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**Question Paper Code: 31512**

B.E. / B.Tech. DEGREE EXAMINATION, NOVEMBER 2015

Fifth Semester

Civil Engineering

01UCE502 – FOUNDATION ENGINEERING

(Regulation 2013)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. What is significant depth of exploration?
2. What is a representative sample?
3. What are the disadvantages of plate load test?
4. What is tolerable settlement?
5. State the situations under which the raft foundation is adopted.
6. Sketch the contact pressure distribution for a rigid footing on clay and sand.
7. What are the differences between working pile and test pile?
8. How is the efficiency of pile group calculated?
9. The active earth pressure coefficient is equal to the passive earth pressure for a soil. Find its angle of internal friction.
10. What is unsupported vertical height in cohesive soil?

PART - B (5 x 16 = 80 Marks)

11. (a) Explain wash boring method with neat sketch. Also explain how depth of boring and spacing of borehole is decided. (16)

Or

- (b) Explain with sketch how standard penetration test is conducted. Also explain the corrections to be carried out to the observed  $N$  value. (16)
12. (a) Determine the depth at which a circular footing of 2 m diameter be founded to provide a factor of safety of 3. The footing has to carry a safe load of 1600 kN. The foundation soil has  $C = 10 \text{ kN/m}^2$ ;  $\phi = 30^\circ$  and unit weight  $\gamma = 18 \text{ kN/m}^3$ . Use Terzaghi's analysis. Take  $N_c = 28$ ;  $N_q = 12$ ;  $N_\gamma = 10$ . (16)

Or

- (b) A clayey layer of 2.5 m thick is sandwiched between sandy layers at 12 m below the ground level. Determine the consolidation settlement of footing 1.8 x 1.8 m at 1.8 m below ground level carrying 700 kN load. Unit weights of sand and clay are  $18 \text{ kN/m}^3$  and  $21 \text{ kN/m}^3$  respectively. Moisture content and liquid limit of clay are 35% and 48% respectively. Water table is at the top of clay layer and is 12 m below the ground level. (16)
13. (a) Explain the different types of mat foundation with neat sketches. (16)

Or

- (b) Proportionate a trapezoidal combined footing for the data given below:  
Load on column A = 850kN  
Load on column B = 1500kN  
C/C of columns = 5.50m  
Allowable bearing capacity =  $225 \text{ kN/m}^2$ . Both the columns lie on property line. (16)
14. (a) A 200 mm diameter, 8 m long piles are used as foundation for column in a uniform deposit of medium clay ( $q_u = 100 \text{ kN/m}^2$ ). The spacing between the piles is 500 mm. There are 9 piles in the ground arranged in a square pattern. Calculate the ultimate pile load capacity of the group. Assume adhesion factor = 0.9. (16)

Or

- (b) A 3 x 3 pile group made of 300 mm diameter, 15 m long piles driven through loose cohesive stratum. Determine the negative skin friction from the following data:

Safe load on pile	:	200 kN	
Spacing of piles	:	900 mm c-c	
Cohesive strength of soil	:	18 kN/m <sup>2</sup>	(16)

15. (a) Derive the expression for active earth pressure for cohesive backfill. Also draw the pressure distribution diagram and explain the salient features. (16)

Or

- (b) A smooth vertical wall of height 4 m, retains a cohesion less backfill with an angle of internal friction of 30°, void ratio of 0.62 and specific gravity of solids is 2.7. Draw the active earth pressure distribution diagram if the soil is (a) dry (b) saturated (c) submerged. (16)

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