Ref. No.: Ex/CE/5/T/408/2023

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

Design of Foundation

PART-I

Time : Three hours

[Answer All the Questions]

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

[Assume any data reasonably wherever necessary]

Use separate answer script for each Part

Total = 100

This Part = 50

1.	Discuss briefly the '*Location and Depth Criteria*' in the design of shallow foundation.	[10]
2.	Column carrying a superimposed load of 700 kN is to be founded on a sandy deposit as shown in the Figure below. Design a suitable isolated footing for the same. G. L. 1.5m Loose whitish grey silty fine sand $\gamma = 1.8$ t/m^3 $\gamma' = 0.8$ t/m^3, $\varphi' = 30$, Avg. N = 10 3.0m Medium dense brownish grey silty fine sand with mica $\gamma = 1.87$ t/m^3, $\varphi' = 32$, Avg. N = 16 10.0m Dense to very dense brownish grey silty fine sand $\gamma = 1.93$ t/m^3, $\varphi' = 34$, Avg. N = 23 20.0m	[20]
3.	A raft foundation with dimensions 7m x 13m is to be constructed at a depth 1.5m below ground surface. The net foundation pressure can be taken as 40 kN/m^2. Calculate the total settlement of the foundation. The subsoil profile is given below. [*Assume water table at 1m below ground surface*] G. L. Silty Clay $\gamma = 1.8$ t/m^3 $\gamma' = 0.9$ t/m^3, Cu = 32 kN/m^2, $\frac{C_c}{1+e_0} = 0.05$ 4.0m Silty Clay $\gamma = 1.8$ t/m^3 Cu = 20 kN/m^2, $\frac{C_c}{1+e_0} = 0.15$ 11.0m Silty Clay with Kankar $\gamma = 1.9$ t/m^3 Cu = 48 kN/m^2, $\frac{C_c}{1+e_0} = 0.09$ 20.0m	[20]

[Turn over

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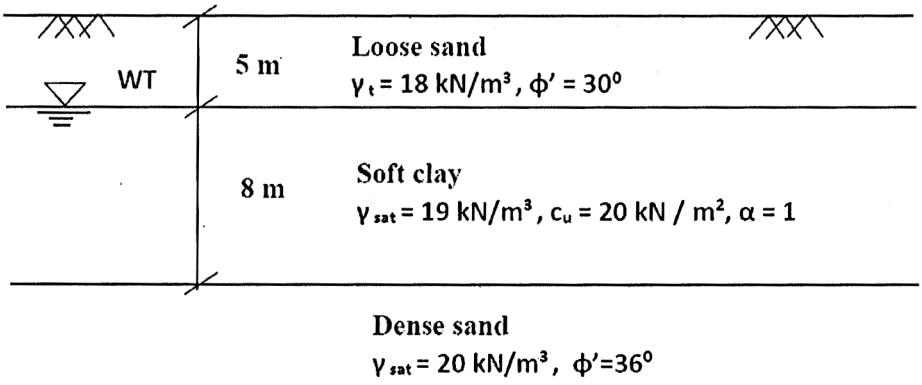
B. E. (CIVIL ENGIEERING) FOURTH YEAR SECOND SEMESTER EXAM 2023

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.	A group of nine piles arranged in a square pattern is used as a foundation in a soil deposit shown below. Each of the piles are 500 mm diameter and 15 m long, bored concrete pile and placed at 1250 mm in each direction. Determine allowable pile load capacity of a single pile. Further, calculate the ultimate pile load capacity of the pile group. Assume Nq value of dense sand as 30, and assume value of δ and K as per Brooms recommendation. 	20
2)	A group of four piles, each having diameter of 450 mm, length 10 m, and spacing 600 mm is driven in a clay soil deposit having depth 15 m, underlain by a dense sand. Calculate the settlement of the pile group. Vertical compressive load is 1200kN. Assume the properties of clay as γ_{sat} = 20 kN/m², Liquid limit = 45 %, Plastic limit = 25 %, Void ratio = 1.03	15
3)	What are types of load tests on piles as per IS 2911 Part IV, describe in brief. What is allowable load on a single pile, in terms of pile load test data as per IS 2911 Part IV	5

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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)
4)	Write short note on any of the two:- (a) Group action of pile group (b) Negative skin friction (c) Classification of pile foundation based on installation techniques; advantages & disadvantages of each type (d) Concept of critical depth in cohesionless soil	5 X 2=10