

**BT-5 / D-19**  
**GEOTECHNOLOGY-I**  
**(CE-307-E)**

Time allowed : 3 hours]

[Maximum marks : 100

*Note:- Attempt any five questions selecting at least one from each unit. Suitably assume missing data if any. All questions carry equal marks.*

**Unit-I**

1. What is subsurface drainage of soils? What are its uses? What are different methods of subsurface drainage? Discuss any two methods in detail. 20
2. (a) Discuss standard penetration test. What are the various corrections? What is the importance of test in geotechnical engineering? 10
- (b) Describe the salient features of a good sub-soil investigation report. 10

**Unit-II**

3. (a) What are the common modes of bearing capacity failure of a footing? Briefly describe with sketches. 5
- (b) State the limitations of terzaghi's theory in predicating the bearing capacity of a shallow footing on a cohesive deposit. 10
- (c) State Skempton's bearing capacity equation for a shallow footing. Explain the notations used in the equation. 05

4. Determine the safe load on a circular footing having a diameter of 3.0 m placed at 1.0 m below GL. The subsoil consists of a deep stratum of normally consolidated clay, having a unit weight of  $18.3 \text{ kN/m}^3$  and unconfined compressive strength of 60 kPa. Use (a) Terzaghi equation (b) Skempton's equation. 20

**Unit-III**

5. (a) Under what conditions negative skin friction develop? How would you compute the axial load-carrying capacity of a pile-subjected to negative friction? 10
- (b) A bored concrete pile of 25 m length and 550 mm diameter is installed in a deep stratum of soft clay having the following properties:  
 $\gamma_{\text{sat}} = 18.2 \text{ kN/m}^3$ ,  $q_u = 36 \text{ kPa}$ ,  $\alpha = 0.9$   
 Determine the ultimate load carrying capacity of the pile. Assume that the GWT is at the ground level. 10
6. (a) What are the conditions where a pile foundation is more suitable than a shallow foundation? 05
- (b) How would you estimate the load carrying capacity of a pile in (a) cohesion less soils, (b) cohesive soils? 15

**Unit-IV**

7. What is the basic difference between a drilled pier and a caissons? Describe various methods for the construction of drilled piers. 20
8. (a) What do you understand by grip length? What is its importance in well foundations? 05
- (b) Describe the procedure for construction of wells. Discuss the causes and remedies for tilts and shifts. 15