B.E Construction Engineering 3rd year 2nd semester examination 2023

Foundation Engineering

Time : Three hours   **(50 Marks for each Part)**   Full Marks : 100

Use separate answer script for each Part

PART I (50 Marks)

Answer any two questions

Assume relevant data if required.

Q-1. (a)). Explain the advantage and disadvantage of strip footing , isolated footing and raft foundation   (6) CO1

(b) Explain different types of shear failure of shallow foundation using load settlement diagram.   (8)   CO2

(c) Define angular distortion and differential settlement of foundation and significance of those in stability of RCC framed structure. (8) CO1

(d) Write the number of the codes used in shallow foundation design . (3) CO1

Q-2 (a) How bearing capacity of shallow foundation may be estimated using SPT value ?   [6]   CO3

(b) Estimate the safe load on a rectangular footing [2m * 2.5 m] resting on a loose sand deposit at a depth of 1.2 m b.g.l [$\phi = 26^0$ $\gamma = 1.85$ t/ m^3] .   [10] CO3

ϕ	Nq	N$_\gamma$
15	3.94	2.65
20	6.40	5.39
25	10.88	10.98

(c) explain the significant depth of soil below foundation for estimation of settlement. [5]   CO3

[Turn over

(d) Why a minimum spacing between two adjacent footing is required ? [4] CO2

Q-3. (a) Design a raft foundation [15m * 20m] for a six storied building with a basement which rests on a sub-soil of medium soft clay with $c = 3$ t/m^2 , $\gamma = 1.86$ t/m^3 $m_v = 0.0038$ m^2/t . [15] CO3

(b) Define floating raft and estimate the degree of compensation for the raft designed in question 3(a) [5] CO3

(c) Write notes on ground water table correction factor . [5] CO2

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SUBJECT: FOUNDATION ENGINEERING

PART - II (50 Marks)

Answer any TWO questions.

	No. of Questions		Marks
CO1 & CO4	Q1.a)	Differentiate between a shallow foundation and a deep foundation.	
	Q1. b)	At a site, the subsoil profile reveals a deposit of clay upto a depth of 9 m below EGL. The geotechnical properties are: c_u = 3.0t/m² and γ_t = 1.82t/m³. This layer is underlain by sand upto great depth having φ = 30° and γ_t = 1.91t/m³. Assume water table is at ground level. i) Determine the vertical load carrying capacity of a 750 mm diameter concrete pile. ii) Determine the capacity of the same against uplift. iii) Also calculate the lateral load carrying capacity of this pile. Assume grade of concrete as M30. Use of relevant IS code is permissible.	5 + 10 + 5 +5
CO4	Q2.a)	Name the IS code for load test on piles. What are the various tests carried out on piles in the field?	
	Q2.b)	From the data of the cyclic load test conducted on a pile, given below, determine the values of point resistance and skin friction at an estimated allowable load of 1000 kN. Assume pile dia as 300MM, length as 12.4M and Grade of concrete as M25.	
		<table><tr><td>Load (KN)</td><td>Total</td><td>Residual</td><td>Recovery</td></tr><tr><td>200</td><td>2.72</td><td>1.49</td><td>1.23</td></tr><tr><td>400</td><td>5.55</td><td>3.31</td><td>2.24</td></tr><tr><td>600</td><td>10.60</td><td>5.40</td><td>5.20</td></tr><tr><td>800</td><td>24.08</td><td>14.08</td><td>10.00</td></tr><tr><td>1000</td><td>31.46</td><td>18.26</td><td>13.20</td></tr><tr><td>1200</td><td>42.62</td><td>24.17</td><td>18.45</td></tr></table>	7 +18
CO5	Q.3(a)	Explain islanding by Bullah Cofferdam and Sheet Pile Cofferdam.	

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PART - II

Q.3(b)	Determine the silt factor from the following data.	
	Sieve size (mm) Percent retained	
	4.00 0	
	2.00 3.87	
	1.18 18.27	
	0.425 18.92	
	0.150 35.92	
	0.075 9.79	
	Pan 13.23	7 + 18
	Calculate the maximum scour depth considering the above silt factor, given the discharge to be 150 cumecs per m. width.	