Ex/ CE/ 5/ T/ 408/ 2018

B.E. CIVIL ENGINEERING (PART TIME) FOURTH YEAR SECOND SEMESTER, 2018

DESIGN OF FOUNDATION

Time : Three hours

Full Marks : 100

Part – I

Q. 1 is compulsory and answer any two from the rest.

1. A typical column of the multi-storeyed building is subjected to the following loads at ground level.

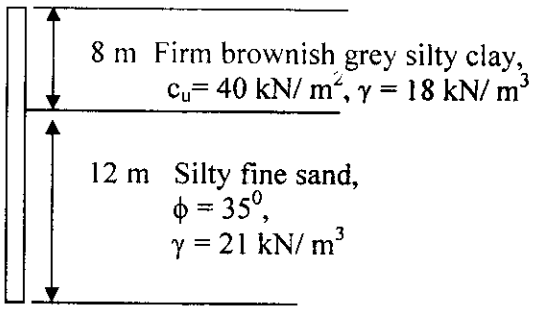
Vertical Load V (kN)			M_{xx} (kN-m)		M_{yy} (kN-m)		Base Shear (kN)	
DL	LL	SL	DL+LL	SL	DL+LL	SL	H_x (SL)	H_y (SL)
5500	760	657	123.5	-	115.2	985	380	-

Using 750 mm diameter bored piles design a suitable pile group for the column. Also determine the moment due to horizontal load for which the section should be designed. The soil profile is given below. 12

For c_u= 40 kN/ m^2, adhesion factor is 1.0

For $\phi = 35^0$, $N_q = 50$

Ground water table is at ground surface.



Pile is 20 m long. Take stiffness factor of pile-soil system is 5 m.

For $L_1/R = 0$, $L_f/R = 1.65$ and reduction factor of moment is 0.7

2. (a) What is meant by dynamic load carrying capacity of pile? 2

(b) A pile was driven by a winch operated drop hammer weighing 10 kN with a height of fall of 2 m. The driving was done without a dolly and helmet, but with a cushion of 25 mm thickness. The average penetration per blow for the last few blows was 10 mm. the diameter of the pile was 300 mm and its length 10 m. The co-efficient of elastic restitution was 0.4. Taking unit weight of concrete as 23.5 kN/ m^3, calculate the safe load one the pile adopting a factor of safety of 5. 9

(c) Write a short note on "pile load test". 4

(d) How will you determine pile load carrying capacity using in-situ soil test? 4

3. (a) What is pile foundation? What do you understand by end bearing pile and friction pile? 2+3

(b) Classify various types of pile foundations based on method of installation. 3

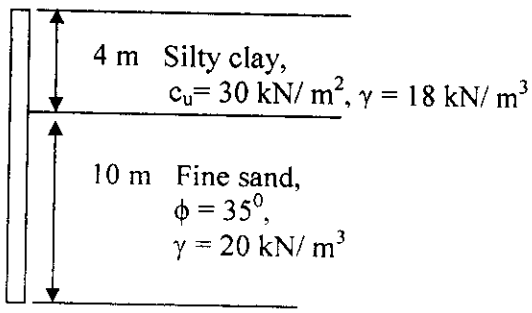
(c) What is meant by "Critical depth"? Explain. 3

(d) Calculate allowable load carrying capacity of a circular bored pile with diameter 60 cm and penetrating through two layers of soil. The soil properties in each layer are given below. 8

For c_u= 30 kN/ m^2, adhesion factor is 1.0

For $\phi = 35^0$, $N_q = 50$

Ground water table is at 2 m below ground surface.



