Total number of printed pages: 2

UG/8th Semester/UCE 814

2024

DESIGN OF SUBSTRUCTURES

Full Marks: 100

Time: Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

(Use of relevant IS code permitted)

1. a) What are the various types of foundations used in civil engineering field? State the criteria of each types of foundation, and explain the situations in which each type if preferred. 10

   b) Outline the methods of analysis a raft foundation as laid down in relevant IS code of practice. Mention briefly the selection criteria of the methods. 10

2. a) Explain with suitable figure the one way shear and two way shear criterion in footing design. 10

   a) Proportion a combined footing, and draw the SFD and BMD having two column A & B separated at a distance of 3m c/c. Size of column A is 500mm x 500mm, and column B is 350mm x 350mm. Assume safe bearing capacity of the soil as 120 kN/m^2 . Use M20 concrete and Fe415 steel. 10

3. a) Explain the IS code procedure for determining the vertical and uplift pile load capacity for a cast-in-situ RCC pile in both cohesive as well as cohesionless deposit. 10

   b) With suitable figure, explain the various components of a well foundation and their importance. 10

4. A square column 500mm x 500mm carries an axial load of 1500 kN. The safe bearing capacity of the soil is 225 kN/m^2. Design the footing and determine the depth from bending moment consideration. Use M20 concrete and Fe415 steel. 20

5. The foundation of a structure is to consist of 16 piles to carry a total load of 10400 kN. The piles are 300mm x 300mm and are 9m long. They are spaced at 1.50m centres. Design one of the piles. Use M20 concrete and Fe415 steel. 20

6. Design an isolated footing for a column of 400mm x 400mm size subjected to a vertical load of 2400 kN, moment of 400 kNm. Assume safe bearing capacity of the soil is 140 kN/m^2 . Use M20 concrete and Fe415 steel. Consider F.o.S. as 3. 20

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