Shantilal Shah Engineering College, Bhavnagar

Applied Mechanics Department

(2180610) Design of Steel Structures

Tutorial

B. E. 8th Semester Civil Engineering

1. A rectangular clad building having pitched roof and located in a farm as shown in Fig.-1.
   Given: Height (h)=3.5m, Width (w)=10.0m, Length (l)=18.0m, Roof angle (α) =5°, Overhang =0.5m, External surface of walls=smooth, Flat ground, Basix wind speed 50m/s, Terrain category 1. Take Cpi= ± 0.5
   Calculate the wind load on roof and wall.

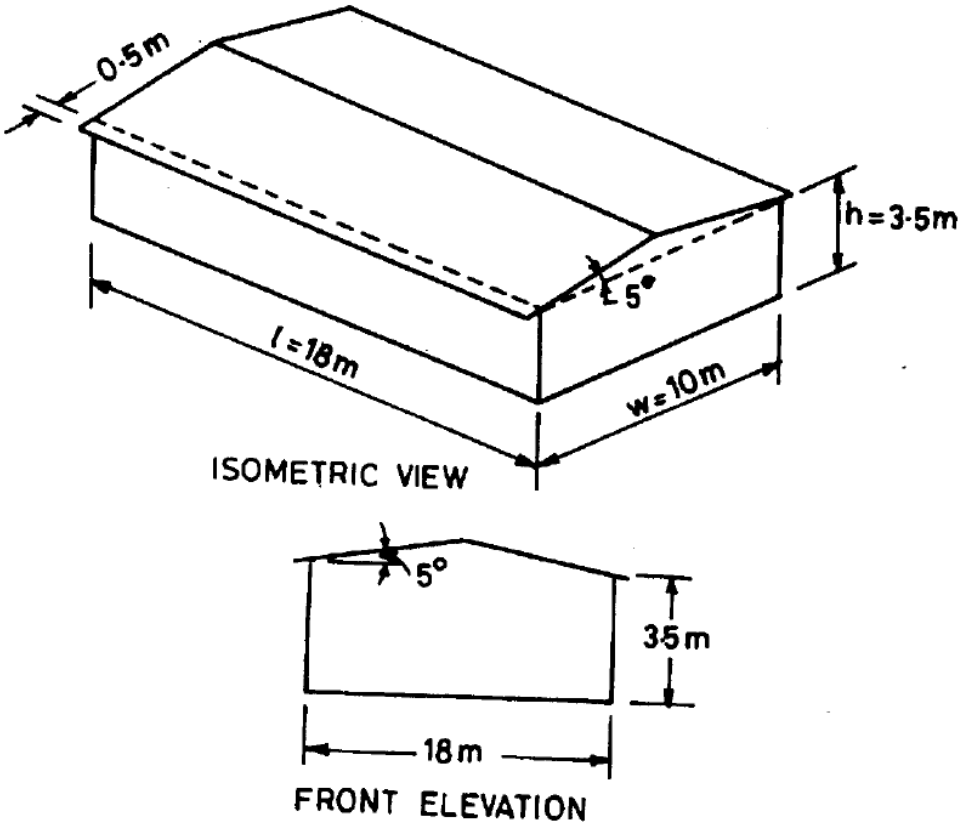

Fig.-1

2. Design a flange angle connection using M 16 bolts of grade 4.6 to transfer a factored moment of 12kNm and a shear of 150kN from a beam of ISMB 350 to a column of ISHB 300.
3. Design a roof truss as shown in Fig.-2.

Given:Location:-Hyderabad, Life Span:-50 Years, Permeability:-Normal Spacing:-3.5m, Span of truss:- 15m, Central Rise:- 3m, Height of truss at eves level:-10m, Fy:-250MPa,Corrugated G.I. Sheets (Self wt. 131 N/m^2), Spacing of purlin: - 1.35m.

