Printed Pages : 3   ECE011

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2446   Roll No. ☐☐☐☐☐☐☐☐☐☐

B.Tech.
(SEMESTER-VI) THEORY EXAMINATION, 2012-13
ADVANCED FOUNDATION DESIGN

Time : 2 Hours]   *[Total Marks : 50*

Note : Attempt **all** the Sections. If required any missing data; then choose suitably.

SECTION – A

1. Attempt **all** questions in brief :   2 × 5 = 10

   (a) Define the terms net ultimate bearing capacity of soil. Also list the use and function of pile cap.

   (b) Classify the pile according to their method of installation.

   (c) What are the various causes of settlements ?

   (d) What are the various components of well foundation ?

   (e) What is a stability number ? What are the uses of stability charts ?

SECTION – B

2. Attempt any **four** of the following :   4 × 4 = 16

   (a) A line load of 100 kN/m run extends to a long distance. Determine the intensity of vertical stress at a point, 2m below the surface and;

   (i) Directly under the line load and

   (ii) At a distance 2 m perpendicular to the line by using Boussinesq's theory.

   (b) How many types of shallow foundation settlements you know ? Explain the approaches to calculate the immediate settlement for shallow foundation.

   (c) Write about the various methods for rectification of Tilts and Shifts in the well foundation.

   (d) Which type of pile foundations you will use for the expensive soils ? Explain the particular types with a neat sketch. Also give the expression for finding the capacity of piles for single bulb under reamed piles.

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(e) How will you find the parameters Mass (m), Spring Stiffness (k) and Damping Constant (c) for the analysis of a machine foundation ? Also write about the degree of freedom of a 'Block Foundation'. Also explain; how the coefficient of elastic uniform compression is affected by the spring stiffness.

(f) What are different types of slope failures ? Discuss briefly; the various methods for improving the stability of slopes.

SECTION – C

Attempt **all** questions :

3. Attempt any **one** part of the following : $6 \times 1 = 6$

(a) Explain 2 : 1 dispersion method for calculating the stress intensity. A concentrated load of 50 kN is applied vertically on a horizontal ground surface. Determine the vertical stress intensities at the following two points :

(i) At a depth of 3 m below the point of application of the load

(ii) At a depth of 2 m and at a radial distance of 3 m from the line of action of the load

(b) How will you determine the vertical stress intensity at any depth by using the Newmark Influence Chart Method ?

Draw a Newmark's Influence Chart on the basis of Boussinesq's equation, for an influence factor of 0.005. While drawing the chart, take arbitrarily the value of 'z' is 2.5 cm.

4. Attempt any **one** part of the following : $6 \times 1 = 6$

(a) Write the Hansen's bearing capacity equation along with their correction factors.

A square footing 1.5 m × 1.5 m rests at a depth of 1.5 m in a saturated sandy clay layer 6 m deep. The clay is normally consolidated having UCS of 45 kN/m^2, liquid limit = 35%, saturated unit weight = 18.5 kN/m^3, $w = 29\%$ and $G_s = 2.65$. Determine the load with a factor of 3 against shear. Also determine the settlement if the footing is loaded with this safe load.

(b) For 'L/B = 5.0'; explain all the steps, which will you follow for determining the settlement in the cohesion less soil by using the Schmertmann approach.

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5. Attempt any **one** part of the following : 6 × 1 = 6

   (a) What are laterally loaded and battered piles and why batter piles are more effective than vertical piles in resisting the horizontal loads ? Also determine the forces in the piles by the Column's Method.

   (b) A raft foundation has to be supported by a group of concrete piles. The gross load to be carried by the pile group is 250 t, inclusive of the weight of the pile cap. The subsoil consists of a 25 m thick stratum of normally consolidated clay having an UCS of 4.8 t/m^2 and an effective unit weight of 0.9 t/m^3. Design the pile group with a factor of safety 3 against the shear failure.

6. Attempt any **one** part of the following : 6 × 1 = 6

   (a) Explain the procedure to calculate the factor of safety of a finite slope possessing both 'c' and 'φ' value by the method of slices.

   (b) What are the various laboratory methods used to determine the dynamic properties of soils ? Explain them in brief.

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