B.Tech. Civil (Construction Management) / B.Tech. Civil (Water Resources Engineering)
Term-End Examination
00633   **June, 2018**

ET-501(B) : FOUNDATION ENGINEERING

Time : 3 hours · *Maximum Marks : 70*

Note : *Attempt any five questions. Support your answers with neat sketches. All questions carry equal marks.*

1. (a) Discuss different types of soil samples and how they are driven. 7

   (b) "Disturbance in the soil samples affects the engineering properties of the soil." Justify this statement. 7

2. (a) Explain the determination of net bearing capacity as per IS codal provisions for general shear failure. 7

   (b) A strip footing of 3 m width is located at a depth of 3·0 m in a stiff clay of saturated unit weight 20 kN/m^3 and $\phi_u = 0$. Determine the load carried by the footing for a factor of safety of 3 with respect to shear failure. Use Terzaghi's bearing capacity equation and take

   $N_c = 5·7$, and $C_u = 125 \ kN/m^2$. 7

3. (a) Explain the circumstances under which a raft foundation is adopted. Explain the features of such a foundation.   7

(b) Draw the pressure distribution diagram under a square footing of size 3 m × 3 m carrying a load of 1200 kN when the eccentricity is 0·4 m.   7

4. (a) Show that immediate settlement (S_i) for concentrated point load (Q) at surface can be expressed as

$$S_i = \frac{Q}{\pi E r}(1 - \mu^2)$$

    7

(b) Discuss the various methods of minimising settlement.   7

5. (a) Explain the Coulomb's theory of earth pressure.   7

(b) A retaining wall with a smooth vertical back retains dry sand backfill for a depth of 4·0 m. The backfill has a level surface and has the following properties : $c = 0$, $\phi = 30°$, $\gamma = 15$ kN/m³. Calculate the magnitude of the total active earth thrust against the wall and its point of application assuming that the wall is free to move.   7

6. (a) Discuss the general principles of foundation design.   7

(b) Explain the design criteria of machine foundation.   7

7. (a) Discuss the necessity of load test on piles. 7

(b) A square pile of section 0·5 m × 0·5 m and 10 m long penetrates a deposit of clay with cohesion (c) as 40 kN/m^2. Taking m = 0·7, determine the load carried by the pile by skin friction. 7·

8. Write short notes on the following : $4 \times 3\frac{1}{2} = 14$

(a) Effect of water table on bearing capacity of soil

(b) Modes of failure in shallow foundations

(c) Consolidation settlement

(d) Efficiency of pile group

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