

BACHELOR OF ENGINEERING (CIVIL ENGINEERING) FOURTH YEAR SECOND SEMESTER SUPPLEMENTARY EXAM 2023

Design of Foundation

PART-I

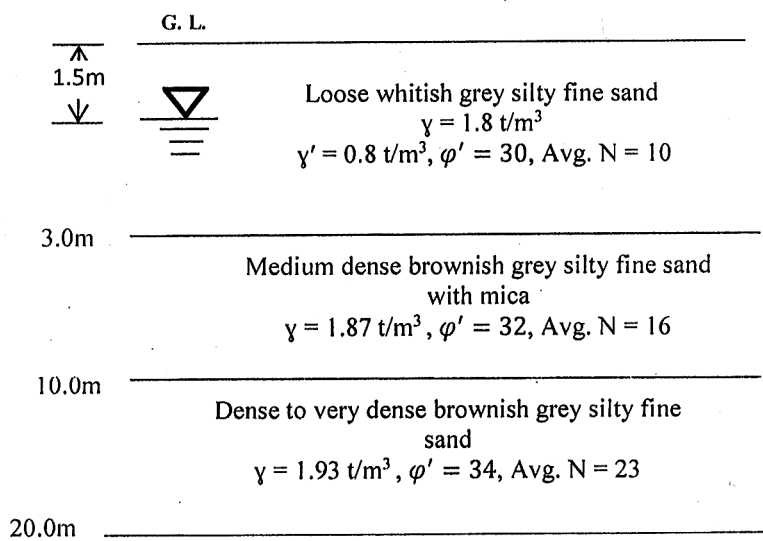
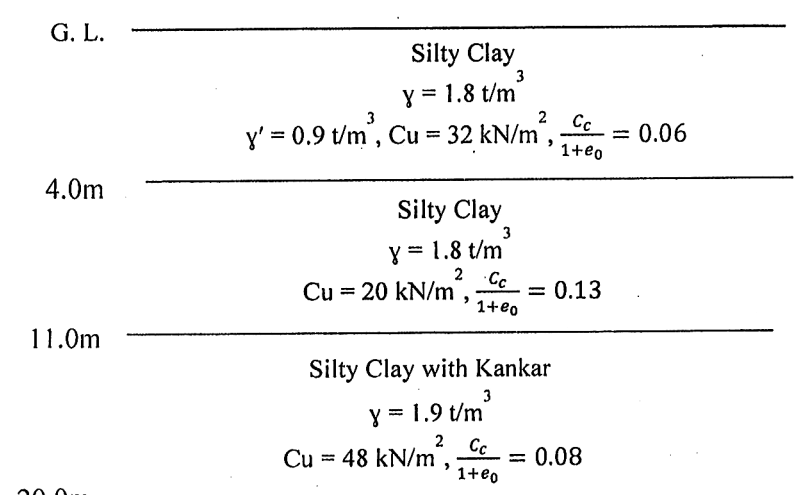
[Answer All the Questions]

[Use code: IS: 6403 & IS: 8009]

[Assume any data reasonably wherever necessary]

