



- Tables of Steel Sections and Egyptian Code of Practice (ECP) are allowed.
 - Any sketches should be neat, detailed and fully dimensioned.
 - Any missing data may be reasonably assumed.
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- Read carefully the given data and solve the required questions. (Total Marks: 100)

Answer the following questions

Question 1: (60 Marks)

The frame ABCDE shown in Figure (1) is supported at A and E by two hinged supports at A & E. The frame is regularly spaced at 6.0 m and the roof purlins are spaced at 1.50 m.

Given:

- Steel to be used = ST. 37 ($F_y=2.4 \text{ t/cm}^2$ & $F_u=3.60 \text{ t/cm}^2$)
- Bolts used = M22
- (Type (10.9), For M22, $A = 3.80 \text{ cm}^2$, $A_s = 3.03 \text{ cm}^2$, $T_o = 19.08 \text{ t}$, and $P_s = 6.10 \text{ t}$)

Required:

For the given Loads and Reactions it is required to:

1. Sketch with suitable scale all necessary views of the bracing system required for the stability of the structure. [20 marks]
2. Draw the B.M, S.F and N.F diagrams for the frame for the given loads. [10 marks]
3. Design the Critical rafter of the shown frame. [20 marks]
4. Design the Critical Column of the shown frame. [20 marks]
5. Design and draw joints B and C showing all details. [20 marks]
6. Discuss briefly the benefits of the bracing system in the structure [10 marks]

With my best wishes,,,

Dr. Maher Elabd

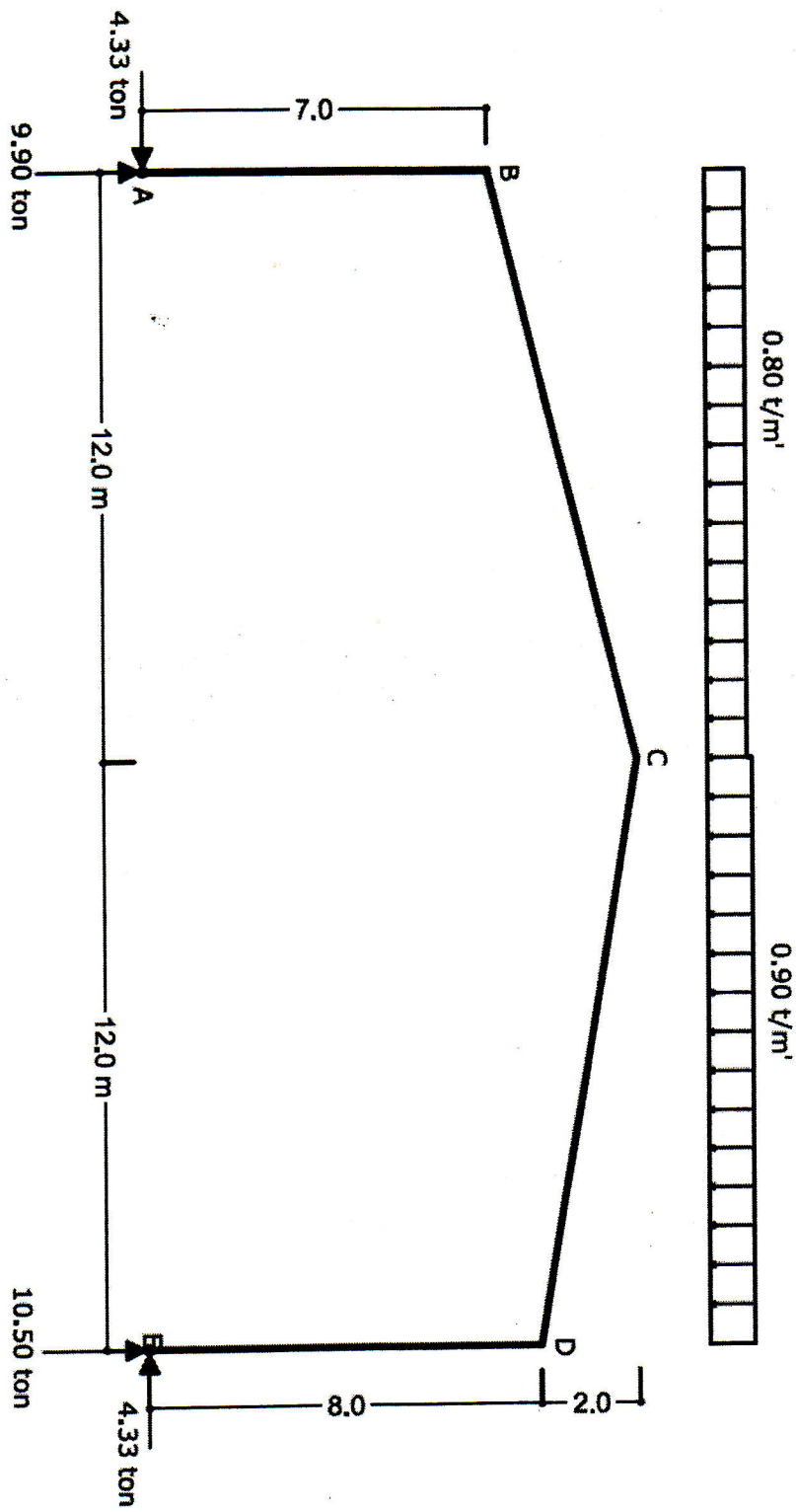


Figure (1)