m, underlain by hard rock. The unconfined compressive strength (average) of the clay is 65kN/m², Adopt a factor of safety of 3 against shear failure. Assume suitable data if found necessary.

Or

(b) The following data was obtained in a pile load test on a 350mm diameter pile. Compute the allowable load as per IS code.

Load – kN	20	40	80	120	160	200	240	280	320	360
Settlement – mm	0.60	1.0	2.3	4.0	6.50	9.5	14.5	22.3	32.0	50.0

15. (a) (i) A 6 m high retaining wall is to support a soil with $\gamma = 18\,kN/m^3$, $\phi = 26°$, c = 15 kN/m². Determine the Rankine active force per unit length of the wall both before and after the tensile crack occurs, and determine the line of action of the resultant in both cases. (8)

(ii) Describe the Coulomb's wedge theory for determining active earth pressure indicating the various assumptions made. (8)

Or

(b) (i) Describe Culmann's graphical method of finding earth pressure. (10)

(ii) Discuss briefly the procedure to check the stability of retaining wall. (6)

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