Total = 100

This Part = 50

1.	Discuss briefly the plate load test in connection with the determination of bearing capacity and settlement of granular soil.	[12]
2.	<p>Column carrying a superimposed load of 600 kN is to be founded on a sandy deposit as shown in the Figure below. Design a suitable isolated footing for the same.</p>  <p style="text-align: center;">G. L.</p> <p>1.5m ▽ =</p> <p>Loose whitish grey silty fine sand $\gamma = 1.8 \text{ t/m}^3$ $\gamma' = 0.8 \text{ t/m}^3$, $\phi' = 30$, Avg. N = 10</p> <p>3.0m</p> <p>Medium dense brownish grey silty fine sand with mica $\gamma = 1.87 \text{ t/m}^3$, $\phi' = 32$, Avg. N = 16</p> <p>10.0m</p> <p>Dense to very dense brownish grey silty fine sand $\gamma = 1.93 \text{ t/m}^3$, $\phi' = 34$, Avg. N = 23</p> <p>20.0m</p>	[20]
3.	<p>A raft foundation with dimensions 8m x 12m is to be constructed at a depth 1.5m below ground surface. The net foundation pressure can be taken as 38 kN/m². Calculate the total settlement of the foundation. The subsoil profile is given below. [Assume water table at the base of the footing]</p>  <p style="text-align: center;">G. L.</p> <p>Silty Clay $\gamma = 1.8 \text{ t/m}^3$ $\gamma' = 0.9 \text{ t/m}^3$, $C_u = 32 \text{ kN/m}^2$, $\frac{C_c}{1+e_0} = 0.06$</p> <p>4.0m</p> <p>Silty Clay $\gamma = 1.8 \text{ t/m}^3$ $C_u = 20 \text{ kN/m}^2$, $\frac{C_c}{1+e_0} = 0.13$</p> <p>11.0m</p> <p>Silty Clay with Kankar $\gamma = 1.9 \text{ t/m}^3$ $C_u = 48 \text{ kN/m}^2$, $\frac{C_c}{1+e_0} = 0.08$</p> <p>20.0m</p>	[18]

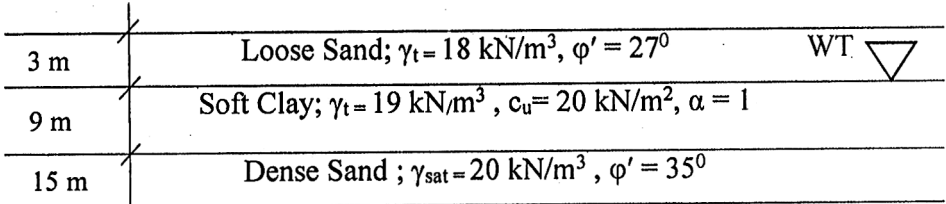
**B. E. (CIVIL ENGINEERING) FOURTH YEAR SECOND SEMESTER EXAM 2023
(Supplementary)**

**DESIGN OF FOUNDATION
PART-II**

Time: Three Hours

Full Marks 100
(50 marks for each part)

Use a separate Answer-Script for each part
[No code or handbook is allowed, assume any suitable data]

No. of questions		Marks (50)
1)	<p>Determine the allowable pile load capacity of a 750 mm RCC bored cast in situ pile of length 15 m installed in a soil as per following sub soil profile. Assume N_q value of loose and dense sand as 15 and 42 respectively, and assume value of δ and K as per Brooms recommendations.</p>  <p>The diagram shows a vertical cross-section of soil layers. The top layer is 3 m thick Loose Sand with $\gamma_t = 18 \text{ kN/m}^3$ and $\phi' = 27^\circ$. The middle layer is 9 m thick Soft Clay with $\gamma_t = 19 \text{ kN/m}^3$, $c_u = 20 \text{ kN/m}^2$, and $\alpha = 1$. The bottom layer is 15 m thick Dense Sand with $\gamma_{\text{sat}} = 20 \text{ kN/m}^3$ and $\phi' = 35^\circ$. A water table (WT) is shown as a downward-pointing triangle in the sand layer.</p>	15
2)	<p>A group of nine piles, each having diameter of 450 mm, length 15 m, and spacing 1050 mm is driven in a sandy soil deposit having depth 20 m, underlain by a hard stratum. Calculate ultimate load capacity of pile group. If settlement of a single pile at safe load capacity is 10 mm then what will be the settlement of the pile group. Assume the properties of sand as $\phi' = 32^\circ$; $\delta = \frac{3}{4} \phi'$; $N_q = 27$</p>	20
3)	<p>Write short note on any of the three:-</p> <ul style="list-style-type: none"> (a) Engineering News Formulae (b) Calculation of settlement of a pile group (c) Group action of pile group (d) Negative skin friction (e) Concept of critical depth in cohesionless soil 	5X3=15