

B. Constn. Engg. 4th Year 1st Sem. Supplementary Exam. 2017

Foundation System

Full Marks: 100

Time: Three hours

Part - I

Answer any two questions.

Q.1.(a) Write a short note on various codes on pile foundations. 7

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 brownish grey silty clay	c	1.9	2.8	0.0	1.82
II	Soft grey/dark grey Silty Clay	c	6.1	2.9	0.0	1.73
III	Stiff bluish grey Silty Clay	c	6.5	7.5	0	1.89
IV	Dense yellowish brown silty clay	phi	4.5	0.0	30	1.90

If deep foundation is to be adopted, 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 the ground surface. Determine the safe vertical load carrying capacity of a 750 mm diameter bored-cast-in-situ 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.

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Q.1(c) Calculate the safe uplift load for the above pile. Assume M30 grade of concrete. 8

Q.2(a) State and explain the various clauses of IS code on pile load test. State separately for vertical, lateral and uplift capacities. 10

Q.2(b) A 400 x 400 mm RC pile 20m long weighing 74 kN is driven as a bearing pile with a set of 30 mm for last last blows using a drop hammer 30 kN in weight falling through 1.5 m. Determine the capacity of the pile assuming a weight of dolly, helmet, packing is 4 kN. Use Janbu formula. 15

Q.3(a) Write short notes on :

5

i) CAPWAP analysis

ii) Field measurement of set of piles.

Q.3(b) Determine the silt factor of soil collected from a river bed with the following gradations. Write the expressions for founding depth of well foundations.

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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(c) What do you mean by well foundations? Briefly enumerate its various applications.

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Assume relevant data wherever required.

Answer any two questions.

1. Determine the (a) ultimate bearing capacity (b) net ultimate bearing capacity (c) net ultimate safe bearing capacity and (d) allowable bearing capacity of a soil with 2m square footing resting on silty sand having $\phi = 30$ degree , $E = 1000 \text{ t/m}^2$ at a depth of 1.0 m. Also find out the changes in allowable bearing capacity of soil if the footing is 2 m wide strip. (25)

2. Write notes on the following.

(a) Local shear failure.

(b) Skempton's theory

(c) Depth correction factor

(d) Rigidity correction

(e) Differential settlement. (5 X 5 = 25)

3. Determine the design bearing capacity of a Raft foundation (10m X 20m) resting on soft clay $C = 2.5 \text{ t/m}^2$, $m_v = 0.0040 \text{ m}^2/\text{t}$ resting with one basement. Find out the degree of compensation of the raft for recommended depth. (20 + 5)