Civil-7

Seat No. : _____

7128

December-2008

Foundation Engineering

Time : 3 Hours] **[Max. Marks : 100**

(10 : 30 A.M. to 1 : 30 P.M.)

Instructions : (1) Figures to the right indicate full marks.

(2) Answers to the two sections must be written in separate answer book.

(3) Use of calculating aid is permitted

(4) Assume suitable additional data if required.

(5) Use of IS : 6403 and IS : 2911 is permitted.

SECTION – I

1. (a) Explain with neat sketches failure zones under a strip footing in Terzaghi bearing capacity analysis. **04**

(b) Discuss the effect of shape and water table on bearing capacity of soil. **06**

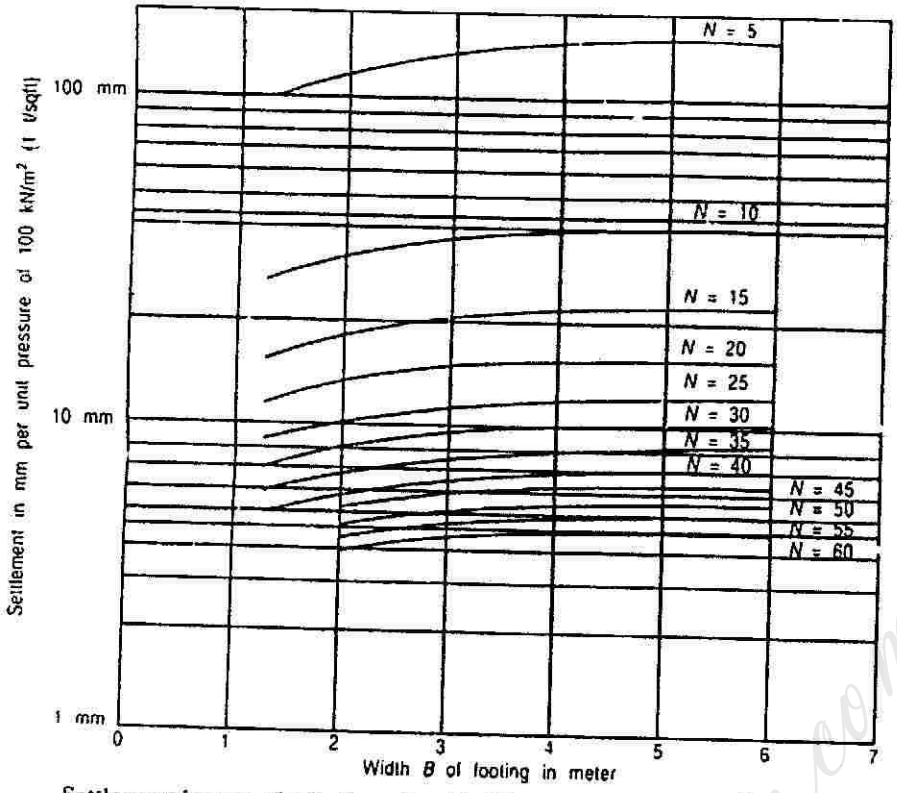
(c) A strip footing of width 1.5 m is founded at a depth of 2m below ground surface in clay. The unconfined compressive strength of clay is 100 kN/m^2. Calculate ultimate bearing capacity of the footing. Assume unit weight of soil =18 kN/m^3. Use appropriate method. **06**

2. (a) What is the difference between standard penetration test and static cone penetration test ? How the bearing capacity is obtained from static cone penetration test ? **06**

(b) The results of a standard penetration test carried out at a site made up of sandy silty soil are given below. The water table is at a great depth. **10**

Depth	: 0.5	1.5	3.0	4.5	6.0	7.5
SPTNo.	: 12	18	16	25	26	29

If the unit weight of soil is 17 kN/m^3, determine the settlement of a 1.5m wide strip footing embedded at 1.2 m depth carrying a total vertical load of 100 kN/m run.



Settlement in mm of a footing of width B loaded with 100 kN/m² resting on dry cohesionless soil of given SPT (N). [IS 8009 Part I 1976]

OR

(a) In what way raft is differing from an ordinary footing ? Describe the factors which affect analysis of raft foundation and explain any one in detail. **06**

(b) A plate load test was carried out on a ground having a uniform soil stratum up to sufficient depth. The size of the plate used was 300mm × 300mm. The following results were obtained : **10**

Load (kN) :	4.5	9.0	18	27	36	45	54
Settlement (mm) :	0.75	1.25	2.0	3.5	5.35	7.75	10.75

Plot load settlement curve. Determine the bearing capacity and load that can be taken by a column footing of size 1.2m × 1.2m, for allowable settlement of 25mm.

3. Answer the following : (any **three**) **18**

(a) Define the terms area ratio and recovery ratio. How does it affect disturbances of a soil sample ?

(b) List the direct and indirect methods of sub surface investigation. Explain minimum one in each case.

(c) Differentiate between the following :

(i) flexible foundation & rigid foundation

(ii) initial settlement & consolidation settlement.

(d) Comment on the following statement :

(i) Ultimate bearing capacity of a strip footing on cohesive soils increases with increase of width of footing

(ii) The bearing capacity improvement for clay is difficult but the same for sand is easy.

(e) Methods to reduce foundation settlement.

SECTION – II

4. (a) What are the disadvantages of pre cast piles ? **03**

(b) Differentiate between the following : (any **three**) **06**

(i) Better pile and Fender pile,

(ii) Skin resistance and Tip resistance,

(iii) Cohesion and Adhesion

(iv) Floating foundation and Floating pile.

(c) Estimate the pile length of a 500 mm diameter pile to carry an axial load of 600 kN. The soil properties are as under.

Layer I : soft clay of 6 m depth, $C = 50\ kN/m^2$, $7 = 18\ kN/m^3$, $\alpha = 1.0$

Layer II : medium stiff clay of L.m depth, $C = 50\ kN/m^2$, $\gamma = 20 kN/m^3$, $\alpha = 0.6$ **07**

5. (a) Comment on the following statements : **06**

(i) Settlement of a pile group is always more than an individual pile,

(ii) The principal effect of negative skin friction is to reduce factor of safety,

(iii) In a pile group the pile driving work should be carried from center to out word.

(b) Design a square pile group to carry 600 kN load in clay with unconfined compressive strength of $60\ kN/m^2$. The piles are 6 m long and 30 cm in diameter. Assume $\alpha = 0.5$. **10**

OR

(a) Write the dynamic pile driving formulae. Explain in detail the symbols involved in it. Why have they limited application in pile driving work ? **08**

(b) A sixteen pile group has to be arranged in the form of a square in soft clay with uniform spacing. Neglecting the end bearing action, determine the optimum value of spacing of the piles in terms of the pile diameter. Assume $\alpha = 0.6$. **08**

6. Answer the following : (any **three**) **18**

(a) Write a note on cyclic pile load test.

(b) State and explain methods of identifying expansive soils.

(c) Write a short note on pile driving equipments

(d) In which circumstances you will prefer well foundation ? Show different parts of well foundation with all forces acting on it.

(e) Explain the statement : "Under reamed piles provide better solution for foundation in expansive soil." Give codal provisions for under reamed piles.
