D 52386 (Pages : 2) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2008

CE 04 604 – GEOTECHNICAL ENGINEERING – II

(2004 admissions)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions from Question 1.*
Answer any **one** *question from each Question 2 to Question 5.*
Assume any additional data required appropriately.

1. Answer *all* questions :–

(i) Give a typical borelog. How is it useful in determining the type and depth of foundations?

(ii) How would you decide the depth of soil exploration and the lateral extension of investigation?

(iii) Write a note on isobars.

(iv) Why is that the settlement of a raft foundation will be more than that of isolated footings for the same load and same soil conditions beneath a building? Discuss.

(v) What are the functions of foundations? What are the major criteria to be satisfied in the design of all types of foundations (shallow or deep or machine foundations)?

(vi) Briefly discuss the common types of foundations (shallow and deep) and what are their advantages and limitations?

(vii) What are the different circumstances under which pile foundations are recommended? Discuss.

(viii) What considerations govern the fixing of the depth of a well foundation? Discuss briefly.

(8 × 5 = 40 marks)

2. (a) Briefly explain the geophysical methods of exploring the underground strata.

Or

(b) (i) Differentiate between Ultimate Bearing Capacity and Safe Bearing capacity, and between Safe Bearing pressure and allowable bearing pressure.

(ii) Estimate the gross and net safe bearing capacities of a 2m × 3m footing placed at a depth of 1.5 m on a strata of soil of unit 19 kN/m^3. Assume the following soil properties and conditions of water level.

Case 1. c = 50 kN/m^2 and $\phi = 0°$ with water level at 5 m below the level of foundation.

Case 2. c = 5 kN/m2 and $\phi = 30°$ with water level at 0.5 m below the level of foundation ($N_c = 30$, $N_q = 18$, $N_r = 22$).

Turn over

3. (a) Write down the Boussinesq's equation for a point load. What are the assumptions made? Extend Boussinesq's equation for pressure below corner and centre point of a uniformly loaded rectangular area.

Or

(b) What is the effect of rise of water table on bearing capacity and the settlement of a footing on sand? Discuss. Explain how do you estimate the settlement of a footing on sand using SPT N values.

(15 marks)

4. (a) Discuss the various loads that can possibly act on a foundation – that need to be considered in the design of foundations. Discuss the codal recommendations of the computation of design loads.

Or

(b) Design a Trapezoidal combined footing to support two columns (30 cm × 30 cm) carrying column loads of 1.2 MN and 0.90 MN, if the spacing between the two columns is 4 m. Allowable soil pressure is 200 kN/m^2 and the length of the footing is to be 5 m.

(15 marks)

5. (a) (i) Write a short note on uplift piles.

(ii) Determine the load carrying capacity of a single square pile 400 mm × 400 mm, 20 m long. The bored cast in place pile is installed in a sandy soil having $c = 0$, $\phi = 35°$, $\gamma = 19$ kN/m^3. Water table is not available with the top 30 m at site. Sand may assumed to be dry ($N_q = 50$, $N\gamma = 40$).

Or

(b) Discuss in detail : identification of expansive soils, problems encountered. For foundations in expansive soils, design of foundations in expansive soils.

(15 marks)

[4 × 15 = 60 marks]