4. (a) A group of 9 piles with 3 piles in a row was driven into a soft clay extending from ground level to a great depth. The diameter and the length of the piles were 30 cm and 10 m respectively. The unconfined compressive strength of clay is 70 kPa. If the piles were placed 90 cm c/c, compute the allowable load on the pile group on the basis of a shear failure criterion for a factor of safety of 2.5. Take $\alpha = 1.0$. 8

(b) Write a short note on "Negative skin friction". 3

(c) Explain Brom's method to estimate ultimate lateral resistance of pile. 8

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B.E. CIVIL ENGINEERING (PART TIME) EXAMINATION, 2018

(4^{TH} Year, 2^{ND} Semester)

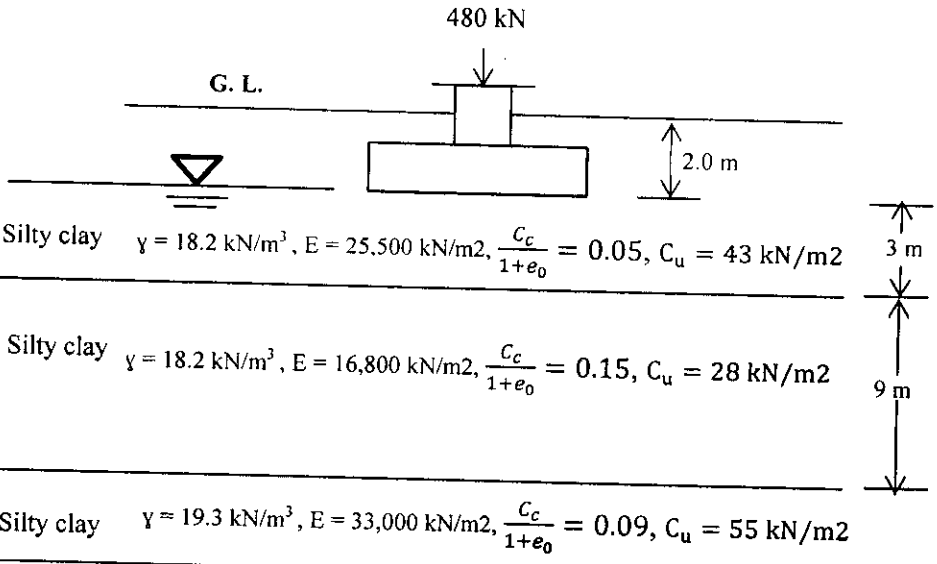
DESIGN OF FOUNDATION

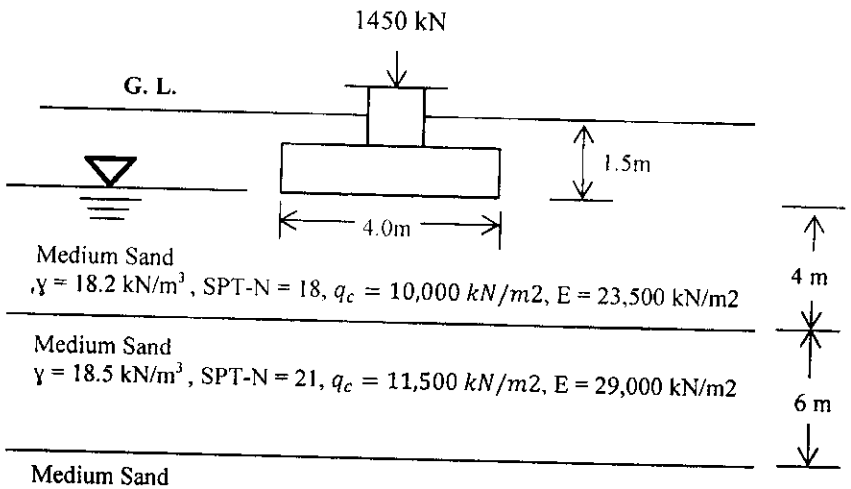
[PART-II]

Time: Three Hours

Full Marks 100
(50 marks for this part)

Question No.	(Answer all the questions.) [Assume any data reasonably if necessary]	Marks
1.	An isolated column in a building carries a superimposed load of 480kN.The subsoil condition is shown in the Fig. Design a suitable square footing for the column. (Assume Pore pressure coefficient A = 0.6)	20
2.	A 4m x 4m foundation is placed 1.5m below GL in a stratified sandy deposit as depicted in the following figure. Calculate the settlement of the foundation using (a) Elastic Theory (b) Buisman method and (c) SCPT value.	15





