

**B.Tech. Civil (Construction Management) /  
B.Tech. Civil (Water Resources Engineering)**

**Term-End Examination**

**June, 2017**

00445

**ET-501(B) : FOUNDATION ENGINEERING**

*Time : 3 hours*

*Maximum Marks : 70*

**Note :** Attempt any **five** questions. All questions carry equal marks. Assume any missing data, if not given. Use of calculator is allowed.

1. (a) What are samplers ? Draw the diagram of a typical sampler and define the following along with their limits recommended by IS-Code : 10
- (i) Area Ratio
  - (ii) Inside Clearance
  - (iii) Outside Clearance
  - (iv) Recovery Ratio
- (b) Differentiate between Representative and Non-representative samples. 4

2. The foundation for a circular tank is to be of diameter 18 m and founded at a depth of 2.5 m. The soil properties are :  $c' = 0$ ;  $\phi = 34^\circ$ ,  $\gamma = 19 \text{ kN/m}^3$ .

Determine the ultimate bearing capacity when ground water table is

- (i) 2.0 m below foundation
- (ii) at the base of foundation
- (iii) at 1 m below the ground surface.

Use correction factors to consider the effect of the water table. Use Terzaghi's equation.

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3. Design a footing such that the base pressure is approximately uniform under the footing for the data given below :

Dead load = 400 kN; Live Load = 500 kN;  
Moment = 450 kN-m; Allowable bearing capacity of soil = 150 kPa; Column size = 500 mm  $\times$  500 mm; Grade of concrete = M 20; Grade of Steel = Fe 415.

14

4. (a) Explain the method of controlling settlements. 7
- (b) Name different types of settlements. How do you determine the immediate settlement on a sandy soil ? 7

5. A retaining wall with a smooth vertical back retains a two layered dry cohesionless backfill with the following properties :

$$0 - 4 \text{ m}; c = 0, \phi = 30^\circ; \gamma = 17 \text{ kN/m}^3$$

$$4 \text{ m} - 8 \text{ m}; c = 0, \phi = 34^\circ; \gamma = 20 \text{ kN/m}^3.$$

Determine the total lateral earth force acting on the wall and its line of action.

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6. Describe various foundations for problematic soils, with neat sketches.

14

7. Explain two dynamic formulae, along with coefficients associated to them.

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8. Write short notes on the following :

$$4 \times 3 \frac{1}{2} = 14$$

(a) Identification of Swelling Soils

(b) Types of Machine Foundations

(c) Soil Pressure under an Eccentrically Loaded Footing

(d) Backfill Drainage

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