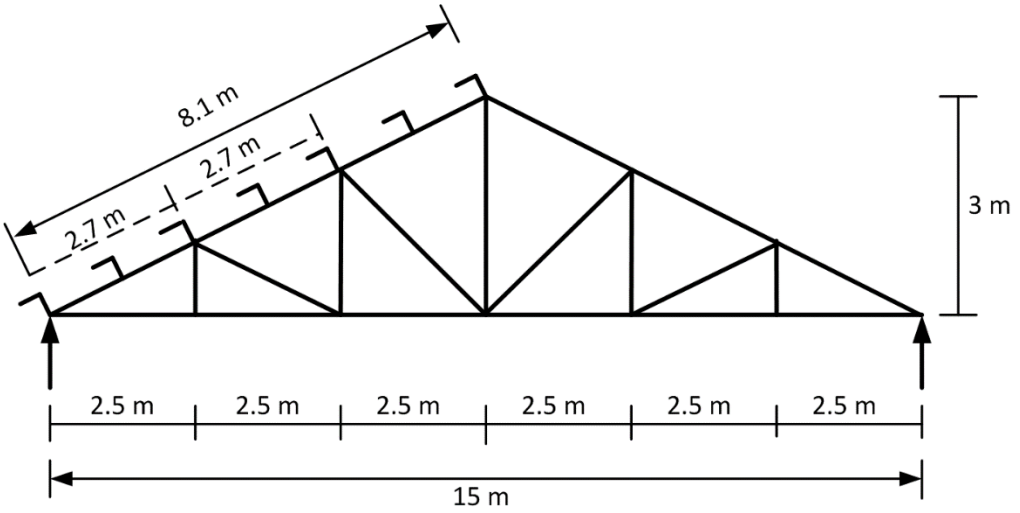

Fig.-2

4. Design a welded plate girder of 20 m span using the tension field action for the following factored forces. Maximum moment, Mz = 5000 kNm Maximum shear force = 900 kN. The girder is laterally restrained. Use steel of grade Fe 410 and assume yield stress of steel to be 250 MPa irrespective of thickness of plates. Connections need not be designed.
5. Design a gantry girder to be used in an industrial building carrying a manually operated overhead travelling crane, for the following data:
    - Crane capacity 200 kN
    - Self-weight of the crane girder excluding trolley 200 kN
    - Self-weight of the trolley, electric motor, hook, etc. 40 kN
    - Approximate minimum approach of the crane hook to the gantry girder 1.20 m
    - Wheel base 3.5 m
    - c/c distance between gantry rails 16 m
    - c/c distance between columns (span of gantry girder) 8 m
    - Self-weight of rail section 300 N/m
    - Diameter of crane wheels 150 mm

    Steel is of grade Fe 410. Design also the field welded connection if required. The support bracket connection need not be designed.

6. Design the foot bridge for the following data (Fig.-3). 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/mm^2. Live load =5kN/m^2

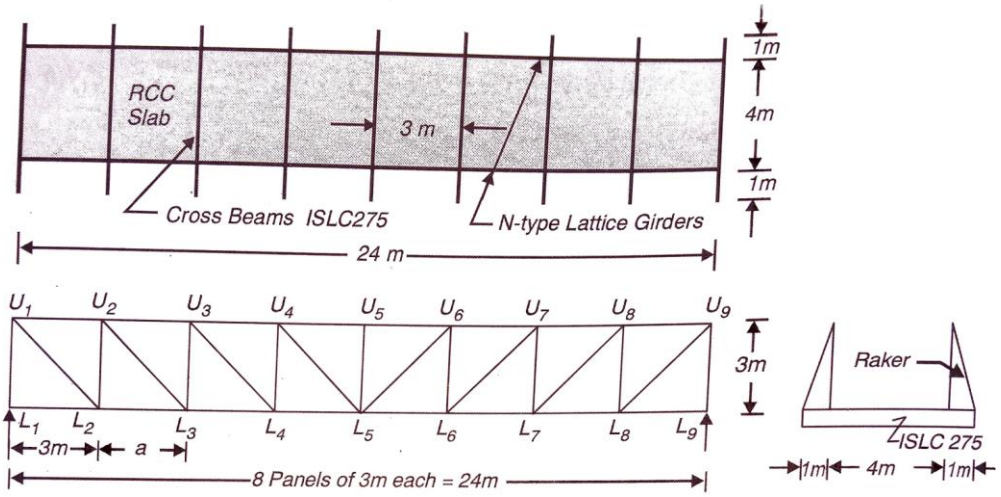

Fig.-3

7. A three span continous beam dissimilar sections will be specified to suit the moment diagram as shown in Fig.-4. L1=10m, L2= 12m, L3= 8m. Design the beam for single loading condition using Plastic design approach.

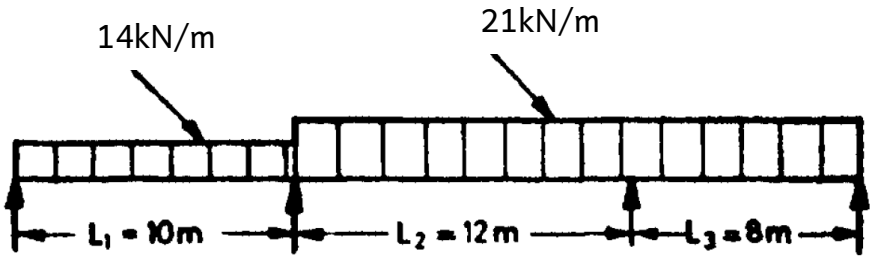

Fig.-4

~~~~~~ End of Tutorial ~~~~~~
~~~~~~