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Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION JUNE 2007

CE 04 604—GEOTECHNICAL ENGINEERING—II

(2004 admissions)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Assume any additional data required appropriately.

1. (i) What are the different Civil Engineering projects where subsurface investigation is required ? What kind of information is required in these jobs ?

   (ii) Describe open excavation methods of exploration. What are their advantages and disadvantages ?

   (iii) The contact pressure for a square footing 2 m × 2 m is 400 kN/m^2. Assuming 2 V : 1 H distribution. Determine the depth at which the contact pressure is 100 kN/m^2.

   (iv) Write a note on permissible, total and differential settlement.

   (v) Why is that a minimum depth of foundation is recommended in all types of soils and rocks ? Discuss.

   (vi) What are the functions of foundations ? What are the major criteria to be satisfied in the design of foundations ?

   (vii) State the IS and IRC specifications for the grip length of a well foundation.

   (viii) Discuss the major advantages and disadvantages of precast driven piles.

   (8 × 5 = 40 marks)

2. (a) Define the following (i) Undisturbed sample (ii) Representative sample (iii) Area ratio (iv) Inside and Outside clearances (v) Recovery ratio (vi) Rock quality designation.

   Or

   (b) (i) What are the assumptions in Terzaghi's Bearing Capacity theory ? Write the equations of ultimate bearing capacity for a strip footing, a square footing and a circular footing.

   (ii) Differentiate between general shear failure and local shear failure. Discuss the effect of water table on the bearing capacity of the soils.

   (15 marks)

3. (a) (i) Differentiate between Immediate and consolidation settlements ; and between Total and differential settlements.

   (ii) Write down the Boussinesq's equation for a point load. Extend Boussines's equation for uniform strip load.

   Or

   (b) A raft 20 m × 20 m has an intensity of loading of 300 kN/m^2. Determine the vertical pressure at the centre of raft at a depth of 10 m by equivalent point load method. Compare this value with the 2 V : 1 H method. Also estimate the vertical pressure at a point 10 m below the corner point.

   (15 marks)

Turn over

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 rectangular combined footing to support two adjacent columns (40 cm × 40 cm) carrying loads of 3 MN and 4 MN, if the spacing between the two columns is 5 m. The lighter column is near the property line. Allowable soil pressure is 400 kN/m^2.

(15 marks)

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

(ii) A 4 m × 4 m square pattern pile group supports a column. Piles are 30 cm dia. 15 m long, spaced at 0.9m c/c bothways. The cohesive strength of soil is 75 kN/m^2. Determine if the failure would occur by individual action or group action (as a block).

Or

(b) With a neat sketch show the various components of a well foundation. List the forces for which a well foundation is designed. With neat sketches explain briefly any 4 methods of rectifying tilts in wells.

(15 marks)