
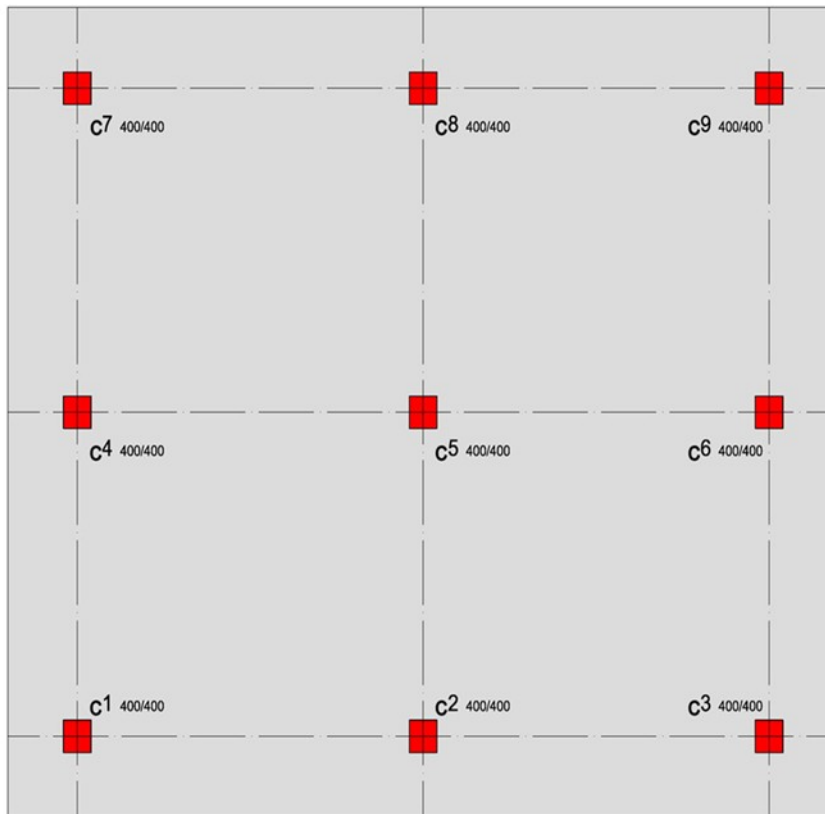


<b>Name:</b> <b>Enrolment No:</b>			
<b>UNIVERSITY OF PETROLEUM AND ENERGY STUDIES</b> <b>End Semester Examination, May 2022</b>			
<b>Course:</b> Foundation of Structures <b>Program:</b> M.Tech Structural Engineering <b>Course Code:</b> CIVL 7015		<b>Semester:</b> 2 <b>Time</b> : 03 hrs. <b>Max. Marks:</b> 100	
<b>Instructions:</b> This is open book examination . Students are allowed to bring hard copy of notes, codes, books and other reference material and use them in examination. Any data required and not provided should be assumed suitably and clearly stated.			
<b>SECTION A</b> <b>(5Qx4M=20Marks)</b>			
S. No.		Marks	CO
Q 1	Explain through a sketch how the soil can settle below a rigid or flexible shallow foundation.	4	CO1
Q 2	List and explain two situations where strip beams need to be provided in isolated footing foundations.	4	CO1
Q 3	Which type of foundation will be most suitable for a building to be constructed at the site, which is marshy having safe bearing capacity nearly zero. Give reasons.	4	CO1
Q 4	An end corner footing foundation in a building can be which of the following type: a. An axially loaded type, b. Foundation subjected to an axial load and uniaxial moment, c. Foundation subjected to an axial load and biaxial moment. Give reasons.	4	CO2
Q 5	In an annular raft chimney foundation, where is the critical section located for calculation of bending moments in the base plate, due to reaction from concrete raft foundation. Illustrate through sketch.	4	CO2
<b>SECTION B</b> <b>(4Qx10M= 40 Marks)</b>			
Q. 6	Shown below is the foundation plan of a raft foundation for a multistoreyed building. The distance between the columns may be assumed as 4m in both directions, and the projection of base beyond the columns may be taken as 0.5m, in both directions. Total load on the columns are as follows:	10	CO1

Calculate total load acting on the raft foundation, and the position of resultant load and eccentricities, if any.



Column	Total load (KN)	Column	Total Load (KN)	
C1	850	C2	1200	
C3	1600	C4	1800	
C5	1650	C6	1950	
C7,	1700	C8, C9	2000	
Q. 7	In the raft foundation of Q. 6 calculate the maximum and minimum pressures below raft, and mark the points where these are present.		<b>10</b>	<b>CO1</b>
Q .8	Modify the size of raft foundation of Q. 6, so as to obtain uniform pressure below the raft. Also calculate the modified uniform pressure below the raft.  Or Design a floating raft foundation for the building of Q. 6, assuming the density of soil below the raft as 1500KN/m <sup>3</sup> .		<b>10</b>	<b>CO2</b>
Q. 9	A compressor pump operating at a frequency of 800 rpm is resting on a		<b>10</b>	<b>CO3</b>

	<p>concrete foundation.</p> <p>As per IS code, what should be the frequency of the foundation such that it can be designed as a High Tuned foundation.</p> <p>If the foundation is designed as a high tuned foundation, what will the magnitude of dynamic response of foundation as a ratio of static response.</p> <p>What should be the natural frequency of machine foundation such that its dynamic response can be 1.5 times the static response.</p>		
<p><b>SECTION-C</b> <b>(2Qx20M=40 Marks)</b></p>			
Q 10	<p>A determinate four legged steel tower with legs spaced at 8m c/c is constructed in an industry for security purpose. The maximum downward reaction due to all forces in the each tower leg is 350KN and the maximum upward reaction due to all forces is 330 KN. Assuming a safe bearing capacity of 140KN/sq.m. at a depth of 4.5m, suggest a suitable base area and height of the foundation to be provided. If the foundation gets submerged during monsoon season, what will be the revised base area of foundation.</p> <p style="text-align: center;">or</p> <p>Design a raft foundation for the above tower, if the safe bearing capacity of soil below is 10 KN/sq.m at a depth of 1.5m.</p>	<b>20</b>	<b>CO3</b>
Q 11	<p>A self supporting steel chimney is to be constructed at Dehradun. Chimney is made up of steel plates with the bottom plate being 12mm thick.</p> <p>The result of analysis of super structure of chimney shows the following stresses at the base of chimney:  Stress in steel plate due to self weight = 4.5MPa  Stress in steel plate due to lining = 7.2 MPa  Stress due to wind = 40.5MPa</p> <p>Do the following:</p> <p>a. Calculate the width of steel base plate to be provided.  b. Design only the concrete raft foundation for the chimney, using M20 grade concrete and Fe 415 steel.</p> <p>Assume :</p> <p>SBC for soil = 350KN/m<sup>3</sup> at a depth of 2m and below.  Base diameter of chimney = 5m</p>	<b>20</b>	<b>CO2</b>