CLASS: M.TECH   SEMESTER : II
BRANCH: CIVIL   SESSION : SP/2024

SUBJECT: CE549 STRUCTURAL DESIGN OF FOUNDATION

TIME: 3 Hours   FULL MARKS: 50

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. IS 456:2000 is allowed in the examination hall.

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Q.1(a) Interpret your conclusion on Case studies for foundation failure from the research   [5]   CO1   K3
article provided to you.

Q.1(b) An R.C.C column of size 400 mm x 400 mm is reinforced with 8-25 # bars of grade Fe   [5]   CO4   K4
4150. The concrete is M 25. It is loaded with an axial, unfactored load of 1800kN. A pad
footing of size 3.15 m x 3.15 m and a thickness of 700 mm is provided. The allowable
gross bearing capacity is 200 kN/m^2.
Discuss and check for transfer of load from the column to the square footing if the
grade of footing concrete is M20.

Q.2 A reinforced concrete column 400 mm by 400 mm support an axial service load of 1000   [10]   CO3   K3
kN. The safe bearing capacity of soil at site is 200 kN.m^2. Adopting M20 grade concrete   CO4
and Fe15 HYSD bars design a suitable footing for the column and sketch the details of
reinforcements.

Q.3 Design a raft footing for the foundation plan shown. Assume SBC   [10]   CO2   K3
150kN/m^2. Columns marked C1(300x300) and C2(300x300) carry 800 kN and 600 kN
loads respectively. Consider the grade of concrete M25 and Fe500 steel.
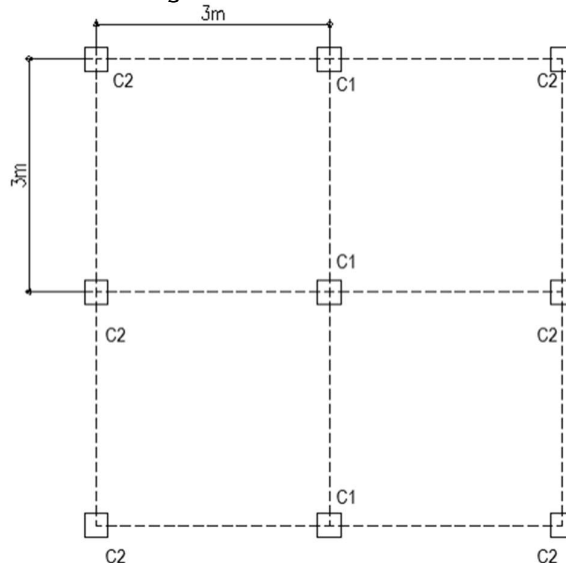
Q.4(a) Prove that in a combined footing for two columns carrying unequal loads, the maximum   [5]   CO2   K2
hogging bending moment occurs at less loaded column.

Q.4(b) What are the different types of combined footings and in what scenarios are each type   [5]   CO1   K1
used.

Q.5(a) Distinguish between pile foundation and caisson foundation.   [3]   CO4   K4

Q.5(b) Design a pile cap to support a column service load of 1000 kN. The size of the column is   [7]   CO2   K3
400 mm x 400 mm. The cap is supported on two 300 mm diameter piles and materials
are M25 grade concrete and HYSD bar Fe 415.