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

ER ID : 2446 Roll No. | | | | | | | | | | |

B. Tech.

(SEM. VI) THEORY EXAMINATION 2010-11

ADVANCED FOUNDATION DESIGN

? *Hours* *Total Marks : 50*

te :— Attempt **ALL** questions. All questions carry equal marks. Assume any data, not given, suitably.

Attempt any two parts of the following :— **(6.5×2)**

(a) Write about the assumptions for the Boussinesq's method for the determination of the stress increment due to an external load. Show all the expressions for the normal and tangential stresses with the neat sketch of the load application. A rectangular footing of **3m × 4m** in size has to carry a uniformly distributed load of **200 kN/m²**. Show the distribution of the vertical stress intensity on a horizontal plane at a depth of 3 m below the base of footing by the **2 : 1** dispersion method.

(b) Show the expressions for the Westergaard's solution for the vertical stress due to a point load, for a line load of finite length, due to a rectangularly loaded area and due to a circularly loaded area.

(c) A long flexible strip footing of **2.5 m** width having a smooth base is subjected to a uniformly distributed load of **80 kN/m** run. Determine the vertical stress

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intensities at a depth of 2 m below a line parallel to the centre line of the footing at a distance of 3 m from it.

Also draw a Newmark's influence chart on the basis of Boussinesq's equation, for an influence factor of 0.005.

2. Attempt any two parts of the following :— (6.5×2)

(a) Show and explain the nature of bearing capacity failure in soil with the help of their neat sketches. How will you modify the bearing capacity equations for the different cases of water table location ?

(b) Give all the steps to calculate the elastic settlement of sandy soil by using the strain influence factor. Also show the variation of the strain influence factor with z.

(c) Determine the allowable bearing capacity of a 2 m × 2 m square footing founded at a depth of 1.5 m below the ground level in a deep stratum of silty clay having the following average properties :

$\gamma = 1.8$ t/m^3, $c = 3$ t/m^2, $\phi = 0^0$, $C_c = 0.259$ and $e_0 = 0.85$.

The maximum permissible settlement of the footing is 7.5 cm. The highest position of the water table at the site is at a depth of 1.0 m below the ground level.

3. Attempt any two parts of the following : (6×2)

(a) How will you calculate the bearing capacity of an individual pile by the various dynamic formulae, i.e. Engineering News and Modified Hilly Formulas ?

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(b) An RCC pile of 18 m overall length is driven into a deep stratum of soft clay having an UCS of 3.5 t/m². The diameter of the pile is 30 cm. Determine the safe load that can be carried by the pile with a factor of safety of 3.0. Take α = 0.95.

What do you mean by efficiency of group piles ? How will you calculate the group efficiency of piles in clay ? Give all their relevant equations and variations.

(c) Give the expression for finding the elastic settlement of a pile group in sand and gravel by Meyerhof's. Also give the expression for calculating the settlement of pile groups in the Clayey Soils.

Attempt any **two** parts of the following : **(6×2)**

(a) Discuss the various types of piles which are used in the construction work; on the basis of their structural characteristics with their advantages and disadvantages.

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

(c) How will you find the parameters Mass (m), Spring Stiffness (k) and Damping Constant (c) for the analysis of a machine foundation ? 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 ?