

**BACHELOR OF ENGINEERING (CIVIL ENGINEERING)
FOURTH YEAR SECOND SEMESTER EXAM 2024**

Design of Foundation

PART-I (50 Marks)

[Answer All the Questions]

[Use code: IS: 6403, IS: 2131, IS: 1904 (2021), IS: 8009 (Part-I)]

Time : Three hours [Assume any data reasonably wherever necessary]

Use separate answer script for each Part

Full Marks : 100

1. An isolated footing (2.5 m x 2.5 m) in a building carries a superimposed load of 900 kN. The subsoil condition is shown in the figure (Fig. 1). Calculate total settlement of the foundation under the load using the following method: (i) Using SPT 'N' value, (ii) Using SCPT value and (iii) Elastic Method

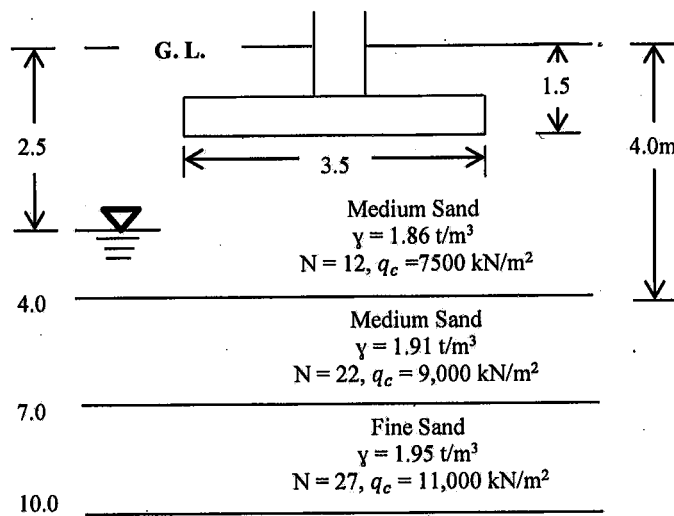


Fig. 1

[15]

2. An isolated column in a building frame carries a superimposed load of 450kN. The subsoil condition is shown in the figure (Fig. 2) below. Design a suitable isolated footing for the column. [Assume water table at 1m below ground surface]

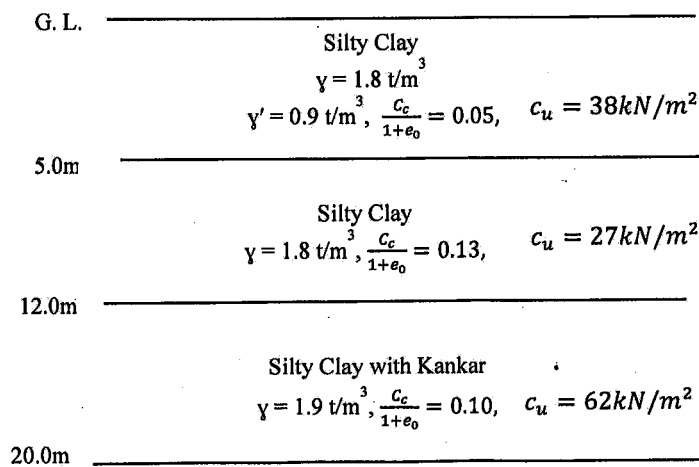


Fig. 2

[20]

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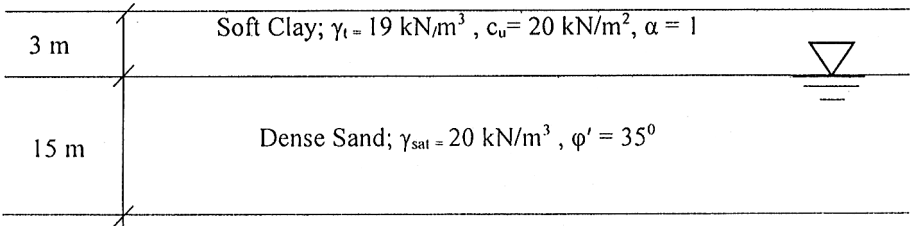
3.	Determine the size of a combined footing with the following data: Number of columns: 2 Load on left column: 450 kN Load on right column: 550 kN Safe Bearing Capacity: 140 kN/m ² Centre-to-centre distance between columns: 3.5m Based on the property line the distance from the left face of the foundation to centre of left column should be 1.5m	[6]
4.	Discuss different types of raft foundations with neat sketches.	[9]

B. E. (CIVIL ENGINEERING) FOURTH YEAR SECOND SEMESTER EXAM 2024
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 dia. RCC bored cast in situ pile of length 12 m installed in a soil as per following sub soil profile. Assume N_q value of dense sand as 42, and assume value of δ and K as per Brooms recommendations. Pile cut off level at 1 m below GL, and water level at 3 m below GL</p> 	10
2)	If a group of nine piles (3 X 3), as per details of question no (1) is installed in the same soil, then calculate ultimate load capacity of the pile group.	10
3)	Calculate the settlement of a pile group of nine (09) (3X3) piles of diameter 500 mm, spaced @ 1500 mm c/c, having length 9 m each, installed in a uniform clay deposit having properties as $\gamma_{sat} = 20 \text{ kN/m}^3$, Liquid Limit = 40 %, Plastic Limit = 25 %, Initial void ratio, $e_0 = 1.05$; Assume rigid pile cap of thickness 800 mm, pile cut off level at 1.5 m below GL, total vertical load on the pile group as 750 kN & depth of hard stratum at 15 m below GL.	15
4)	Write short note on: - (a) Group efficiency (b) Initial pile load test and routine pile load test (c) Negative skin friction	5X3=15