

P310/JPO/01/007-9-12-323

Master

- N. B. :** (1) Question No. 1 is **compulsory**.  
 (2) Attempt any **four** questions among the remaining.  
 (3) Draw **neat** labeled sketches whenever **required**.  
 (4) Assume **suitable** data if required with proper justification and highlight the **same**.

1. (a) What are types of clay deposits? Discuss with the help of void ratio 'vs' effective stress curve. 20  
 (b) Compare the results of  $\overline{CU}$  and CD tests on clay.  
 (c) Briefly discuss the vertical stress  $\sigma_z$ , (x, z) for a Line Load.  
 (d) How do you consider effect of compressibility of on ultimate bearing capacity ?  
 (e) Briefly discuss various loads acting on pile foundation. Draw free body diagram for a single pile subjected to axial load.
  
2. (a) Draw C/s and plan of vertical drains with preload. Show clearly triangular pattern, spacing of drains, diameter of influence zone, position of various equipments and their functions. How do you determine time required for 90% consolidation ? 15  
 (b) How do you determine load carrying capacity of stone column ? 5
  
3. (a) In a triaxial test, a soil sample was consolidated under a cell pressure of 700 kN/m<sup>2</sup> and a back pressure of 350 kN/m<sup>2</sup>. Thereafter with drainage not allowed the cell pressure was raised to 800 kN/m<sup>2</sup> resulting in increased pore water pressure to 445 kN/m<sup>2</sup>. The axial load was then increased to give a deviator stress of 575 kN/m<sup>2</sup> (cell pressure remained at 800 kN/m<sup>2</sup>) and pore water pressure reading of 640 kN/m<sup>2</sup>. Calculate pore pressure coefficient A and B. 10  
 (b) Write stepwise method of extrapolation of field consolidation curve. 10
  
4. (a) For a laboratory consolidation test on a clay specimen (drained on both sides), the following results were obtained. 10  
 Thickness of clay soil = 25 mm  
 $\sigma_1' = 50 \text{ kN/m}^2$   $e_1 = 0.92$   
 $\sigma_2' = 120 \text{ kN/m}^2$   $e_2 = 0.78$   
 Determine the hydraulic conductivity (k) of clay for the loading range.  
 (b) Draw Mohr failure envelope for CD test on N-C clay. Write respective shear strength equation. Draw and discuss typical stress-strain curves and volume change characteristics of clay in CD test. 10

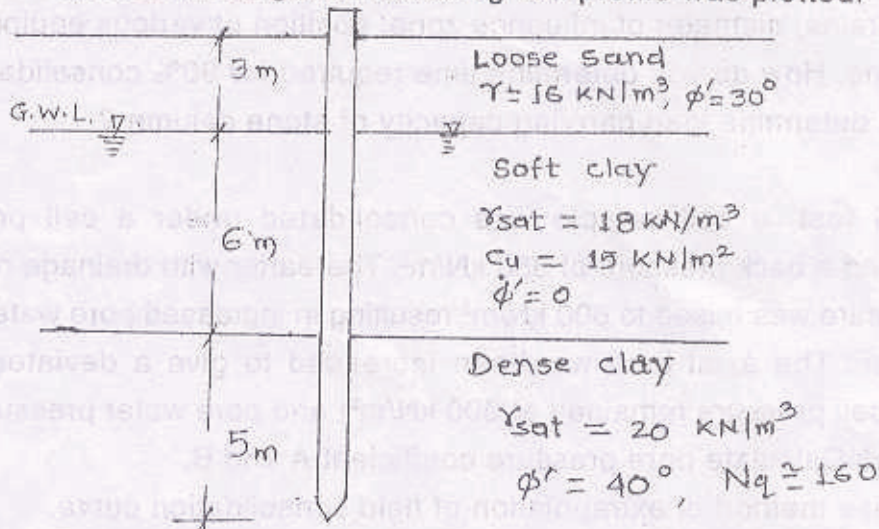
5. (a) A plate load test was conducted on uniform deposit of sand and following data were obtained. 15

Pressure, kN/m <sup>2</sup>	50	100	200	300	400	500	600
Settlement, mm	1.5	2.0	4.0	7.5	12.5	20	40.0

- (i) Plot the pressure - settlement curve and determine the failure stress.  
 (ii) Determine allowable bearing pressure, if permissible settlement of 40 mm of 2 m x 2 m and 1.5 deep footing factor of safety is 3. Take  $\phi = 38^\circ$   $N_f = 6.7$  and  $N_q = 50$ . Ground water table is at far depth.

- (b) Briefly write the method of separating skin friction and end bearing resistance in pile load test. 5

6. (a) In a sub-surface investigation following soil profile was plotted. 15



Determine the allowable pile load capacity of 40 cm diameter concrete pile.

Take  $\delta = \frac{3}{4} \phi$ ;  $k = 1$ .

- (b) Write limits of maximum and differential settlement for isolated foundation of R.C.C. structure as per I.S. 1904 (1986). Write allowable bearing pressure by any one method. 5

7. (a) Why do we need undisturbed samples? Describe any one procedure of obtaining the undisturbed samples for multistoried building project. 10

- (b) Describe in detail step by step procedure of construction of 'New marks' influence chart. Calculate upto 8<sup>th</sup> circle for any influence factor. 10