B.E. CIVIL ENGINEERING (PART TIME)
FOURTH YEAR SECOND SEMESTER EXAM 2018 (Old)
DESIGN OF FOUNDATION

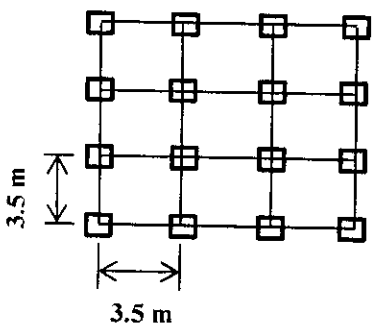
Time: Three Hours

Full Marks 100

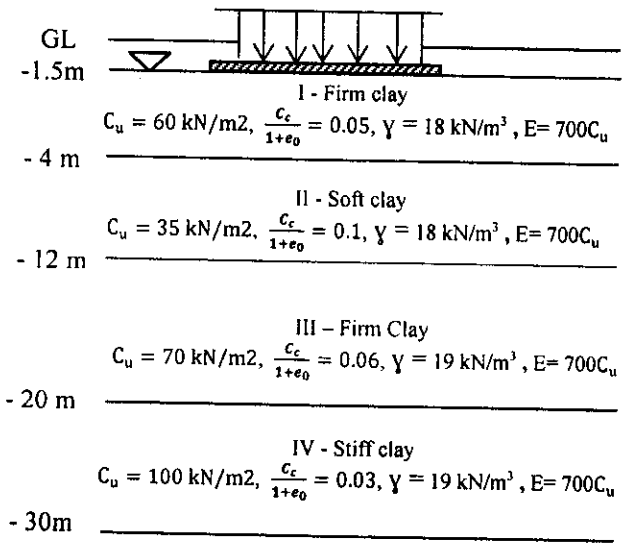
Question No.	[Assume any data reasonably if necessary]	Marks

Q. 1 and Q. 2 are mandatory.

1. Design a raft foundation for the building shown in Figure below:

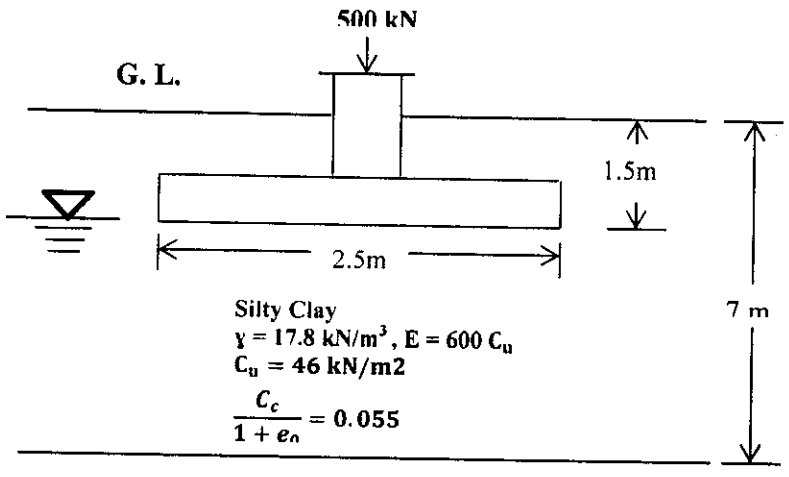


[Inner Columns = 600 kN each]
Outer Columns = 400 kN each]



[25]

2. (a) Figure shows an isolated footing which carries a vertical load of 500 kN and is supported on a footing, 2.5m x 2.5m, placed 1.5 m below the G. L. The subsoil consists of 7.0 m of silty clay (C_u = 46 kN/m2,) followed by a sandy layer (N = 25). Calculate the settlement of the footing. (Assume reasonable correction factor for 3D consolidation).



[15]

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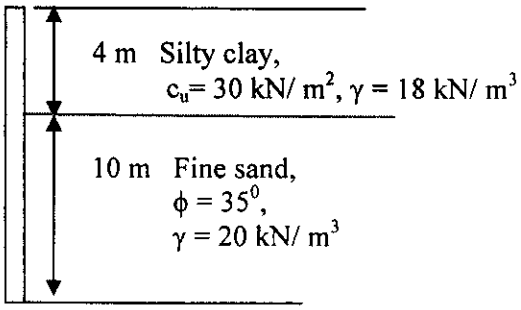
Question No.	[Assume any data reasonably if necessary]	Marks
(b)	Write a short note on "The choice of foundation".	[10]
	Q. 6 is compulsory and answer any two from the rest	
3. (a)	What is pile foundation? What do you understand by end bearing pile and tension pile?	2+3
(b)	Write short note on (i) Compaction pile, (ii) Anchor pile	2.5+2.5
(c)	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. For c_u= 30 kN/ m^2, adhesion factor is 1.0 For $\phi = 35^0$, $N_q = 50$ Ground water table is at 1 m below ground surface. 	10
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 40 cm and 12 m respectively. The unconfined compressive strength of clay is 80 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 $\alpha = 1.0$.	9
(b)	What is meant by dynamic load carrying capacity of pile?	2
(c)	Explain "Engineering News formula" for dynamic pile load carrying capacity.	5
(d)	How can you classify a pile long or short with reference to stiffness factor of pile-soil system?	4
5. (a)	What is lateral resistance of pile?	2
(b)	Discuss I.S. code method of lateral resistance of pile foundation.	7
(c)	How can you estimate vertical pressure under uniformly loaded circular area? Explain.	7
(d)	State the assumptions used in Boussinesq equation?	4
6. (a)	What is meant by "Geostatic stress"?	2

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(b)	Three parallel strip footing 3 m wide and 5 m apart centre to centre transmit contact pressures of 200, 150, 100 kN/ m^2 respectively. Calculate vertical stress due to the combined loads beneath the centres of each footing at a depth of 3 m below the base. Assume the footings are placed at a depth of 2 m below the ground surface. Use Boussinesq's method for line loads.	8

[Necessary Graphs and Tables]

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