

Tutorial-1: Loads and Load Combination

Q.1. A rectangular clad building having pitched roof and located in a farm of Bhavnagar City as shown in Fig.-1. Calculate wind load as per IS 875 Part-3: 2015.

Physical Parameters:

- Height (h): 3.5 m
- Width (w): 10.0m (excluding the overhangs)
- Length (l): 18.0m
- Roof angle (α): 5° .
- Overhang: 0.5m
- Openings on sides: 10 percent of the wall area.
- External Surface of walls: Smooth
- Flat ground.

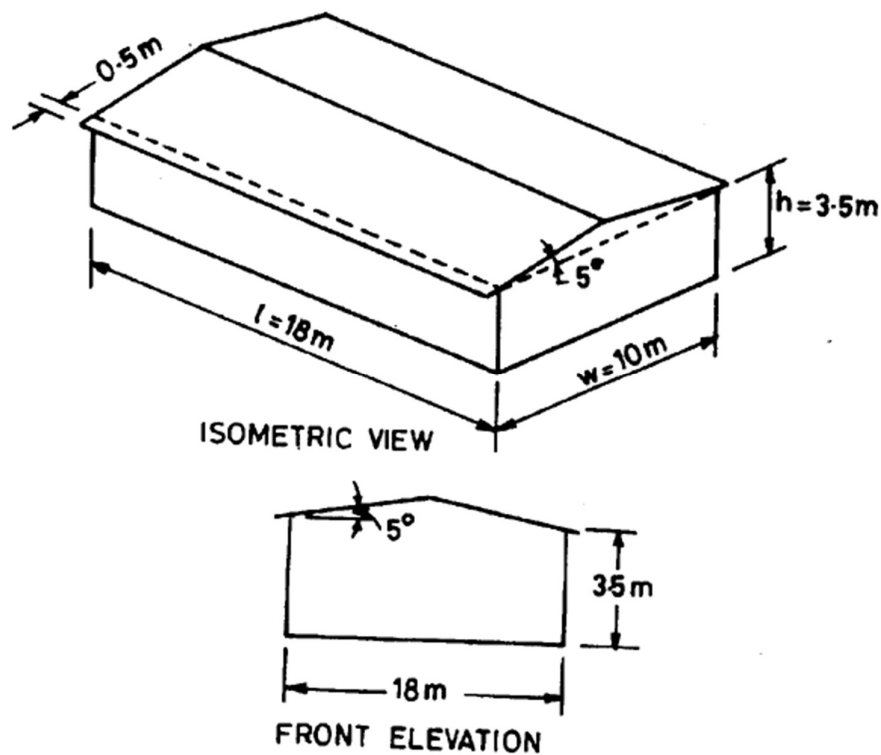


Fig.-1

Tutorial-2: Connections

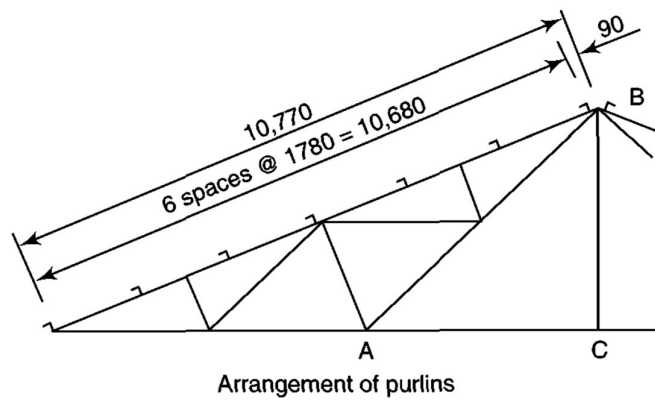
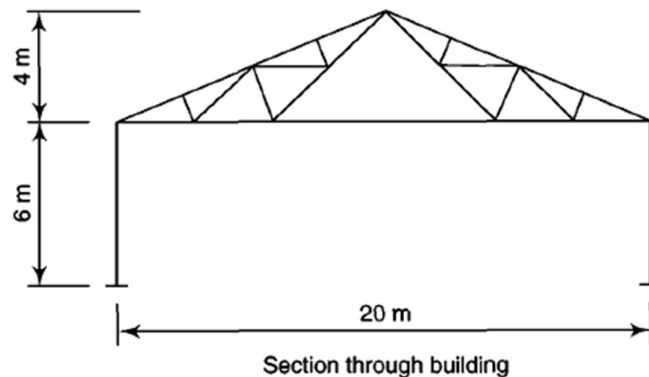
Q.1. Design a framed connection to connect an ISLB @ 485.6N/m transmitting an end reaction of 450kN to the web of ISMB550 @ 1017.3N/m. (i) Design a bolted connection (ii) Design a site welded connection.

Q.2. An ISLB 225 @ 230.5N/m and 1 m long is connected at one end to the column section ISHB 200@ 365.9 N/m. It supports a load of 300kN at its free end. Design a bolted seat connection.

Q.3. An ISLB 325 @ 422.8N/m transmits a factored end reaction of 75kN and a factored end moment of 100kNm to the flange of a column ISHB 300 @ 576.8 N/m. Design a site welded connection.

