

GANPAT UNIVERSITY
B.Tech. Semester VIth Civil Engineering
Regular Examination May/June -2012
C-603 Geotechnical Engineering-II

Time: 3 Hours

Total Marks: 70

Instruction:

- (1) Answer to the two sections must be written in **separate** answer books.
- (2) Figure to the right indicate **full** marks.
- (3) Assume suitable data if required.

Section-I

- 1(A) Explain 'general shear failure' and 'Local shear failure'. (5)
 Differentiate between (i) Shallow foundation and deep foundation.
 (ii) Gross and net bearing capacity, (iii) Safe bearing capacity and Allowable soil pressure.
- (B) Discuss the various types of foundations and their selection with respect to different situations. (5)
- (C) Define: Net pressure intensity, Ultimate bearing capacity (2)
- (OR)**
- 1(A) Discuss standard penetration test. What are the various corrections? (5)
 What is the importance of the test in geotechnical engineering?
- (B) What is reconnaissance? What type of information is obtained in reconnaissance? What is its use? (5)
- (C) What is split spoon sampler. What is its use? (2)
- 2(A) Explain the factors affecting the selection of type of foundation. (5)
- (B) What are the factors that affect sample disturbances? (3)
- (C) How is the depth of the foundation determined? (3)
- (OR)**
- 2(A) Write the steps in choosing types of foundation. (5)
- (B) What are the Factors Affecting Bearing Capacity of soil? (3)
- (C) What are the general considerations in the choice of the foundation type? (3)
- 3(A) Calculate the elastic settlement of a rectangular foundation, $6 \text{ m} \times 12 \text{ m}$, on a uniform sand with $E = 20,000 \text{ kN/m}^2$ and Poisson's ratio = 0.2. The contact pressure is 200 kN/m^2 . The settlements are to be calculated at the centre, mid-point of long side, and midpoint of short side, and at the free corner. Also compute the allowable bearing pressure, if the maximum settlement is restricted to 40 mm. (6)

- (B) A foundation, 2.0 m square is installed 1.2 m below the surface of a uniform sandy gravel having a density of 19.2 kN/m^3 , above the water table and a submerged density of 10.1 kN/m^3 . The strength parameters with respect to effective stress are $c' = 0$ and $\phi' = 30^\circ$. (6)
- Find the gross ultimate bearing capacity for the following conditions:
- (i) Water table is well below the base of the foundation (i.e., the whole of the rupture zone is above the water table);
 - (ii) Water table rises to the level of the base of the foundation; and
 - (iii) the water table rises to ground level.
- (For $\phi = 30^\circ$, Terzaghi gives $N_q = 22$ and $N_\gamma = 20$)

Section-II

- 4(A) What is negative skin friction? What is its effect on the pile? (5)
- (B) Discuss various dynamic formulae. What are their limitations? (5)
- (C) What do you mean by Geosynthetics? (2)
- (OR)
- 4(A) Give a method to determine the bearing capacity of a pile in clay soil. (6)
- What is group effect and how will you estimate the capacity of a pile group in clay ?
- (B) What is the underreamed pile? What are its design criteria? How would you install it? (6)
- 5(A) Discuss about the types of Geosynthetic material and their use (5)
- (B) Describe the method of replacement of the expansive soil with a good quality soil. How would you construct a footing using this method? (6)
- (OR)
- 5(A) What are the various methods of modification of an expansive soil to improve its characteristics? (5)
- (B) Classify piles on the basis of function, material & composition and method of installation. Briefly explain them also. (6)
- 6(A) Design a square pile group to carry 400 kN in clay with unconfined compression strength of 60 kN/m^2 . The piles are 30 cm diameter and 6 m long. Adhesion factor may be taken as 0.6. (6)
- (B) A reinforced cement concrete pile weighing 30 kN (including helmet and dolly) is driven by a drop hammer weighing 30 kN with an effective fall of 0.9 m. The average penetration per blow is 15 mm. The total temporary elastic compression of the pile, pile cap and soil may be taken as 18 mm. Coefficient of restitution 0.36. What is the allowable load on the pile with a factor of safety of 2? Use Hiley's formula. (6)

END OF PAPER