53 (CE 604) FDEN

2018

FOUNDATION ENGINEERING

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. *(a)* Define : 10

   (i) Undisturbed and disturbed sample

   (ii) Area ratio

   (iii) Inside and outside clearance.

   (b) What are the corrections that must be applied to the field *N*-values for sand before they are used in design charts and empirical correlations ? 10

2. *(a)* Bring out clearly the effect of ground water table on the bearing capacity of soil. 10

(b) What is negative skin friction ? How is it calculated for a single pile and a group of piles in clay ? How can it be eliminated ? 3+5+2=10

3. (a) Determine the safe load that can be carried by a square footing $2m \times 2m$ placed at a depth of $1{\cdot}5m$ below G.L. The foundation soil has following properties —

$\gamma = 1{\cdot}65t/m^3$, $C = 1{\cdot}4t/m^3$,

$\phi = 20°$, Assume FOS = 3,

for, $\phi = 20°$, $N_c' = 11{\cdot}8$, $N_q' = 3{\cdot}8$,

$N_\gamma' = 1{\cdot}3$. 10

(b) What are the assumptions in Boussinesq's theory for finding out stresses in a soil medium ? 5

(c) Explain the degrees of freedom of a block foundation with the help of a diagram. 5

4. (a) Draw the different components of a well foundation. 5

(b) Explain *any one* method of improving a loose sandy soil deposit. 5

(c) A square group of 9 piles was driven into soft clay extending to a large depth. The diameter and length of piles were $30cm$ and $9m$ respectively. If the UCS of clay is $9t/m^2$ and pile spacing is $100cm$ c/c, what is the capacity of the group ? Assume FOS = 2·5, adhesion factor = 0·75. 10

5. (a) Explain Terzaghi's analysis of bearing capacity. Deduce the equation of bearing capacity of shallow foundation. 12

(b) What is the necessity of soil exploration ? Explain different methods of soil explorations. 8
