

**SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE****EXAMINATION, DECEMBER 2007****CE 04 604—GEOTECHNICAL ENGINEERING—II**

(2004 admissions)

Time : Three Hours

Maximum : 100 Marks

*Answer all the questions from Q. I.**Answer any one question from each of Q II to Q V.**Assume any additional data required appropriately.***I. Answer all questions :**

- (i) Write a short note on "Significant Depth of Exploration".
- (ii) What are the various methods of drilling holes for subsurface exploration ? Explain.
- (iii) Differentiate between immediate settlement and consolidation settlement; and between total and differential settlements.
- (iv) Discuss the methods available to reduce settlements in buildings.
- (v) Differentiate between shallow foundations and deep foundations (Discuss in terms of geometry, construction techniques, load transfer mechanism, disturbance to surrounding soil)
- (vi) How would you find the depth of foundation ? Discuss Rankine's formula for minimum depth of foundation.
- (vii) What do you ensure when the elastic theory method and the ultimate soil resistance method are used to check the lateral stability of a well foundation by the IRC approach ?
- (viii) Define "Free swell", "Differential free swell", and "zone of moisture variation as applied to expansive soils.

(8 × 5 = 40 marks)

2. (a) (i) Explain in detail how to conduct the plate load test . What are its limitations ? Discuss.
- (ii) The results of two plate load tests for a settlement of 25.4 mm are given

<i>plate diameter</i>	<i>load</i>
0.305 m	31 kN
0.61 m	65 kN

A square column foundation is to be designed to carry a load of 800kN with an allowable settlement of 25.4mm. Determine the size using Housel's method.

*Or*

- (b) (i) Differentiate between cone penetration test and SPT. Discuss in detail.

(15 marks)

**Turn over**

3. (a) Write down the Boussinesq's equation for a point load. What are the assumptions? Extend Boussinesq's equation for line load.

*Or*

- (b) A concentrated load of 50 kN acts on the surface of a homogenous soil mass of large extent. Draw the variation of vertical stress directly beneath the load for a depth of 10m at every 1 m interval. Also draw the variation of vertical stress on a horizontal plane at a depth of 3 m, for a distance of 5 m on either side of the load, at every 1 m interval.

(15 marks)

4. (a) Describe the procedure of the design of mat foundation by conventional method.

*Or*

- (b) Design a rectangular combined footing to support two adjacent columns (40 cm × 40 cm) carrying loads of 4 MN and 5 MN, if the spacing between the two columns is 5.5 m. The lighter column is near the property line. Allowable soil pressure is 450 kN/m<sup>2</sup>.

(15 marks)

5. (a) (i) Find the safe design on a pile given that the pile penetrates 95 mm in the last 10 blows under a 5 ton hammer falling from a height of 75 cms. Use Engineering News Formula. Assume steam hammer is used. Pile is 30 cm diameter and 15 m long made of RCC.
- (ii) What is group action? Define group efficiency of pile groups.

*Or*

- (b) Discuss in detail the advantages and disadvantages of bored cast in place piles, precast driven piles, and driven cast in piles.

(15 marks)

[4 × 15 = 60 marks]