Name: **Enrolment No:**	

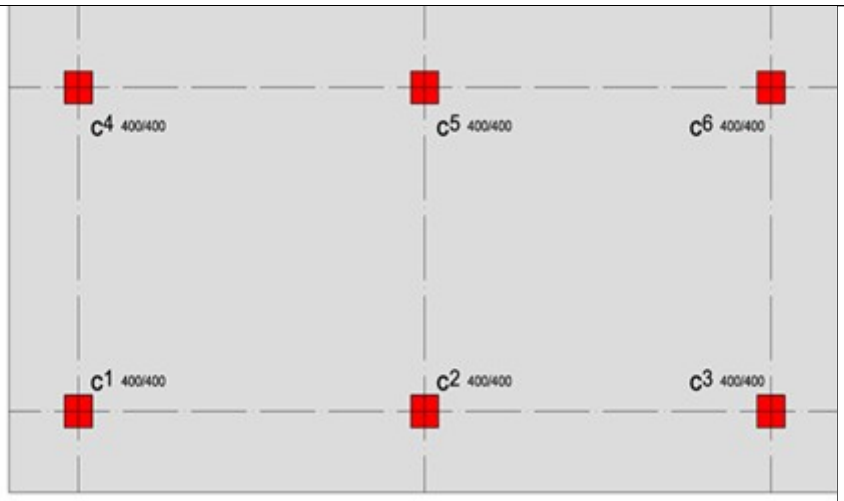
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2022

Course: Foundation of Structures **Semester: 2**
Program: M.Tech Structural Engineering **Time : 03 hrs.**
Course Code: CIVL 7015 **Max. Marks: 100**

Instructions: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.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Explain how can foundation below a building be provided in a clayey soil.	**4**	**CO1**
Q 2	If the distance between two adjacent columns in a building frame is small, such that the isolated footings of these columns overlap, suggest how can the foundation be constructed.	**4**	**CO1**
Q 3	Explain, in case of eccentric loading, how can the size of raft foundation be modified, so as to obtain uniform pressure below the raft.	**4**	**CO1**
Q 4	A corner footing in a building frame is subjected to biaxial moment loading. Show in sketch the points below the footing, where the pressure is likely to be maximum and minimum.	**4**	**CO2**
Q 5	A raft foundation is subjected to eccentric loading. Explain how can the stresses below the raft foundation be made uniform.	**4**	**CO2**
SECTION B **(4Qx10M= 40 Marks)**			
Q 6	A multistoreyed building has a raft foundation, the plan of which is as shown below. Assume the distance between the columns as 3.5m in both directions, and the projection of base beyond the columns may be taken as 0.4m, in both directions.	**10**	**CO1**



Total load on the columns are as follows:

Calculate the resultant load acting on the raft foundation, and its location.

Column	Total load (KN)	Column	Total Load (KN)
C1	800	C2	1250
C3	1700	C4	2000
C5	1650	C6	1950

Q. 7	In the raft foundation of Q. 6 calculate the eccentricities of resultant load if any and their location. Also mark the points of minimum and maximum stress.	**10**	**CO1**
Q .8	In the raft foundation of Q. 6, calculate the stresses below the raft at all the four corner points. or Suggest a suitable size of raft foundation of Q. 6, such that uniform pressure can be obtained below the raft. Also calculate this uniform pressure below the raft.	**10**	**CO2**
Q. 9	An impact hammer used in an industry operates at a speed of 150 strokes per minute. The hammer has a weight of 1 KN, and base size as 200x400mm. Design a block foundation for the machine, where the safe bearing capacity is 30 KN/m^2 at a depth of 1m.	**10**	**CO3**
	SECTION-C **(2Qx20M=40 Marks)**		
Q 10	A steel chimney is made up of steel plates with the bottom plate resting on concrete foundation made up of M25 concrete.	**20**	**CO2**

	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 = 5MPa Stress in steel plate due to lining = 7MPa Stress due to wind = 40MPa b. Design only the steel base foundation using steel angles. Assume : SBC for soil = 350KN/m^2 at a depth of 2m and below. Base diameter of chimney = 5m Chimney is self supporting type. Or If the wind force acting on the above chimney is 200KN, design a suitable lug plate foundation for the chimney. Concrete raft need not be designed. Any other data required may be suitably assumed.		
Q. 11	A determinate four legged steel tower is to be constructed at a site where the safe bearing capacity of soil below is8KN/sq.m at a depth of 2m. Assume the maximum downward reaction due to all forces in the each tower leg is 370KN and the maximum upward reaction due to all forces is 350KN. Design a raft foundation for the tower. The spacing between legs may be taken as 8.5m.	**20**	**CO3**