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B. E / B. TECH.DEGREE EXAMINATION, MAY 2023

Fifth Semester

CE18501 – APPLIED GEOTECHNICAL ENGINEERING*(Civil Engineering)***(Regulation 2018)****TIME:3 HOURS****MAX. MARKS: 100**

- CO 1** Describe the various site investigation procedures to select geotechnical design parameters and type of foundation.
- CO 2** Design shallow foundations, its component or process as per the needs and specifications
- CO 3** Design combined footings and raft foundations, its component or process as per the needs and specifications
- CO 4** Design deep foundations, its component or process as per the needs and specifications
- CO 5** Design retaining walls, its component or process as per the needs and specifications

PART- A(10x2=20Marks)

(Answer all Questions)

	CO	RBT LEVEL
1. Write the different types of samplers.	1	2
2. How do you decide the depth of exploration? List the factors you will consider.	1	2
3. Sketch the pressure distribution beneath a flexible footing on cohesive and cohesionless soil.	2	2
4. Differentiate general shear failure and local shear failure.	2	2
5. Indicate the circumstances under which strap footing is adopted.	3	2
6. What is ultimate bearing capacity?	3	2
7. State Feld's rule for determining group capacity of pile groups.	4	2
8. What is under reamed piles? When it is preferred?	4	2
9. What is active earth pressure?	5	2
10. List out the different types of retaining wall.	5	2

PART- B (5x 14=70Marks)

	Marks	C O	RBT LEVEL
11. (a) Explain in detail about the geophysical method of site exploration with neat sketch.	(14)	1	3
(OR)			
(b) Explain in detail about the salient features of bore log report.	(14)	1	3

12. (a) A strip footing having width 2 m is laid at a depth 1.5 m below G.L. The soil properties are $\gamma = 18 \text{ kN/m}^3$, $\phi = 30^\circ$ and $C = 20 \text{ kPa}$. For $\phi = 30^\circ$, take $N_c = 37.2$, $N_q = 22.5$, $N_r = 19.7$. The Water table is at depth 3 m below the base of the footing. F.O.S = 3

Determine i) Ultimate Bearing Capacity

ii) Net Ultimate Bearing Capacity

iii) Safe Bearing Capacity

iv) Net Safe Bearing Capacity

v) Safe Load applied on the footing

(OR)

- (b) Compute the safe bearing capacity of a square footing 1.5 m X 1.5 m located at a depth of 1 m below the ground level in a soil of average density 20 kN/m^3 , $\phi = 20^\circ$ and $c = 0$. For $\phi = 20^\circ$, take $N_c = 17.7$, $N_q = 7.4$ and $N_\gamma = 5$. Assume a suitable factor of safety when 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.

13. (a) Explain the design procedure of Trapezoidal combined footing with the suitable sketch.

(OR)

- (b) What is meant by floating foundation? List their types and explain the problems that are encountered during executions. Also brief how they are managed?

14. (a) Discuss in detail about the method of estimating the individual and group capacity of piles.

(OR)

- (b) (i) What is meant by under reamed pile. When and where they are used and why? Discuss.

- (ii) Explain about the different methods of pile driving

15. (a) A retaining wall with a smooth vertical back retains sand backfill for the depth of 8 m. The backfill has horizontal surface and has the properties of $c = 0$, $\Phi = 28^\circ$, $\gamma_{\text{bulk}} = 18 \text{ kN/m}^3$, $\gamma_{\text{sat}} = 20 \text{ kN/m}^3$. Calculate the active thrust and its point of application on the wall. Take the water table is at 5 m from the ground surface. Also determine the change in the total active thrust if the water table rises to 3 m from ground level.

(OR)

- (b) A retaining wall is 5 m high. Its back is vertical and it has got sandy backfill up to its top. The top fill is horizontal and carries a uniform surcharge of 80 kN/m². Determine the active earth pressure on the wall per meter length of the wall. Water table is 1.5 m below the top of the fill. $\gamma_{\text{sat}} = 18.5 \text{ kN/m}^3$. Moisture content above water table is 13%, $\Phi = 30^\circ$, $G=2.6$ and $n=30\%$. The wall friction may be neglected. (14) 5 4

PART- C (1x 10=10 Marks)

(Q.No.16 is compulsory)

- | | Marks | CO | RBT
LEVEL |
|---|-------|----|--------------|
| 16. How Standard penetration test is conducted in the field to determine the properties of the subsurface soil? Also discuss the corrections to be applied for field 'N' Value. | (10) | 1 | 4 |