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B.E. CIVIL ENGINEERING (PART TIME) EXAMINATION, 2018

(4^{TH} Year, 2^{ND} Semester)

DESIGN OF FOUNDATION

[PART-II]

Time: Three Hours

Full Marks 100
(50 marks for this part)

Question No.	(Answer all the questions.) [Assume any data reasonably if necessary]	Marks
3 (a)	A 30 x 30 cm square test plate settles by 18mm in a plate load test conducted on a granular soil when the loading intensity was 200 kN/m^2. Estimate the settlement of a 1.5m x 1.5m square footing, resting on the same soil, at the same intensity of loading.	[5]
(b)	Discuss the limitations of plate load test.	[4]
(c)	Write a short note on 'the choice of foundation'.	[6]

Required Graphs and Tables

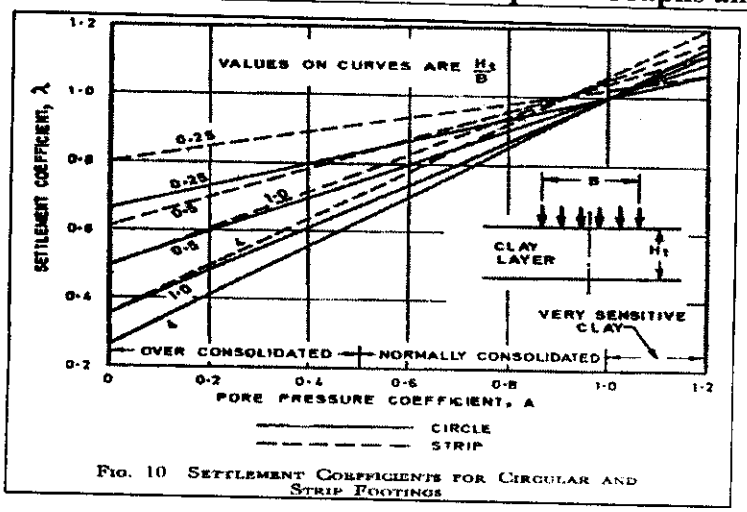
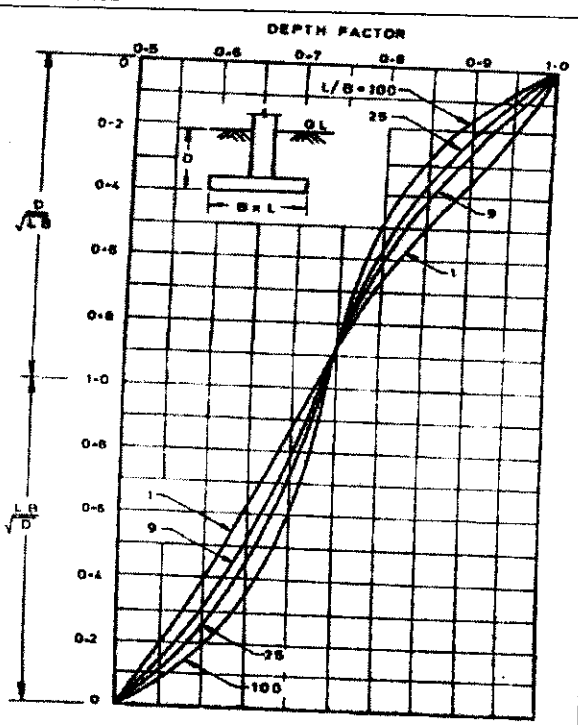


FIG. 10 SETTLEMENT COEFFICIENTS FOR CIRCULAR AND STRIP FOOTINGS



SHAPE	INFLUENCE FACTOR (I)		
	Centre	Corner	Average
(1)	(2)	(3)	(4)
Circle	1·00	0·64 (edge)	0·85
Square	1·12	0·56	0·95
Rectangle:			
L/B = 1·5	1·36	0·68	1·20
2	1·53	0·77	1·31
5	2·10	1·05	1·83
10	2·52	1·26	2·25
100	3·38	1·69	2·96