

[01 – 3213]

III/IV B.E. DEGREE EXAMINATION.

Second Semester

Civil Engineering

GEOTECHNICAL ENGINEERING – II

(Common with Civil Environmental Engineering
and B.E. + M.E. Dual Degree Programme in
Civil Engineering)

(Effective from the admitted batch of 2006–2007)

Time : Three hours

Maximum : 70 marks

Question No.1 is compulsory.

Answer any FOUR from the remaining.

All questions carry equal marks.

1. (a) Sketch a split-spoon sampler and explain its parts.
- (b) Under what conditions :
 - (i) a base failure and
 - (ii) a toe failure are expected. Explain.

7. (a) Discuss the method for checking the stability of an infinite slope in a cohesive soil. What is critical height?
- (b) Describe the general procedure for the design of a shallow foundation.
8. Write short notes on FOUR of the following :
- (a) Rectangular foundation
- (b) Allowable settlement
- (c) Static formula method
- (d) Base slope failure
- (e) Bulkheads
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- (c) What are the assumptions in Coulomb's theory?
 - (d) What are different types of sheet pile walls?
 - (e) Define the Net safe bearing capacity, gross safe bearing capacity.
 - (f) Discuss different methods for the installation of piles.
 - (g) What are the merits and demerits of a floating caisson when compared with other types?
2. (a) Explain: (i) active (ii) passive and (iii) at rest conditions in earth pressure against a retaining wall.
- (b) A gravity retaining wall retains 12 m of a backfill, $r = 17.7 \text{ kN/m}^3$ $\phi = 25^\circ$ with a uniform horizontal surface. Assume the wall interface to be vertical determine the magnitude and point of application of the total active pressure. If the water table is a height of 6 m, how far do the magnitude and the point of application of active pressure changed?
3. (a) What are the assumptions made in Terzaghi's analysis of bearing capacity of a continuous footing?

- (b) Compute the allowable bearing capacity of a square footing of 2 m resting on dens sand of unit weight 20 kN/m^3 . The depth of foundation is 1 m and the site is subject to flooding. The bearing capacity factors are: $N_c = 55$, $N_q = 38$ and $N_r = 45$.
4. (a) Discuss different methods for the installations of pile groups.
- (b) The pile load test on a 40 cm diameter concrete pile in a deposit of sand indicates a settlement of 4 mm under a load of 400 kN. Estimate the settlement of a 4×4 pile group. The piles are driven at a spacing of 100 cm. The total load on the group is 6400 kN.
5. (a) How would you estimate the settlements of a foundation on cohesionless soils?
- (b) A rectangular footing ($3 \text{ m} \times 2 \text{ m}$) exerts a pressure of 100 kN/m^2 on a cohesive soil ($E_s = 5104 \text{ kN/m}^2$ and $\mu = 0.50$). Determine the immediate settlement at centre, assuming (i) the footing is flexible (ii) the footing is rigid.
6. (a) What is a "Caisson"? How are Caissons classified based on the method of construction?
- (b) Discuss various methods for providing anchors for a sheet pile wall.