C 14719 (Pages : 3) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2010

CE 04 604—GEOTECHNICAL ENGINEERING—II

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

1. (a) What is a bore log ? What are its uses ?

   (b) What are the limitations of settlement computation ?

   (c) What are the criteria to be considered in selecting the type of foundation for a given site ?

   (d) When would you call a soil as expansive ? What are the problems associated with expansive soils ?

   (e) How would you assess the degree of disturbance of a given soil sample ?

   (f) Write a note on pressure bulb.

   (g) How are uplift pressures resisted in a mat foundation ?

   (h) Explain the construction procedure of pneumatic caissons. What are the advantages of pneumatic caissons ?

   (8 × 5 = 40 marks)

II. (a) (i) Describe the functioning of Osterberg piston sampler with a neat sketch.

   (7 marks)

   (ii) Calculate the gross and net allowable bearing pressure of a strip footing of width 2.5 m founded at a depth of 3 m from ground level. Subsoil is cohesionless with $\phi = 35^{o}$, $\gamma_{sat} = 20\ kN/m^3$. Water table is located at a depth of 3 m from ground level. For the given value of ϕ, $N_c = 57.8$, $N_q = 41.4$ and $N_\gamma = 42.4$. Factor of safety = 3. Use Terzaghi's general shear failure theory. Also find the percentage reduction in ultimate capacity when the water table rises to the ground surface.

   (8 marks)

Or

(b) (i) Explain the methods of geophysical exploration with the help of neat sketches. What are the limitations of these methods ?

(7 marks)

(ii) A circular footing of diameter 3 m is founded at a depth of 1.5 m in medium stiff clay soil having an unconfined compressive strength of 175 KPa. Determine the net safe bearing capacity of footing with the water table at ground level by Skempton's bearing capacity analysis. Given that γ =21 kN/m^3, N_c = 7, and F_s = 3.

(8 marks)

3. (a) (i) Explain the method to calculate vertical stress beneath loaded areas of irregular shape using Newmark's chart.

(7 marks)

(ii) A ring foundation of external diameter 9 m and internal diameter 4 m rests at a depth 3 m below the ground surface. It carries a load intensity of 200 kN/m^2. Find the vertical stress at depths 2, 4 and 8 m along the axis of the footing below the footing base.

(8 marks)

Or

(b) (i) Sketch the contact pressure distribution below rigid and flexible footings founded in sandy and clayey soils.

(7 marks)

(ii) 8 m depth of sand overlies a 6 m depth of clay, below which is an impermeable stratum. Water table is 2 m below the surface of sand. A 3 m depth of fill (γ = 20 kN/m^3) is to be dumped on the surface over an extensive area. The saturated unit weight of sand is 19 kN/m^3 and that of clay is 20 kN/m^3, and above the water table, unit weight of sand is 17 kN/m^3. For the clay, relationship between void ratio and effective stress (in kN/m^2) can be expressed by the relation $e = 0.88\text{-}0.32 \log \sigma/1100$ and the coefficient of consolidation is 1.26 m^2/year. Calculate the final settlement of the area due to the consolidation of clay.

(8 marks)

4. (a) (i) Explain the conventional procedure for proportioning footing for equal settlements.

(7 marks)

(ii) A square footing of 3 m^2 transmits a total column load of 1500 kN to the ground. The subsoil is cohesionless with $\phi = 30^\circ$ and $\gamma = 15$ kN/m^3. The footing is to be located at a depth of 2 m below ground level. Determine the factor of safety by Terzaghi's general shear failure theory if water table is located at great depth. For $\phi = 30^\circ$, N_c = 37.2, N_q = 22.5 and N_γ = 19.7.

(8 marks)

Or