

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

PAPER ID : 2446

Roll No.

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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**
- Define the terms net ultimate bearing capacity of soil. Also list the use and function of pile cap.
 - Classify the pile according to their method of installation.
 - What are the various causes of settlements ?
 - What are the various components of well foundation ?
 - 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 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;
 - Directly under the line load and
 - At a distance 2 m perpendicular to the line by using Boussinesq's theory.
 - How many types of shallow foundation settlements you know ? Explain the approaches to calculate the immediate settlement for shallow foundation.
 - Write about the various methods for rectification of Tilts and Shifts in the well foundation.
 - 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.



- (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 × 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 × 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/m², liquid limit = 35%, saturated unit weight = 18.5 kN/m³, w_L = 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.

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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