53 (CE 604) FOEN

2015

FOUNDATION ENGINEERING

Paper : CE 604

Full Marks : 100

Time : Three hours

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

*Answer **any five** questions out of seven.*

1. *(a)* Explain the terms — 3+3+4=10

   (a) Local shear failure

   (b) General shear failure

   (c) Allowable bearing pressure.

   (b) Deduce the expression of ultimate bearing capacity according to Terzaghi's bearing capacity theory. 10

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

$\gamma = 1{\cdot}65 t/m^3$, $c = 1{\cdot}4 t/m^3$, $\phi = 20^o$,

Assume a $FOS = 3$.

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

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

(b) Explain the effect of water table on the bearing capacity of the soil. 10

3. *(a)* Explain how the allowable load on a pile group and a single pile is estimated from pile load test as per IS specification. 10

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

4. *(a)* State the basic assumptions in Boussinesq's theory of stress distribution in soils. Show with sketch only the vertical stress distribution on a horizontal plane at a given depth and also the vertical stress distribution with depth. 6

(b) Draw the different components of well foundation ? What is grip length of a well ? 6

(c) What are the different criteria for satisfactory action of a machine foundation ? 8

5. *(a)* Explain with sketch how the ground improvement of soft saturated claycy soil can be obtained with the help of vertical sand drains. 10

(b) Explain *any two* method of densifying loose sand deposit. 5+5=10

6. *(a)* Describe in brief how the standard penetration test is conducted ? What are the corrections that must be applied to the field *N*-values for sand ? 6+4=10

(b) What is a bore log ? Explain in detail by drawing a bore log. 10

7. Write short notes on : ***(any four)*** 4×5=20

(a) Wash boring

(b) Critical depth of pile

(c) Negative skin friction

(d) Design criteria of sampler

(e) Plate load test.
