

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/cm³ 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/m². 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/m³.

The soil has undrained parameters as $\phi_u = 0^\circ$ and $c_u = 25$ kN/m³ ($N_c = 5.7$, $N_q = 1$ 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 $c = 50$ kN/m², 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.