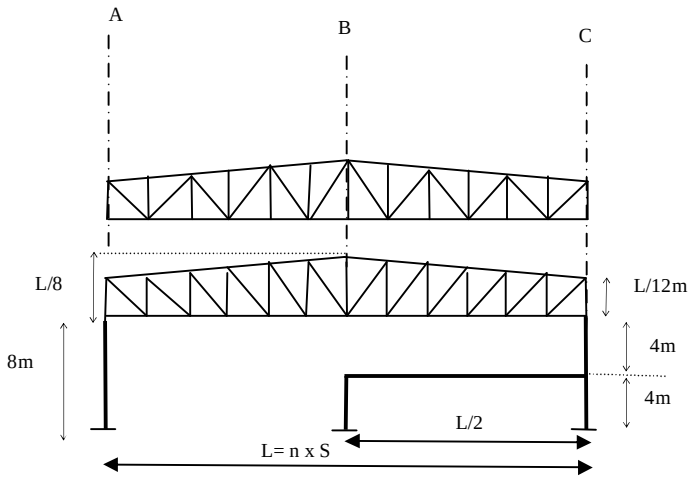
CE 473 : Steel Structures

Project and Assignment: 1



The main structural system of an industrial structure is composed of a roof truss that can have two different configurations as shown, with a span equal to L = n x S , where n, is the number of truss panels and S, is the width of each panel. The structure has also an intermediate floor with a span equal L/2 that is covered with a concrete slab and consists of steel beams. The clear height of the roof truss is 8m, while that of the intermediate floor is 4m. 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 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) = 0.5 kN/m^2
- R.C slab thickness = 140 mm
- Live load on intermediate R.C floor = 2 kN/m^2, Super imposed loads = 1.5 kN/m^2

Values of n = 6 , 7, 8; S =2.5, 2.75, and 3.0 m; B = 5, 6, 7 and 8 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 on the roof truss and R.C floor , considering the following two load combinations;
   a) 1.4 D
   b) 1.2 D + 1.6 L
3- Determine the forces in all truss members due to vertical loads, considering the truss as simply supported, (roller at axis A and hinged at Axis C)
4- Design all critical tension and compression members in the truss.
5- Design the purlins as simply supported beams.
6- Design the intermediate floor beam system for the part between axis (B) & (C)
7- Analyze the structural system under the action of ultimate vertical and horizontal loads (wind loads). Assume column base is roller at axes A,& B, and hinged at axis C.
8- Design the main beam of the frame between axis (B) & (C)
9- Design the columns on axis (A) , (B) and (C)
10- Design the connection between the main beam of frame and the columns, assuming that the connection at axis (B) is a shear connection, while that on axis (C) is a moment connection.