Tutorial-3: Industrial Building

Q.1. An industrial building is shown in Fig. 1. The frames are at 5 m centres and the length of the building is 40 m. The purlin spacing of the roof is as shown in Fig. 1 (b). The building is situated in Bhavnagar. Assume live and wind loads as per IS 875 (part 2 and part 3) and the roof is covered with GI sheeting. Design the roof truss using angle members and gusseted joints.



Q.2. A 50kN hand-operated crane is provided in a building and has the following data:

- Centre-to-centre distance of the gantry beam (width of the building): 16m
- Longitudinal spacing of columns (span of gantry): 7.5m
- Weight of the crane: 40kN
- Wheel Spacing : 3m
- Weight of the crab: 10kN
- Minimum hook approach: 1m
- Yield stress of steel: 250MPa

Design a simply supported gantry girder assuming lateral support to it.

Q.3. Design gantry girder of Q.2 by assuming lateral unsupported to it.

Tutorial-4: Plate Girder

Q.1 What is the difference between a beam and a plate girder?

Q.2. Determine the buckling resistance moment for a welded plate girder consisting of 400 x 25 mm flange plates and a 1000 x 10 mm web plate in grade 410 steel. Assume a laterally braced span of 5.5 m.

Q.3. Design an 18-m long simply supported welded plate girder carrying a uniformly distributed load of 50 kN/m excluding self-weight, and two concentrated loads of 350 kN each at quarter points of the span. Assume that the girder is laterally supported throughout.

Tutorial-5: Design of Foot Over Bridges

Q.1. Design the foot bridge for the following data as shown in Fig.-1.

- Span 24m
- Width of walk way : 4m
- N- Type lattice girder with 8 panels, laterally supported by rakers.
- The flooring consists of RCC slab 110mm thick with floor finish 0.75 kN/m^2
Live load is 5.0 kN/m^2 .

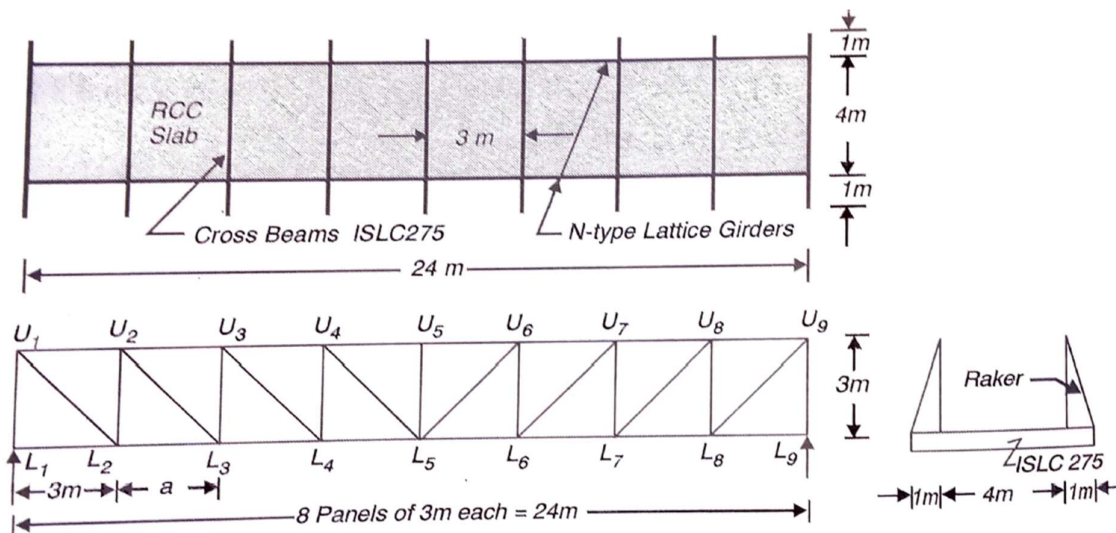


Fig.-1

Tutorial-6: Plastic Design

Q.1. Design three span continuous beam using plastic design method as shown in Fig. 1.

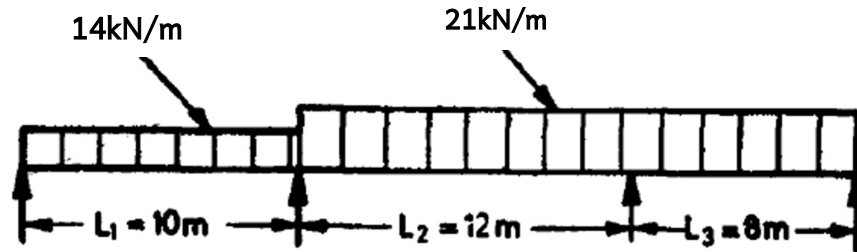


Fig.-1

Q.2. Design a portal frame having pin base with height of column is 6m and span of beam is 9.0m. Load on beam is due to DL + LL is 40kN/m and load on column due to DL+LL+WL is 13.33kN/m towards right. Design the column and beam using plastic design method.