Ex./CON/T/321/2017

BACHELOR OF CONSTRUCTION ENGINEERING EXAMINATION, 2017

(3rd Year, 2nd Semester)

Foundation System

Time : Three hours

Full Marks : 100

Part - I

Answer any two questions.

Q.1.(a) Write a short note on various IS codes on pile foundations. 5

Q.1.(b) Given below is the details of sub-soil profile of a site.

Strata No.	Soil stratification	Type of Soil	Thickness (m)	Design Parameter		Bulk Density, T/m^3
				c_u T/m^2	ϕ_u	
I	Soft grey silty clay	c	1.9	2.8	0.0	1.82
II	Soft/very soft grey silty clay	c	7.1	1.9	0.0	1.73
III	Stiff bluish grey silty clay	c	5.5	7.5	0.0	1.89
IV	Medium dense yellowish brown silty sand	phi	4.5	0.0	30^0	1.90

Deep foundation has been recommended for the site. State what kind of pile foundation will be suitable for the site, bored-cast-in-situ or driven? Give reasons in support of your answer.

The water table may be assumed to be located at 1.5 m below the ground surface. Determine the safe vertical load carrying capacity of a 450 mm diameter driven pile having cut-off level at a depth of 1.5m below ground level.

Assume length of pile as 17.5m.

Use of relevant IS code is allowed. 15

Q.1(c) State the criteria for safe load for finding the lateral load and uplift load from pile load tests as per IS code. 5

Q.2(a) Briefly describe the pile driving formulae by Hiley and Simplex explaining the meanings of the various terms. 5

Q.2(b) What is wave equation? Explain CAPWAP. 5

Q.2(b) A 400 x 400 mm RC pile 20m long weighing 74kN is driven as a bearing pile with a set of 30 mm for last blows using a drop hammer 30kN in weight falling through 1.5m. Determine the capacity of the pile assuming the weight of the dolly, helmet and packing is 4kN. Use Janbu formula.

15

Q.3(a) Write short notes on : 5

i) Initial test

ii) Routine test

Q.3(b) Determine the silt factor of soil collected from a river bed with the following gradations. If the highest flood level be obtained as 2 x dsm in the vicinity of piers, determine the founding depth of well foundations. The design discharge may be considered as 25000 cumecs over an effective linear waterway of 450 m. 15

Sieve Size (mm)	Weight of soil retained (gm)
4.75	0
2.00	24.5
1.00	50
0.600	150
0.425	175
0.300	50.5
0.150	25
0.075	25
Pan	20

Q.3(d) Explain tilt of well. How this can be rectified? 5

FOUNDATION SYSTEM PART- II **Ref. No.: Ex/CON/T/321/2017**

Answer any two questions.

Assume relevant data if required.

Q1. Design a strip foundation for five columns which at are placed at a c/c distance of 3.5 m in a row of a RCC framed building resting in a sub soil C= 35 kN/m^2 , Y= 19 kN/m^3 and $C_c/(1+e_0)$ = 0.06 as shown in figure-1. (13)

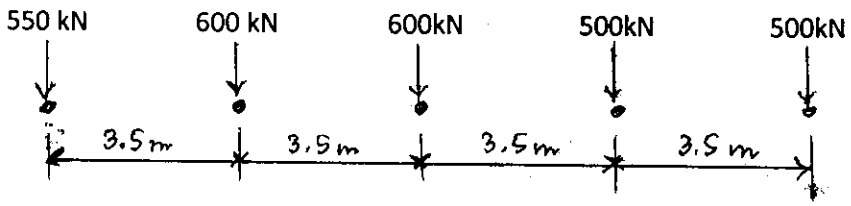

Fig-1.0

(b) Also design the columns with isolated type of footing so that no differential settlement will occur between the footings. (12)

Q-2.(a) Design a raft foundation of 8m × 12 m size with one basement floor for a five storied building on the same sub soil as specified in Question -1(a). (14)

(b) Write notes on (i) Hansen's method (ii) Skemptons method (iii) Mayerhof's method.

(4+4+3)

Q-3. (a) Design a square footing using Teng's correlation to carry vertical load of 150 t from a column with a foundation depth of 2.0 m below ground level and permissible settlement of 40 mm. The average N value of Sandy sub soil is 18 and the water table is at a large depth. (12)

(b) If an angular distortion of 1/3000 is allowed between columns 7.5 m apart , what will be the value of differential settlement. (3)

© Explain punching shear failure. (5)

(d) Describe the factors which are to be considered seriously for laying shallow foundation. (5)