

**B.Tech.**  
**(SEM VI) THEORY EXAMINATION 2018-19**  
**FOUNDATION DESIGN**

**Time: 3 Hours****Total Marks: 70****Note: 1.** Attempt all Sections. If you require any missing data, choose suitably.

**SECTION A**

**1. Attempt all questions in brief. 2 x 7 = 14**

- a. Justify the statement “the seismic refraction method is better than the seismic reflection method”.
- b. Classify the pile according to their mode of transfer of loads.
- c. Define negative skin friction.
- d. List the different types of shallow foundation settlements
- e. Define differential settlement.
- f. Discuss in short double reamed pile.
- g. State the term Local Shear failure.

**SECTION B**

**2. Attempt any three of the following: 7 x 3 = 21**

- a. Discuss the different methods used for boring holes. Explain CPT test.
- b. A Square footing 1.8 m x 1.8 m is placed over loose sand of density 1.6 g/cm<sup>3</sup> and at depth of 0.8m, the angle of shearing resistance is 30°,  $N_c = 10.14$ ,  $N_q = 18.4$  and  $N_\gamma = 15.1$ . Calculate the total load that can be carried by the footing.
- c. A group of nine piles, 13m long and 250mm in diameter, is to be arranged in a square form in a clay soil with an average unconfined compressive strength of 80 kN/m<sup>2</sup>. Work out the Centre to Centre spacing of the piles for a group efficiency factor of 1. Neglect bearing at the tip of the piles. ( $\alpha = 0.9$ )
- d. Explain the measures for rectification of tilts and shifts in Well foundation.
- e. Discuss the properties and use of reinforced soil.

**SECTION C**

**3. Attempt any one part of the following: 7 x 1 = 7**

- (a) Describe the SPT test. List the corrections used in SPT test and its need.
- (b) Describe Site investigation and stages in sub surface exploration.

**4. Attempt any *one* part of the following:** **7 x 1 = 7**

- (a) Explain the different components of settlement of shallow foundations. Write the equation involved in finding immediate settlement of cohesive soils.
- (b) A square footing 2 m x 2 m, is founded on a depth of 1.2 m below the surface of a deep stratum of soft saturated clay having unit weight of 19.5 kN/m<sup>3</sup>.

The soil has undrained parameters as  $\phi_u = 0^\circ$  and  $c_u = 25 \text{ kN/m}^3$  ( $N_c = 5.7$ ,  $N_q = 1$  and  $N_y = 0$ ) and consolidated undrained parameters (triaxial test) as  $\phi' = 22.5^\circ$  and  $c' = 0$  ( $N_c = 21.4$ ,  $N_q = 10.1$  and  $N_y = 7.3$ ).

Determine the ultimate bearing capacity of the foundation, (i) immediately after the construction, and (ii) few years after construction.

**5. Attempt any *one* part of the following:** **7 x 1 = 7**

- (a) Discuss the Principles of design of Footings.
- (b) In a 16 pile group, the pile diameter is 45 cm and Centre to Centre spacing of the square group is 1.5 m. If  $c = 50 \text{ kN/m}^2$ , determine whether the failure would occur with pile acting individually, or as a group? Neglect bearing at the tip of the pile. All piles are 10 m long. Take  $m=0.7$  for shear mobilized around each pile. Assume data required, if any.

**6. Attempt any *one* part of the following:** **7 x 1 = 7**

- (a) Elaborate the different shapes and components of well foundation.
- (b) Differentiate between a sheet pile and a retaining wall. List the uses of sheet piles.

**7. Attempt any *one* part of the following:** **7 x 1 = 7**

- (a) Discuss the shallow foundation on soil with reinforcement and its design consideration.
- (b) Describe elastic models of soil behavior.