53 (CE 604) FDEN

2014

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.*

1. *(a)* Define disturbed samples. Describe the various types of disturbed samples. 10

   (b) Differentiate between cohesive soil and non-cohesive soil. Describe soil based on the values of shear strength parameters. 10

2. *(a)* What do you understand by the term soil exploration ? Describe the stages of soil exploration. 10

   (b) Define foundation. What are the functions of foundation ? 5

(c) What are the factors which result in differential settlement ? 5

3. (a) What are the principal modes of soil failure ? Give the typical features of all the modes of soil failure with suitable diagrams. 15

(b) Describe the mechanism of shear resistance. 5

4. (a) Define the following terms : 10

(i) Bearing capacity

(ii) Ultimate bearing capacity

(iii) Net ultimate bearing capacity

(iv) Net safe bearing capacity

(v) Gross safe bearing capacity.

(b) Write short notes on : 10

(i) Grouting

(ii) Sand drains

(iii) Stone column.

5. Calculate the net ultimate bearing capacity of a rectangular footing $(2\times4)\ m^2$ in plan, founded at a depth of $1{\cdot}5m$ below the ground surface. The total load on the footing is eccentric in the direction of width by $15cm$. The saturated unit weight of soil is $18kN/m^3$. Natural water table is at a depth of $2m$ below the ground surface. Given $\rightarrow C = 15kN/m^2$ and $\phi = 25°$. Use IS code method. 20

6. A nine pile group arranged in a square pattern is used as a foundation for a column in sand, $\phi = 32°$. Piles $300mm$ in diameter and $10m$ in length are placed at a spacing of $900mm$ in each direction. Calculate the ultimate load capacity of the pile group, given unit weight of soil $18kN/m^3$. 20

7. If $\sigma_1 = 167\ kN/m^2$, $\sigma_3 = 0$ and $\alpha = 54°$. Determine

   (i) Shear strength parameters.

   (ii) Orientation of major and minor principal planes and the stresses acting on them

   (iii) Orientation of the plane of maximum shear stress.

   Use Mohr's Circle. 20
