M.E. First Semester (Civil Engg. (Geotechnical Engg.)) (Full Time) (C.G.S. - New)

13044 : Advanced Foundation Engineering : 1 SFGE 3

P. Pages : 2 **AU - 3475**

Time : Three Hours * 0 3 9 3 * Max. Marks : 80

Notes :
1. Answer **any five** questions.
2. All question carry equal marks.
3. Due credit will be given to neatness and adequate dimensions.
4. Assume suitable data wherever necessary.
5. Diagrams and chemicals equations should be given wherever necessary.
6. Illustrate your answer necessary with the help of neat sketches.
7. Use of slide rule logarithmic table, Steam table, Moller's Chart, Drawing instrument, Thermodynamic table for moist air, Psychometric Chart and Refrigeration charts is permitted.
8. Use of pen Blue/Black ink/refill only for writing book.

1. a) Define undisturbed samples of subsoil. How will you carry out undisturbed sampling of five grained soils recommended by IS.

b) Discuss the standard penetration test to determine standard penetration number.

2. a) In a standard penetration test, the following observations were taken at a depth of 4.0m below the ground level.

S.N.	Depth of penetration of split spoon sampler	No. of Blows
1	First 150 mm	31 Blows
2	Second 150 mm	32 Blows
3	Third 150 mm	23 Blows
4	Fourth 150 mm	36 Blows

Estimate the corrected SPT value for overburden if average unit weight of the soil at 4.0m depth is 19.00kN/m^3.

b) For soft clayey soils encountered up to a depth of 4.0m, Discuss the suitability of vane shear method to establish the in situ shear strength of the starts.

3. a) What are the assumptions mode in Meyerhof's bearing capacity theory. Discuss ultimate bearing capacity equation and effect of shape of foundation depth of foundation, and inclination of load with vertical axis.

b) A 1:0m wide long footing is located at a depth of 1.50m from the ground surface. The supporting soil is compressible and has shear strength parameters $C'_{cu} = 30\,kN/m^2$ and $\phi'_{cu} = 25^\circ$. The total unit wt of soil $\nu = 18.30 kN/m^3$. The water table is at a great depth. Compute the safe load that can be carried by long footing per meter run of the wall. Adopt a factor of safety of 3.0.
Take the values of B.C factors as.

ϕ	N_e	N_q	N_r
15	12.90	4.40	2.50
20	17.70	7.40	5.00
25	25.10	12.70	9.70
30	37.20	22.50	19.70

4. a) Explain the step wise procedure to determine modulus of subgrade reaction. Also state the effect of depth on subgrade reaction.

   b) Discuss the criteria for rigid & Flexible raft and Raft analysis using modulus of subgrade reaction.

5. a) Differentiate between free earth support method and fixed earth support method for anchored sheet pile wall.

   b) For a waterfront structure round concrete piles are planned for use as foundation. The soil at the site is medium dense to dense sand having $\phi = 39°$, $\nu = 19.5 kN/m^3$. and submerged unit wt $\nu' = 10.5 kN/m^3$. The water table located at a depth of 3.0m from the ground surface. As per the design requirements driven piles of 300mm diameter and 8.0m long have to be used.
   Determine the design load considering, factor of safety of 2.0. Assume k = 3.0 and $\delta = 25°$.

6. a) Discuss various types of cellular cofferdams, with their suitability to various conditions & situations.

   b) For a well foundation draw a schematic diagram showing all major components and their design criteria for any three components.

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