

Code No: **R41011**

# R10

# Set No. 1

IV B.Tech I Semester Supplementary Examinations, March - 2017

## GEOTECHNICAL ENGINEERING – II

**(Civil Engineering)**

**Time: 3 hours****Max. Marks: 75**

**Answer any FIVE Questions**  
**All Questions carry equal marks**

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- 1 a) What do you understand by disturbed and undisturbed soil samples? Explain the salient features of soil investigation report. [8]  
b) Describe the pressuremeter test conducted in soil exploration. [7]
- 2 a) Discuss the different types of slope failures and factor of safeties used in the slope stability analysis. [8]  
b) Stability analysis by the method of slices for 1:1 slope on the critical slip gave the following results: Sum of tangential forces = 150 kN; Sum of normal forces = 320 kN; Sum of neutral forces = 50 kN; Length of failure surface = 18 m; Angle of shearing resistance =  $15^\circ$ ; Effective cohesion =  $20 \text{ kN/m}^2$ . Calculate the factor of safety with respect to the shear strength. [7]
- 3 a) Critically explain the theories of earth pressures due to Rankine and Coulomb and indicate the fundamental assumptions in each theory. [7]  
b) A retaining wall 5 m high retains sand. In the loose state the sand has a void ratio of 0.63 and  $\phi = 30^\circ$ , while in the dense state, the corresponding values of void ratio and  $\phi$  are 0.36 and  $45^\circ$ . Estimate the passive earth pressure in the two cases, assuming  $G = 2.67$ . [7]
- 4 a) Explain the design approach of cantilever retaining wall. [8]  
b) A masonry retaining wall of trapezoidal with the vertical face on the earth side is 1.5 m wide at the top and 3.5 m wide at the base and is 6 m high. It retains a horizontal sand back fill with  $\phi = 30^\circ$ . The unit weight of sand is  $19 \text{ kN/m}^3$ . Check the safety of the wall against overturning and sliding. The unit weight of masonry is  $22 \text{ kN/m}^3$ . [7]

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- 5 a) Derive the Terzaghi's bearing capacity equation under strip footing. [8]  
b) A square footing is to be designed to carry a column load of 500 kN. If the depth of the foundation is 1.5 m, determine the suitable size of foundation with a factor of safety of 3. The water table is at foundation level. Take bulk unit weight as  $18 \text{ kN/m}^3$  and saturated unit weight as  $21 \text{ kN/m}^3$ . The angle of internal friction is  $25^\circ$ . Terzaghi's bearing capacity factors are  $N_c = 14.8$  ;  $N_q = 5.6$  and  $N_\gamma = 3.2$ . [7]
- 6 a) Explain the allowable bearing pressure and allowable settlements of shallow foundations. [7]  
b) Discuss the methods for the estimation of safe bearing pressure based of Standard Penetration number. [8]
- 7 a) How do you estimate the load carrying capacity of a single pile foundation in cohesionless and cohesive soils? [8]  
b) A group of 9 piles with 3 piles in a row were driven into soft clay. The diameter and length of the piles were 300 mm and 10 m respectively. The unconfined compressive strength of the clay is  $70 \text{ kN/m}^2$  and adhesion factor is 0.85. If the piles are placed at 0.9 m centre to centre spacing, compute the pile group capacity. [7]
- 8 a) Discuss the various forces acting on a well foundation. [8]  
b) What are the different shapes of well foundation and what are their comparative merits and demerits. [7]