

Assignment 9

Design of Columns and Bases

Question (1)

For the columns shown in figures (1 to 4), it is required to calculate the buckling lengths.

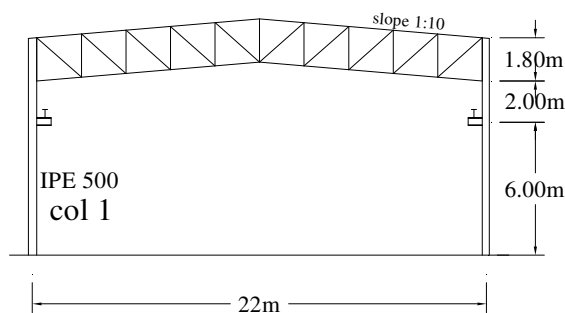


FIG (1)

For col 1 use : a) Hinged base
b) Fixed base

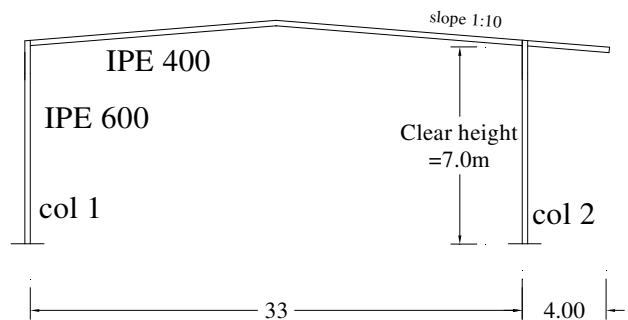
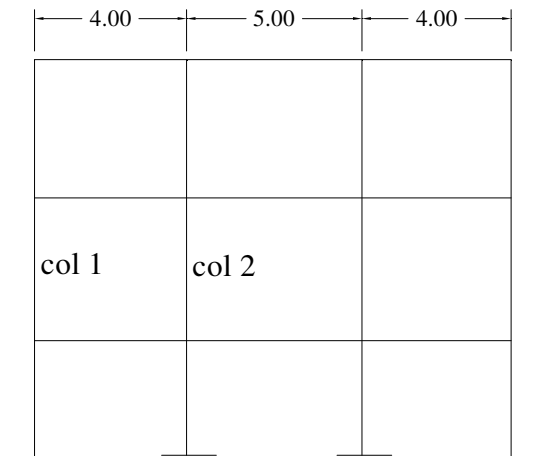
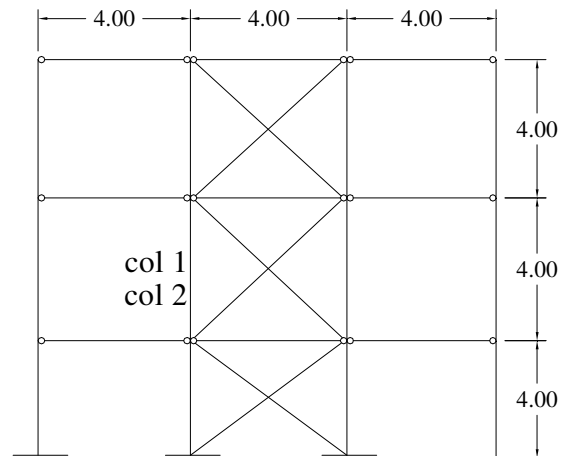


FIG (2)

For col 1 and col 2 use : a) Hinged base
b) Fixed base



Elevation



Side View

All beams are IPE 400.
Columns of first floor are IPE 500, second floor IPE 400
third floor IPE 400.

FIG (3)

Question (2)

Figure (4) shows the main structural system of a car shed.

- Suggest a suitable bracing system for the column.
- Design a rolled section for the column.
- Design the base of the column.
- Draw the rolled column with its base in different views to scale 1:10.

Data:

The load acting on the main frame

D.L. = 0.14 t/m' L.L. = 0.38 t/m' (ignore wind load effect)

Spacing between frames = 7.0 m

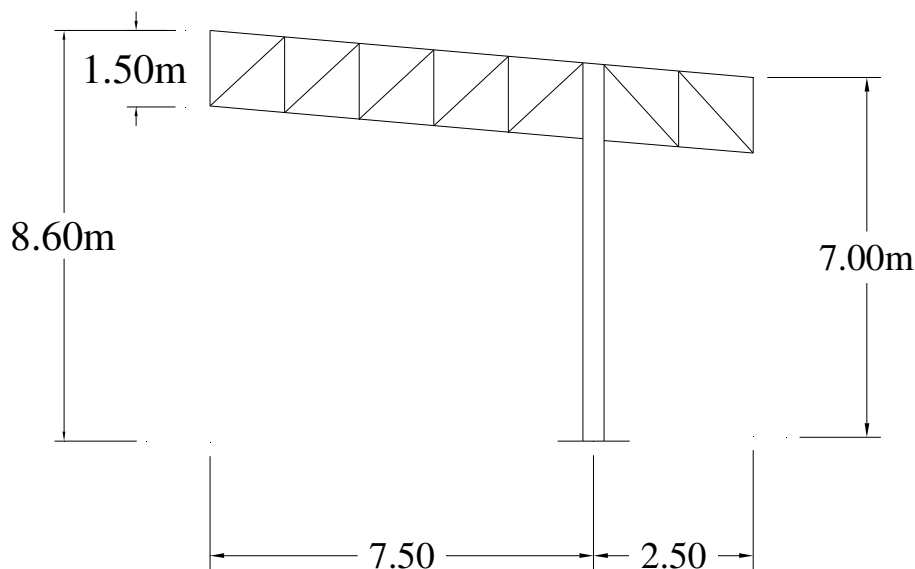


FIG (4)

Question (3)

Figure (5) shows the main structural system of an industrial building;

- Suggest a suitable bracing system for column 1.
- Design a built-up section for the crane column using batten plates.
(Use 2 channels spaced 40 cm)
- Design the base of column 1 ($Q=2.8\text{t}$).
- Draw column 1 and its base in different views using scale 1:10.

