



Allowed Tables and Charts: *Tables of Steel Sections, Egyptian Code of Practice (ECP)*  
This exam measures ILOS No: (a4.1, a4.2, a13.1, a13.2, a14.2, b13.1, b15.1, d3.1)

- Drawings should be neat, detailed and fully dimensioned.
- Any missing data may be reasonably assumed.

Read carefully the given data and solve the required questions. (Total Marks: 70)

The structure shown in Figure (1) presents a structure system used to cover a workshop of dimensions (26m x 36 m). The structure comprises 7 trusses spaced at 6.0 m.

**Given:**

- The total weight of steel = 50 kg/m<sup>2</sup>
- Covering weight = 20 kg/m<sup>2</sup>
- Design Live Load = 100 kg/m<sup>2</sup>
- Steel to be used = ST.37
- Weld = Class I
- Gusset Plate Thickness = 12 mm
- Bolts for field connections = HSFG bolts M20 (10.9)  
(For M20, A = 3.14 cm<sup>2</sup>, A<sub>net</sub> = 2.45 cm<sup>2</sup>, T<sub>o</sub> = 15.43 t, and P<sub>s</sub> = 4.9 t)

**Required:**

1. Draw to a scale 1:100 all necessary views of the bracing system required for the stability of the structure (Plan for using a tie rod system). [15 marks]
2. Design a suitable C-section for the marked Side Purlin shown in Figure (1) [10 marks]
3. Find the forces in the marked members U2, D2, and L2 considering all given loads. [10 marks]
4. Design the marked members U1, D1 and L1. (CASE A Only) [15 marks]
5. Design the connection G shown in drawing. [10 marks]
6. Draw the marked part of the structure shown all details [10 marks]

With my best wishes,,,

Dr. Maher Elabd

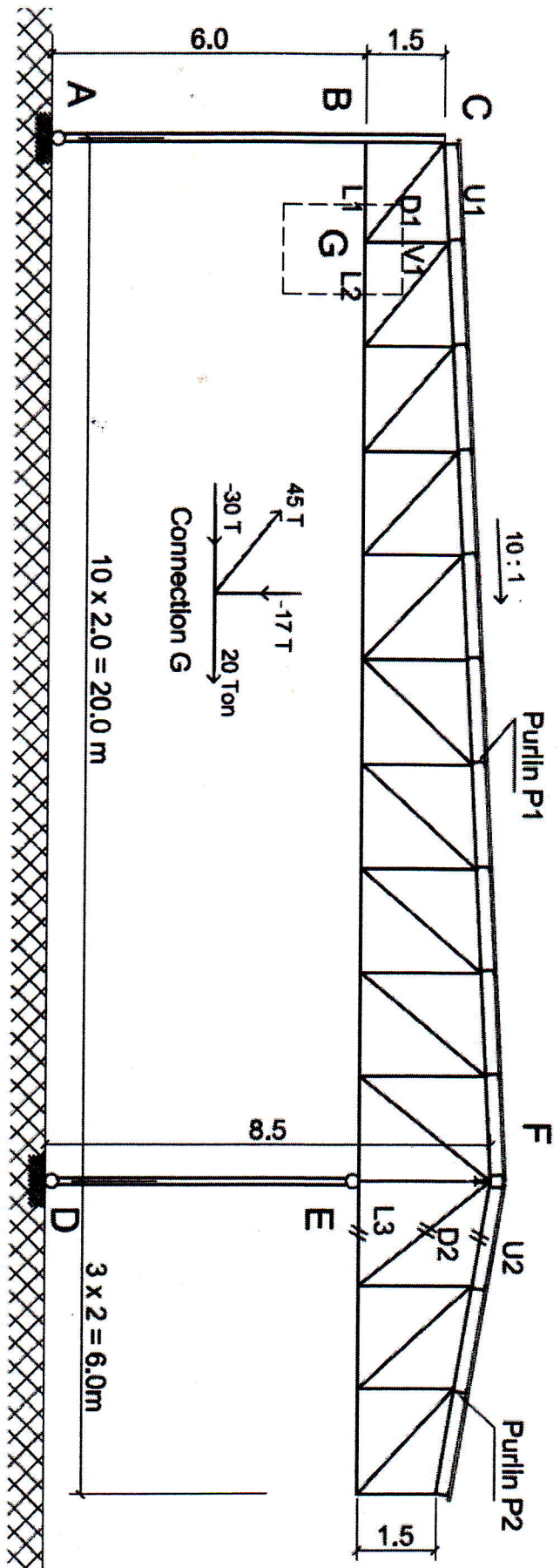


Figure (1)