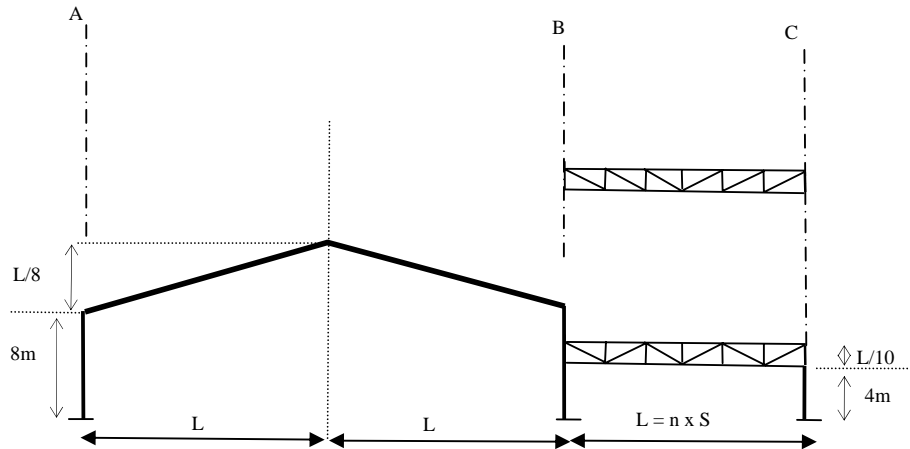


Steel Project and Assignment: 1



The main structural system of an industrial structure is composed of a steel frame between axis A and B, and a roof truss between axis B and C. The roof truss can have two different configurations as shown, with a span equal to $L = n \times S$, where n , is the number of truss panels and S , is the width of each panel. The clear height of the roof truss is 4m, while that of the steel frame is 8m. The main structural system is repeated with 8 equal spacing each equal to B.

For the given values of n , S , B , and the following data:

- weight of steel, isolated roof sheets = 0.2 kN/m^2
- own weight of purlins = 0.25 kN/m
- Steel weight of truss (on horizontal projection) = 0.3 kN/m^2
- Live load on roof (on horizontal projection) = 1.0 kN/m^2
- assume any missing data reasonably

$n = 4, 6, 8, \quad S = 2, 2.5, 3 \text{ m}, \quad B = 5, 6, 7 \text{ m}$

It is required to:

- 1- Draw a general layout of the main structural system (scale 1:100) showing all necessary views and bracings.
- 2- Determine the ultimate vertical loads and wind loads on the steel structure, according to the SBC 301 code, assuming that the structure is located in Riyadh. considering the following load combinations;
 - a) $1.4 D$
 - b) $1.2 D + 1.6 L$
 - c) $1.2 D + 1.6 L_r + 0.8 W$
 - d) $1.2 D + 0.5 L_r + 1.6 W$
- 3- Determine the forces in all truss members due to the critical load combination (a) or (b), considering the truss as simply supported.
- 4- Analyze the steel frame according to the above load combinations
- 5- Design all critical members in the truss, and column at Axis (C) as axially loaded column.
- 6- Design only one truss connection using bolts, and only the central truss connection using welds.
- 7- Design the purlins as simply supported beams.
- 8- Design the frame girder as beams and the frame columns on axis (A), (B) as beam-columns,
- 9- Design the connections of the frame as moment connections
- 10- Design the base plate of the frame columns