Ex/CON/T/321/2019

B. Constn. Engg. 3rd Year 2nd Sem. Exam. 2019

Foundation System – I

Time : Three hours | Full Marks : 100

Part - I

Answer any two questions.

Q.1.(a) Explain the significance of various terms in the formula for determination of static load carrying capacity of bored and cast-in-situ piles as given in IS codes. Discuss how these components are derived? 5

Q.1.(b) Throw light on using the appropriate factor of safety for the various components of this expression giving reasons. 3

Q.1.(c) Illustrate the significance of critical depth giving neat sketch. Discuss its values as per the IS code. 5

Q.1.(d) 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/m³
				c_u T/m²	φ	
I	Fill layer consisting of brick-bats, rubbish etc.	c	1.5	2.1	0.0	1.83
II	Soft brownish grey silty clay	c	1.9	2.4	0.0	1.79
III	Medium stiff grey silty clay	c	6.7	3.5	0.0	1.81
IV	Stiff bluish grey silty clay	c	7.4	6.8	0	1.89
V	Medium dense/dense yellowish brown silty sand	phi	4.9	0.0	30	1.90

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

Assume shaft length of pile as 15 m.

Use of relevant IS code is allowed. 12

Q.2(a) What do you mean by negative skin friction of piles? Discuss its various causes. State the methods of overcoming this phenomenon. 5

Q. 2 (b) State and explain the Converse-Labarre Equation in connection with determining the group efficiency of piles giving neat sketches. 10

Q.2(d) Compute the efficiency of a group by the above formula for a single pile capacity of 600kN. Assume D = 400mm, s = 1000mm (bothways), m = 5, n = 3. Consider all cohesionless material in embedment zone. 10

Q.3(a) What are the criteria for ascertaining safe lateral load on single pile from initial load test? 5

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

i) Initial test

ii) Routine test

Q.3(c) Determine the silt factor of soil collected from a river bed with the following gradations. 10

Sieve Size (mm)	Weight of soil retained (gm)
4.00	0
2.00	16.2
1.18	76.5
0.425	79.2
0.150	150.4
0.075	41.0
Pan	55.4

Q.3(d) What do you mean by tilting of wells? How this can be rectified? 5

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B.E CONSTRUCTION ENGINEERING 3rd YR 2nd SEMESTER EXAMINATION-2019

FOUNDATION SYSTEM PART-II FULL MARKS: 50

Answer either Question [2 (a) (i) + 2 (a) (ii)] or Question [2 (b) (i) + 2 (b) (ii)] and

Similarly answer either Question [3 (a) (i) + 3 (a) (ii)] or Question [3(b) (i) + 3 (b) (ii)]

Different part of the same question should be answered together. [Assume relevant data if required]

No code is allowed in examination hall.

CO-1.

Q-1. (a) Explain the significance of differential settlement and angular distortion with reference to the stability of different types of structures resting on different types of subsoil. (10)

CO-2 (a) (i) Describe the limitations of plate load test for estimation of foundation settlement .(7)

(ii) Explain the method of estimation of settlement using De Beer & Marten's approach. (8)

OR

(b) (i) Explain the significance of the corrections required for estimation of settlement of shallow foundation. (8)

(ii) Explain the significance and assumptions of Vesic's bearing capacity factors . (7)

CO-3

Q-3.(a) (i) Design three isolated RCC footings with zero differential settlement , which are carrying axial loads of 30 ton , 40 ton and 45 ton spaced @ 4m c/c . The footings are to be placed in a subsoil with C= 3.0 t/ m^2 ; $\gamma = 1.84$ t/m^3 , $m_v = 0.0035$ m^2 /t . (12)

AND

(ii) Determine the feasibility of construction of a G+4 storied building with strip footing in the same subsoil as specified in the problem 3 (a) (i) above. (13)

OR

Q-3(b) (i) A square footing with 2.0 m base width is located at a depth of 1.5 m in a sandy subsoil with a ground water table lying at a depth of 2.0 m b.G.L. The average N value of soil below the base level of the footing is 25. Determine the net allowable bearing pressure for a factor of safety of 3 against shear failure and a permissible settlement of 25 mm. [Use Teng' equations] (10)

AND

Q-3(b) (ii) Design a raft foundation of size [12m X 20m] for a B+G+5 storied building in a subsoil as specified below

$[C_c/ 1+ e_0] = 0.086$, $C_u = 35$ KN / m^2 $\gamma_{sat} = 19$ KN /m^3 $\phi_u = 0.$

Calculate the degree of compensation for the proposed raft. (15)