Menoufia University
Faculty of Engineering
Civil Eng. Department
Academic Year: 2013-2014
Date:7/6/2014

Subject : Steel Structures (1)
Course Code : CVE313
Year : 3rd Civil
Time Allowed: 3:00 hours
Final Year Exam

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: 115)

The structure shown in **Figure (1)** presents a structure system used to cover a workshop of dimensions (21m x 36 m). The structure comprises 7 frames **(ABC)** spaced at 6.0 m. Each frame is supported from one side on a steel column **(AB)** and from the other side on a steel trussed frame **(DEFG)** of span 36m. The trussed frame (shown in **Figure (2)**) comprises 12 panles of 3 m each.

. **Given:**

- The total weight of steel = 60 kg/m^2
- Covering weight = 20 kg/m^2
- Design Live Load = 90 kg/m^2
- 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^2, A_{net} = 2.45 cm^2, T_o = 15.43 t, and P_s = 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) using a single tie rod system [**10** marks]
3. Find the forces in the marked members **U1, D1, and L1** considering all given loads. [**10** marks]
4. Design the marked members **U3, L3, D3** and choose suitable sections for **U2, L2, D2.** All forces are given in drawing. (**CASE A** Only is considered) [**15** marks]
5. Design the connections in the marked part. [**10** marks]
6. Design a suitable cross section for the monorail girder shown at joint **D** [**10** marks]
7. Design a suitable **BFIB** section for column **ABC.** [**10** marks]
8. Design a suitable hinged base for the column **ABC.** [**10** marks]
9. Draw to scale 1:10 full details for the area included in the dashed rectangle. [**10** marks]
10. Design and draw the connection shown in Figure (3). [**15** marks]

With my best wishes,,,

Dr. Maher Elabd

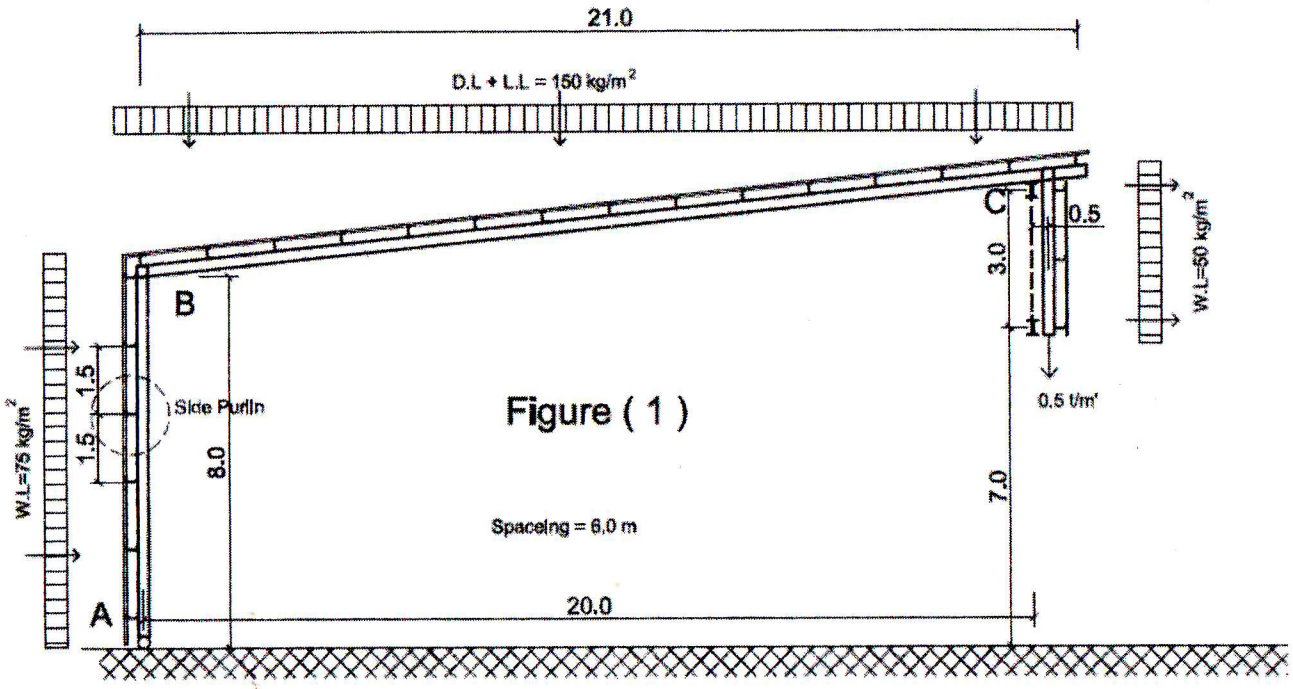

Figure (1)

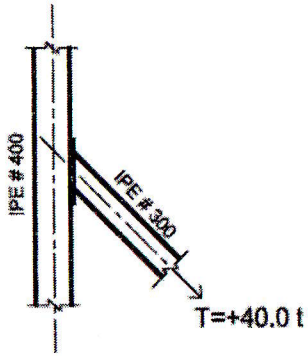

Figure (3)

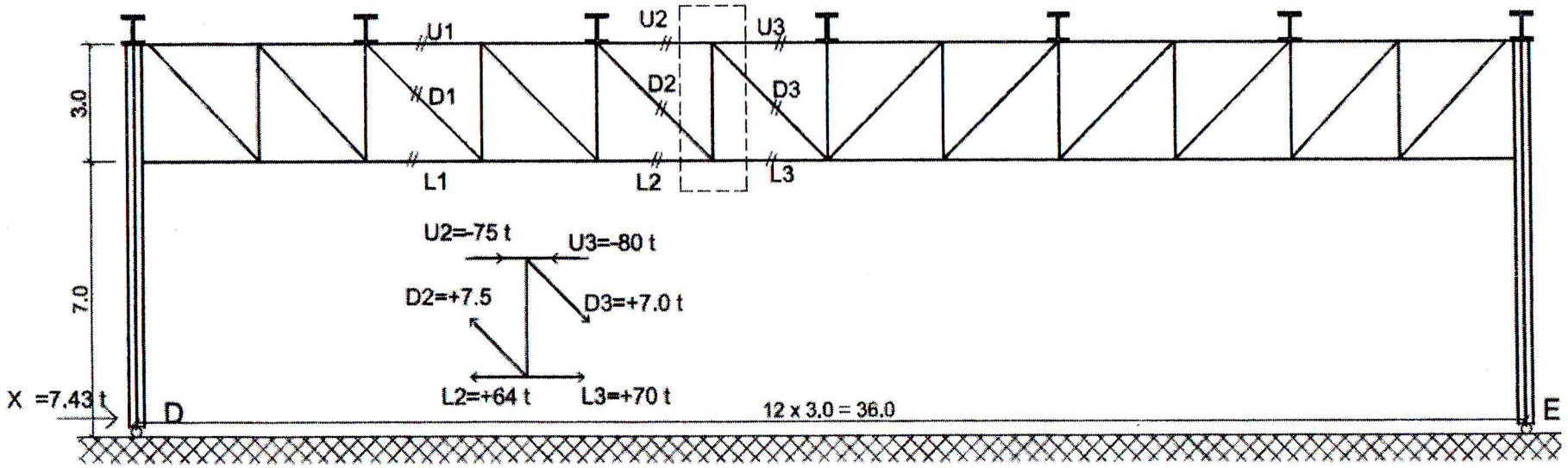

Figure (2)