



End Semester Examination – Nov/Dec – 2016

Code : 14CE3018
Sub. Name : Design of Substructures

Semester : 2016-17 ODD
Duration : 3hrs
Max. marks : 100

ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)

Q. No	Sub Div.	Questions	Course Outcome	Marks
1.	a.	Discuss about the reasons for failure of foundations and selection of a good foundation	CO 2	5
	b.	Enumerate the steps involved in soil exploration	CO 1	5
	c.	Describe any 2 laboratory tests for soil investigation	CO 1	5
	d.	Explain any one NDT technique of soil investigation	CO 1	5
(OR)				
2.	a.	Design a suitable combined footing for 2 columns of size 50 cm x 50 cm each separated by a center to center distance of 6m. The ends of footing are curtailed at the edge of 2 columns. Allowable soil pressure 200kN/m ²	CO3	20
3.	a.	Compute the SBC of the square footing constructed at a depth of 1m below the ground level to carry a load of 1000kN. The properties of the soil are $c = 10\text{kN/m}^2$, $\phi = 35^\circ$, $\gamma_{\text{dry}} = 17.6\text{ kN/m}^3$ and $\gamma_{\text{sat}} = 17.6\text{ kN/m}^3$. Groundwater table is at ground level. Also, determine the dimensions of the square footing so that the factor of safety against the bearing capacity failure = 2.5. Assume $N_c = 46.12$, $N_q = 33.33$, $N_\gamma = 48.03$.	CO 3	7
	b.	Differentiate the types of foundations with necessary sketches	CO 2	8
	c.	Define General, Local and Punching Shear failures	CO 2	5
(OR)				
4.	a.	Design a suitable combined footing to support 2 adjoining columns 50cm x 50cm at a distance of 5m center to center and carrying loads of 4mN and 5mN. The lighter column is very near to the property line. Allowable soil pressure is 400kN/m ²	CO 3	12
	b.	Explain different types of Raft Foundations	CO 2	8
5.	a.	Explain negative skin friction.	CO 2	5
	b.	Describe the group action of piles	CO 2	5
	c.	Enumerate the classification of piles according to their materials	CO 2	5
	d.	Write down the precautions to avoid tilts and shifts	CO 2	5
(OR)				
6.	a.	A concrete pile of 35cm diameter is driven into a medium dense sand having $\phi = 35^\circ$, $\gamma = 25\text{kN/m}^3$, $K = 1$, and $\tan\delta = 0.7$ for a depth of 8m. Estimate the safe load for a FOS = 3. Take $N_q = 60$, $D_c/B = 13$	CO 3	12
	b.	A pile driven is with a single acting steam hammer of weight 15kN with a free fall of 900mm. In the final set, the average of last 3 blows in 27.5mm. Find the safe load using Engineering News Record Formula.	CO 3	8
7.	a.	Write down the classification of clays.	CO 1	5
	b.	Explain methods of foundations in expansive soils.	CO 2	15
(OR)				

8.	a.	Explain CNS concept.	CO 2	5
	b.	Enumerate the methods for vibration isolation	CO 2	5
	c.	Sketch the 3 types of Impact – type machines	CO 1	10
<u>Compulsory:</u>				
9.	a.	Discuss in detail the application areas of reinforced earth with neat sketches	CO 1	20

Course Outcome:

Students at the end of the course will be able to:

CO1: Knowledge about various soil investigation techniques

CO 2: Knowledge about various types of foundations

CO3: Design of various foundations

ALL THE BEST