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Reg. No.

Question Paper Code

11888

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2023

Fifth Semester

Civil Engineering

20CEPC501 - FOUNDATION ENGINEERING

(Regulations 2020)

Duration: 3 Hours

Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

- | | <i>Marks,</i>
<i>K-Level, CO</i> |
|---|-------------------------------------|
| 1. List the various types of boring. | 2,K1,CO1 |
| 2. Describe about standard penetration number. | 2,K1,CO1 |
| 3. Differentiate between local shear failure and general shear failure. | 2,K2,CO2 |
| 4. What are the assumptions made in Terzaghi's bearing capacity analysis? | 2,K1,CO2 |
| 5. Where can be the raft or mat foundation adopted? | 2,K1,CO4 |
| 6. State the requirement of a good foundation. | 2,K1,CO4 |
| 7. Define negative skin friction. | 2,K1,CO5 |
| 8. What are the general forms of deep foundation? | 2,K1,CO5 |
| 9. Summarize coefficient of earth pressure. | 2,K2,CO6 |
| 10. Enumerate the assumptions made in Rankine's theory. | 2,K1,CO6 |

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11. a) Illustrate with neat sketch about the geophysical method of soil exploration. 13,K1,CO1
- OR**
- b) Discuss the various factors affecting quality of samples. Explain any two types of soil samplers with neat sketches. 13,K2,CO1
12. a) A strip footing 2m wide carries a load intensity of 400 kN/m² at a depth of 1.2m in sand. The saturated unit weight of sand is 19.5 kN/m³ and unit weight above water table is 16.8 kN/m³. The shear strength parameters are C=0 and $\Phi = 35^\circ$. Determine the factor of safety with respect to shear failure for the following cases of location of water table :
- (a) Water table is 4m below G.L. 13,K3,CO2
- (b) Water table is 1.2 m below G.L.

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

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(c) Water table is 2.5m below G.L.

(d) Water table is 0.5 m below G.L.
Water table is G.L itself.

OR

- b) A square footing for a column is 2.5m x 2.5m and carries a load of 2000kN. Find the factor of safety against bearing capacity failure, if the soil has the following properties, $C = 50\text{kN/m}$, $\gamma = 17.6\text{kN/m}^3$. Angle of internal friction = 15. $N'c = 12.5$, $N'q = 4.5$, $N'\gamma = 2.5$. The foundation is taken to a depth of 1.5m. 13,K3,CO2

13. a) Briefly discuss about the various types of footing with neat sketch. 13,K2,CO4

OR

- b) Design a strap footing for the two columns of size 0.4 x 0.4 m carrying a load of 600 and 1000kN. The allowable soil pressure is 100 kN/m². Take eccentricity of the footing of column carrying 600kN as 1m. The columns are spaced at 6 m c/c. 13,K3,CO4

14. a) Explain the following,

(i) Uplift capacity of pile 7,K2,CO5

(ii) Construction of under-reamed piles 6,K2,CO5

OR

- b) Design a friction pile group to carry a load of 3000 kN 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/m². The clay may be assumed to be normal sensitivity and normally loaded, with liquid limit 60%. A factor of safety of 3 is required against shear failure. 13,K3,CO5

15. a) Explain the procedure to determine the active earth pressure using Culmann's graphical methods. 13,K2,CO6

OR

- b) A retaining wall with a smooth vertical back is 10m high and retains a two layer sand backfill with the following properties: 13,K3,CO6
0 - 5 m depth: $\phi = 30^\circ$, $\gamma = 18\text{kN/m}^3$
Below 5 m : $\phi = 34^\circ$, $\gamma = 20\text{kN/m}^3$
Show the active earth pressure distribution assuming the water table is well below the base of wall.

PART - C (1 × 15 = 15 Marks)

16. a) The load settlement curve data from a plate load test on a sandy soil areas under : *15,K3,CO3*

Load,t/m ²	10	20	30	40	50	60	70	80
Settlement,mm	4.5	10	15.5	22	29	38.5	50	64

The size of the plate used was 0.3mx0.3m. Find the size of the square column footing to carry an load of 250t with a maximum settlement of 25mm.

OR

- b) Explain the plate load test to determine the bearing capacity of soil. *15,K2,CO3*