

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

Term-End Examination

June, 2010

ET-501(B) : FOUNDATION ENGINEERING

Time : 3 hours

Maximum Marks : 70

Note : Attempt any five questions. All questions carry equal marks. Use of calculator is permitted.

1. (a) Discuss the reasons for soil sample disturbance and how this can be eliminated. 7
(b) Describe the principles on which electrical resistivity studies for subsurface explorations are based. 7

2. (a) Derive Terzaghi's general bearing capacity equation. 7

$$q_u = C N_C + q N_q + \frac{1}{2} \gamma B N_\gamma$$

Where all the terms have their usual meaning.

- (b) A square footing 2.5 m × 2.5 m is built in a loose sand of unit weight 16 kN/m³ and having an angle of shearing resistance of 25°. The depth of base of footing is 1.5 m below the ground surface. Calculate the safe load that can be carried by a footing with a factor of safety of 3 against complete shear failure. Use Terzaghi's analysis. 7

3. (a) Explain the various types of foundation with the help of neat sketches. 7
- (b) Determine the maximum and minimum base pressure under a footing $2.0 \text{ m} \times 2.0 \text{ m}$ carrying a load 1000 kN when the eccentricity is 0.50 m . Also sketch the pressure distribution. 7
4. (a) Explain the effect of footing size on stress zone. 7
- (b) A saturated soil has a compression index of 0.28 . The void ratio at a stress of 12 kN/m^2 is 2.05 . Compute the settlement if the soil stratum is 6 m thick and stress is increased to 21.6 kN/m^2 . 7
5. (a) Describe the causes of failure in earth retaining structures. 7
- (b) Compute the intensities of active and passive earth pressures at a depth of 8 metres in cohesionless sand with an angle of internal friction of 30° when water rises to the ground level. Take saturated unit weight of soil as 22 kN/m^3 and r_w as 9.81 kN/m^3 . 7
6. (a) Explain the floating foundations with the help of a neat sketch. 7
- (b) Briefly describe the wave propagation method of determining dynamic soil properties. 7

7. (a) What is need for load test on piles ? Briefly discuss the procedure. 7
- (b) In a 16 pile group, the pile diameter is 45 cm and centre to centre spacing of the square group is 1.50 m. If $C = 50 \text{ kN/m}^2$, determine whether the failure would occur with the 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 mobilisation around each pile. 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) Design criteria for machine foundation.
- (d) Causes of settlement of foundation.
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