

**B.TECH**  
**(SEM VIII) THEORY EXAMINATION 2018-19**  
**ADVANCED FOUNDATION DESIGN**

Time: 3 Hours

Total Marks: 100

**Note: 1.** Attempt all Sections. If require any missing data; then choose suitably.

**SECTION A**

- 1. Attempt all questions in brief. 2 x 10 = 20**
- a. Define soil resistivity.
  - b. What do you understand by soil investigations?
  - c. Define shallow foundation .
  - d. Define Hansen's bearing capacity equations with usual notations.
  - e. What do you understand by consolidation settlements in cohesive soils?
  - f. What do you understand by bearing capacity of soil?
  - g. What are expansive soils?
  - h. Define under reamed piles.
  - i. Define method of slice.
  - j. Which load taken in machine foundation?

**SECTION B**

- 2. Attempt any three of the following: 10x3=30**
- a. What are the purpose of site investigation? Define stages in sub-surface exploration.
  - b. A normally consolidated clay stratum of 3 m thickness has two permeable layers at its top and bottom. The liquid limit and the initial void ratio of the clay are 36% and 0.82% respectively, while the initial overburden pressure at the middle of clay layer is  $2\text{kg/cm}^2$  . Due to the construction of a new building this pressure increases by  $1.5\text{ kg/cm}^2$ . Compute the probable consolidation settlement of the building.
  - c. A smooth RCC pile of 40 cm diameter and an angle of internal friction of  $25^\circ$ . Determine the safe load which can be carried by the pile. Given for 15 m length is driven into a deep stratum of dry, loose sand having a unit weight of  $1.6\text{ }\varphi=25^\circ$ , Vesic's bearing capacity factor  $N_q=5.3$
  - d. What do you understand by expansive soil? What are condition of the alteration of soil ?
  - e. Derive an expression for the factor of safety of an infinite slope in a cohesion lees soil.

**SECTION C**

- 3. Attempt any one part of the following: 10x1=10**
- a. A long strip footing width 2 m carries a load of  $400\text{kN/m}$ . Calculate the maximum stress at a depth of 5 m below the center line of footing. Compare the result with 2:1 distribution method.
  - b. Describe various methods of drilling holes for sub-surface investigations.

**4. Attempt any one part of the following:****10x1=10**

- a. A square footing of 2mx2m size is subjected to a gross vertical load of 180 t. The depth of foundation is 1 m . The foundation soil consists of a deposit of dense having a bulk density of  $1.85 \text{ t/m}^3$  and an angle of internal friction of  $36^\circ$ . Determine the factor of safety against shear failure.
- b. Discuss the effects of water table on the bearing capacity of the soils.

**5. Attempt any one part of the following:****10x1=10**

- a. Discuss the various types of piles which are used in the construction work, on the basis of their structural characteristics with their advantages and disadvantages.
- b. An RCC pile of 18 m overall length is driven into a deep stratum of soft clay having an unconfined compressive strength of  $3.5 \text{ t/m}^2$ . The diameter of pile is 30 cm. determine the safe load that can be carried by the pile with a factor of safety of 3.0

**6. Attempt any one part of the following:****10x1=10**

- a. Find out the expression for finding the capacity of piles for single bulb and double bulb under reamed piles.
- b. Determine the natural frequency of a machine foundations having a base area  $2\text{m} \times 2\text{m}$  and a mass of 15 kg , including the mass of machine , taking  $C_u = 4 \times 10^4 \text{ kN/m}^3$ .

**7. Attempt any one part of the following:****10x1=10**

- a. A slope of sandy soil extending to great extent is inclined at  $20^\circ$  to be horizontal. Determine the factor of safety (i) the slope is dry (ii) seepage occurs parallel to slope . The angle of shearing resistance of sand is  $30^\circ$  and the saturated unit weight is  $19.7 \text{ kN/m}^3$ .
- b. Define force transmissibility . Find out expression for ratio of the force transmitted to the applied force.