

B.E/B.TECH Degree Examination, December 2020

Fifth Semester

CE18501- Applied Geotechnical Engineering

(Regulation 2018)

Time: Three hours

Maximum : 80 Marks

Answer **ALL** questions**PART A - (8 X 2 = 16 marks)**

1. _____ penetration of sampler is called as SPT value
 - a) 450 mm
 - b) First 150 mm
 - c) First 300 mm
 - d) Last 300 mm
2. Which of the following is not correct on “General Shear Failure”?
 - a) Ultimate bearing capacity is well defined
 - b) Failure along with tilting of footing
 - c) There is No Bulging around footing
 - d) None of the above
3. Under which circumstance, strap footing is provided?
 - a) $x' = L/3$
 - b) $x' < L/3$
 - c) $x' > L/3$
 - d) None of the above
4. The ratio of coefficient of passive earth pressure to that of active earth pressure as 9 for a soil. Find the angle of internal friction?
 - a) 15°
 - b) 30°
 - c) 45°
 - d) 60°
5. Find the area ratio for the split barrel soil sampler of outer diameter 51 mm and inner diameter 35 mm. Comment on nature of soil sample.
6. The settlement of plate size 300 mm on sand for a particular loading intensity is 12.8 mm. Find the settlement of foundation of size 1.5 m on the same sand for the same loading intensity.
7. Draw the pressure distribution diagram beneath a rigid footing for cohesionless soil.
8. What are the methods available to determine load carrying capacity of pile?

PART B - (4 X16 = 64 marks)

09. (a) Describe the salient feature of a good sub soil investigation report. (16)

(OR)

- (b) Describe the principle and procedure of conducting subsoil exploration study using seismic refraction method. (16)
10. (a) A rectangular footing has a size of 1.8 m x 3 m has to transmit the load of a column at a depth of 1.5 m. Calculate the safe load which the footing can carry at a FOS of 3 against shear failure. Use IS Code method. Take $n = 40\%$, $G_s = 2.67$, $w = 15\%$, $c = 8 \text{ kN/m}^3$, $\phi = 32.5^\circ$, $N_c = 38.13$, $N_q = 25.85$, $N_\gamma = 35.21$. (16)

(OR)

- (b) A strip footing of 2 m wide carries a load intensity of 350 kN/m^2 at a depth of 1.3 m in sand. The saturated unit weight of sand is 20 kN/m^3 & unit weight above water table is 17 kN/m^3 . The shear strength parameters are $c = 10 \text{ kN/m}^2$ & $\phi = 35^\circ$. (Use Terzaghi's Equation) ($N_c = 57.8$, $N_q = 41.4$, $N_\gamma = 42.4$) Determine the ultimate bearing capacity if the water table is at 1m, 1.3m and 2.5m below the ground level. (16)
11. (a) Two adjacent columns are to be supported by a trapezoidal combined footing. The heavier column carries a load of 5000 kN and size of 500 mm x 500 mm. The lighter column carries a load of 3500 kN with a size of 350 mm x 350 mm. The columns are spaced 5.3 m c/c. Take allowable bearing capacity as 320 kN/m^2 . Assume the heavier column is on the property line. Proportion a suitable foundation. (16)

(OR)

- (b) A group of 16 piles was driven into soft clay extending to a large depth. The diameter and length of the piles were 50 cm and 9 m. unconfined compression strength of 30 kN/m^2 and pile spacing of 1 m center to center. Consider both the tip bearing and friction resistance of the pile. Determine the ultimate load capacity of the group. Take Adhesion factor = 0.6 and $N_c = 9$. (16)
12. (a) Describe the step by step procedure of Culmann's graphical method to determine the active earth pressure with neat sketch. (16)

(OR)

- (b) A retaining wall 4 m height has a smooth vertical back. There is uniformly distributed surcharge load of 36 kPa intensity over the backfill. The unit weight of backfill is 18 kN/m^3 , $c = 0$ & $\phi = 30^\circ$. Determine the magnitude and point of application of active pressure per meter length of the wall. If the water table rises behind the wall to an elevation 1.5 m below the top, determine the total active thrust and resultant point of application. Take submerged unit weight of sand as 12 kN/m^3 . Assume that there is no change in the angle of shearing resistance due to submergence. (16)

