53 (CE 816) AFEN

2019

ADVANCED FOUNDATION ENGINEERING

Paper : CE 816

Full Marks : 100

Time : Three hours

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

*Answer **any five** questions.*

- Assumptions made should be clearly stated
- Use of IS Code is permitted
- Illustrate answer with real sketches whenever required

1. *(a)* Explain the procedure for conducting soil explorations in the field. How the depth of lorehole is affected by significant depth of soil ? 10

(b) Explain Stadnard Penetration Test in detail. Explain the corrections to be applied to obtain the corrected values of SPT. 10

2. (a) What are the guidelines to be followed while laying out foundations adjacent to the slopping ground? What is floating faft? 8+2=10

(b) A strip footing $2m \times 2m$ has a tilted base inclined at 10° to the horijontal. Estimate its ultimate bearing capacity assuming unit weight of soil as $18kN/m^3$. Cohesion $= 25kN/m^2$ and internal friction angle = 25°. Assume $H = 200kN, V = 600kN$ and the average depth of footing is $0.3m$. 10

3. (a) Design a combined trapezondal footing for two columns $400mm \times 400mm$ and $300mm \times 300mm$ in section carrying loads of $750kN$ and $450kN$ respectively spaced at $3.5m$ c/c. There is a restriction on extending the footing on the heavier column side by a distance not more than $100mm$. Adopt

allowable soil pressure of 13(for design purposes.

(b) A nine pile group arranged in pattern is used as a foundati column in sand ($\phi' = 32°$). Piles in diameter and $10m$ in len placed at a spacing of $900mm$ direction. Calculate the ultim capacity of the pile group. Ass unit weight of soil as $18kN/$ IS:2911 Part I recommendat determining bearing capacity N_q.

4. (a) A reinforced concrete pile $30 \times 30cm$ and $10m$ long is dri coarse sand extending to a grea The average total unit weight $18kN/m^3$ and the average N- 15. Determine the allowable the pile by static formula. Use 2.5. The water table is clos ground surface.

(b) Proportion a strap footing for two columns $(400\times400)mm$ and $(300\times300)mm$, carrying loads of $750kN$ and $450kN$ respectively spaced at $3.5m$ c/c. There is a restruction on extending the footing on the heavier column side by a distance not more than $100m$. Assume soil pressure as $130kN/m^2$. 10

5. (a) $200mm$ diameter, $8m$ long piles are used on foundations for a column in a uniform deposit of medium clay $(q_n = 100kN/m^2)$. The spacing between the piles is $500mm$. There are 9 piles in the ground arranged in a square pattern. Calculate the ultimate pile load capacity of the group. Assume adhesion factor = 0.9. 10

(b) What is sheet pile? What are the different types of sheet piles? Derive the expression for the depth of embedment of a cantilever sheet-pile in granular soils by approximate method of analysis. 2+2+6=10

6. (a) Define the following with respect to machine foundations: 2×5=10

(i) Degree of freedom

(ii) Free vibration and forced vibration

(iii) Frequencey

(iv) Resonance

(v) Amplitude.

(b) What are the basic criteria to be satisfied for machine foundations? 4

(c) What are the tests adopted for determination of dynamic properlies of soil? Discuss briefly. 6