



Seventh Semester B.E. Degree Examination, June/July 2023
Design of RCC and Steel Structures

Max. Marks: 100

- Note:** 1. Answer any One full question from each module.
 2. Use of IS-456, IS-800, SP6(1), SP-16 and steel tables may be permitted.

Module-1

- 1 Design a rectangular combined slab-type footing for supporting two columns 400mm × 400mm in size to carry a load of 1000kN each. Center to center distance between the columns is 3.50m. The projection of the footing on either side of the column with respect to center is 1m. Safe bearing capacity of the soil can be taken as 190kN/m². Use M20 concrete and Fe415 steel. (50 Marks)

OR

- 2 An RC portal frame with a hinged base is required to suit the following data:
 Spacing of portal frames = 4m c/c
 Height of columns = 4m
 Distance between column centers = 10m
 Live load on Roof = 1.5kN/m²
 SBC of soil at site = 200kN/m²
 The RC slab is continuous over the portal frames. Adopt M20 grade concrete and Fe415 grade steel. Design the slab portal frame and foundations. Sketch the reinforcement details of portal frame and Hinge. (50 Marks)

Module-2

- 3 Design the principal rafter and a tie member of a fink-type roof truss for the following data. Design the connections using 20mm φ bolts. Use 12mm thick gusset plate if necessary. Adopt Fe410 grade steel and grade 4.6 bolts.
 [$f_u = 410\text{MPa}$, $f_y = 250\text{MPa}$, $f_{ub} = 400\text{MPa}$].

	Design compressive load	Design tensile load	Length
Principal rafter	165kN	60kN	2.235m
Principal tie member	40kN	150kN	6m

Refer the truss shown in Fig.Q.3.

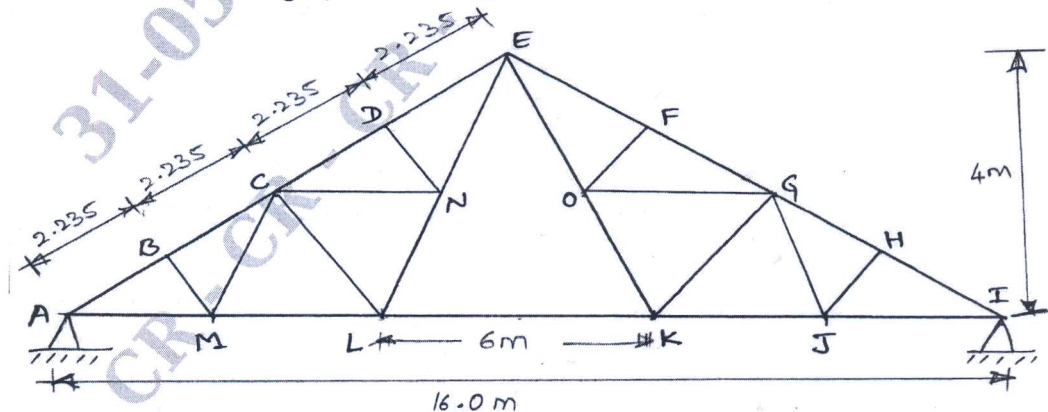


Fig.Q.3
1 of 2

(50 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 4 Design a gantry girder to be used in an industrial building carrying a manually operated overhead travelling crane, for the following data:

Crane capacity	= 200kN
Self-weight of the crane girder excluding trolley	= 200kN
Self-weight of the trolley, electric motor, hook etc	= 40kN
Minimum approach of crane hook	= 1.20m
Wheel base	= 3.50m
C/C distance between gantry rails	= 16m
C/C distance between columns	= 8m
Self weight of rail section	= 300 kN/m.
Diameter of crane wheels	= 150mm

Steel is of grade Fe410. Adopt fillet welded connection if required and design suitable.
(Mining data can be assumed suitably). (50 Marks)
