

<b>Name:</b>	
<b>Enrolment No:</b>	

**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**End Semester Examination, May 2019**

**Course: Foundations of Structures**  
**Program: M. Tech. (Structural Engineering)**  
**Course Code: CIVL 7015**

**Semester: II**  
**Time 03 hrs.**  
**Max. Marks: 100**

**Instructions: Attempt all Questions. Assume and state clearly any data considered necessary, but not given.**

**SECTION A**

S. No.		Marks	CO
Q 1	The steel plate of chimney is not made to rest directly on concrete foundation, but a steel plate is provided in between. Explain why.	5	CO1
Q 2	A concrete foundation below a structure can get completely submerged in water during rainy season. If the upward tensile force acting on the foundation is 'T' and the base size of foundation is 'l x b' with height 'h', how should the dimensions 'l, b and h' of the foundation be fixed such that the foundation is safe even during submergence.	5	CO2
Q 3	A multistoreyed building is transferring eccentric loads to raft foundation. What is the condition for which the foundation can be designed for axial loading only.	5	CO3
Q 4	The legs of a steel tower designed for self load, live load and wind load, carry resultant forces that are compressive in one leg and tensile in other at the base. Explain how can the size of independent foundations provided in the leg be fixed.	5	CO4

**SECTION B**

Q 5	List and explain the criteria for design of annular foundation for chimney. <u>Or</u> An annular concrete foundation having trapezoidal section is provided for an industrial chimney. The cross section of the foundation is 8m at the top and 16m at the bottom with the height of 4m and side slope of 45°. Check if no tension develops at the base of foundation and calculate the maximum and minimum pressures below the base of the foundation. Assume: a. weight of chimney steel plate = 800 KN/m run of foundation b. Weight of lining = 1500 KN/m run of foundation c. Moment at the foundation due to wind on chimney = 8800KNm/m run of foundation.	10	CO1
Q 6	A steel foundation for an industrial structure is made up angle section welded to steel plate below. Illustrate in a figure the critical section that should be considered for	10	CO2

	<p>calculating the bending moment due to pressure from below. Assuming suitable notations calculate :</p> <ol style="list-style-type: none"> <li>The length of projected portion of base plate and angle from the critical section.</li> <li>The maximum bending moment per unit width of foundation at the critical section that should be considered for the design of foundation.</li> </ol>		
Q 7	<p>A raft foundation of size 12m in 'x' direction and 18m in 'y' direction supports a symmetrically placed multistoreyed building on columns embedded in the raft. The equivalent axial load from the building on the raft has been estimated as 3000 KN with an eccentricity of 0.5m in 'x' direction and 1.5m in 'y' direction. Calculate the maximum soil pressure for which the raft should be designed. Suggest the revised size of the raft foundation such that the soil pressure below the raft is uniform.</p>	10	CO4
Q 8	<p>A concrete foundation is provided for an industrial tower in marshy area where water table can rise in monsoons upto 1m below the ground level. The base size of foundation is 2x3m and height 2.5m is provided by the designer considering the only the self load, wind load and live load. The foundation is placed at 3m below ground level. What will be the required modification in the foundation, where the water table rises to its maximum in monsoon.</p>	10	CO5
<b>SECTION-C</b>			
Q 9	<p>Shown below is the first floor and second floor plan of a hotel building. The load from these two floors is being transferred to the raft foundation on the ground floor through the columns. Calculate the live load transferred from the two middle end columns located in longer direction of left hand corner suite No 905. Assume that:</p> <ol style="list-style-type: none"> <li>the columns are equally spaced.</li> <li>Length of shorter side of suite no 905 is 8m,</li> <li>Width of corridor outside suite No 905 is 2m,</li> <li>Live load in suite as 3KN/m<sup>2</sup></li> </ol> <p style="text-align: center;">Or</p> <p>Illustrate in sketch the following types of raft foundations:</p> <ol style="list-style-type: none"> <li>Slab type</li> <li>Beam and slab type</li> <li>Cellular type</li> </ol> <p>Also explain why beam and slab type is preferred over other types.</p>	20	CO4
Q 10	<p>A four legged square steel tower having base width as 8m is to be constructed in Dehradun city for mobile transmission purpose. It is proposed to provide independent concrete foundations for each tower leg. The wind load moment on the tower has been estimated by the designer as 5800KNm.</p> <p>Assuming self weight of tower as 200KN, safe bearing capacity of soil below the foundation as 120KN/m<sup>2</sup> calculate the maximum compressive and tensile force at the base of the tower legs. Design a suitable concrete foundation for the tower leg.</p>	20	CO5