Data:

Crane girder wheel loads are 8t each and spaced 1.8m. Spacing between frames = 5.50m

Assume brackets are IPE 400, the crane girder BFIB 360, distance between center line of crane girder and center line of column is 55 cm.

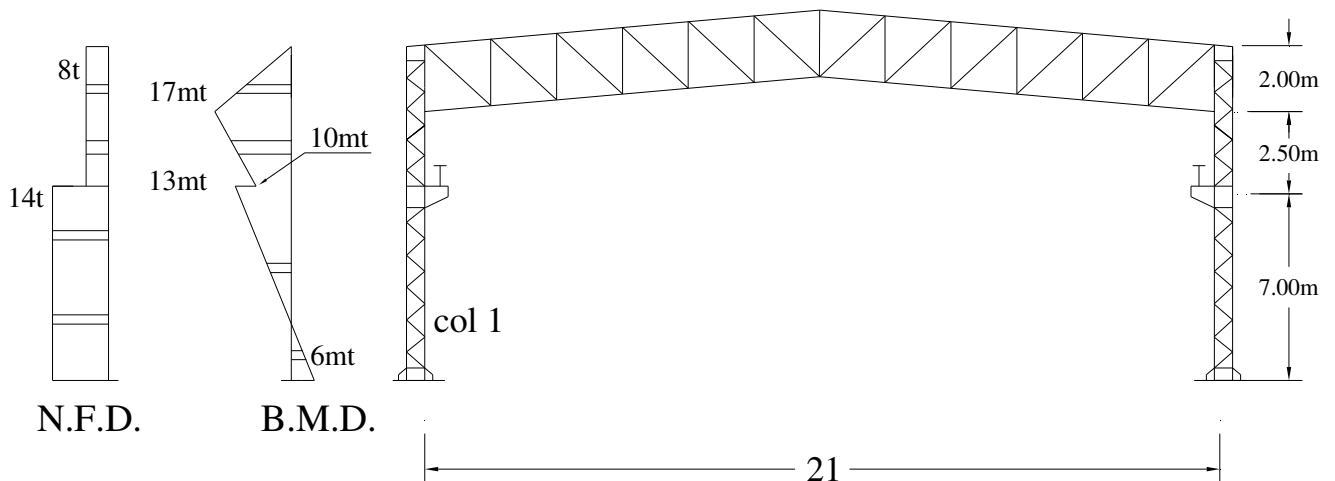


FIG (5)

Question (4)

Figure (6) shows the main structural system of an industrial building;

- Suggest a suitable bracing system for the columns.
- Design a built-up section for the crane column using lacing bars
(Use 4 angles spaced 50 cm)
- Design a suitable rolled section for the roof column.
- Design the fixed base of the crane column.
- Draw the column and its fixed base showing the connection
between the roof and the crane column in different views to scale 1:10.

Data:

For combined column $M=39 \text{ mt.}$ $N=30 \text{ t.}$ $Q=9 \text{ t.}$

For roof column $M=8 \text{ mt}$ $N=11 \text{ t.}$

Spacing between trusses=6.0 m

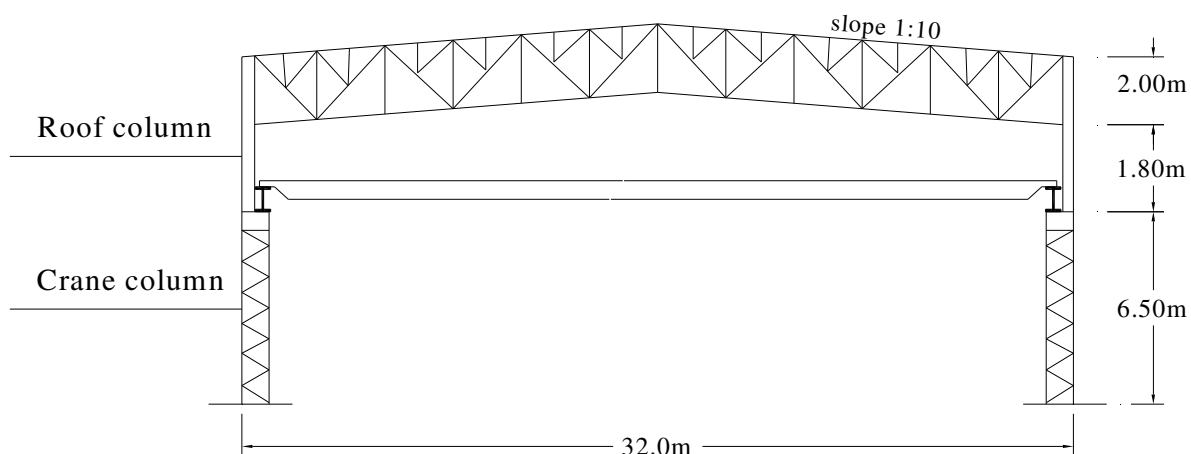


FIG (6)