Menoufia University
Faculty of Engineering
Civil Eng. Department
Academic Year: 2014/2015.

Year: Third Year Arch.
Subject: Steel Structures (CVE 328).
Time Allowed: 3 Hours.
Total Marks: (70 Marks).

- **Allowed Tables and Charts: Tables of Steel Sections, Egyptian Code of Practice (ECP)**
- **Drawings should be neat, detailed and fully dimensioned.**
- **Any missing data may be reasonably assumed.**

QUESTION (1): (50 Marks)

The umbrella structure shown in **Figure (1)** is used at a Maintenance Station to cover an area of 16x36 m and the structure is spaced @6.0m. The structure is supported at only one column **ABC** as shown. The data required for the design of are as follows;

GIVEN:

- The total weight of steel = 50 kg/m^2
- Covering weight = 20 kg/m^2
- Design Live Load = 100 kg/m^2
- Steel to be used = ST.37
- 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)
  Weld thickness = 7.0 mm.

REQUIRED:

a. Draw to a scale 1:100 all necessary views of the bracing system required for the stability of the structure. [**10** marks]

b. Design a suitable C-Section for the roof purlin [**10** marks]

c. Find the forces in the marked members **U1, D2,** and **L2**. [**8** marks]

d. Design the marked members (**D7, V6, L5** and **L6**) at Joint **(F)**- (Case A Only)[**12** marks]

e. Design Connection **F** as Welded Connection with **S= 7.0 mm**. [**10** marks]

QUESTION (2): (20 Marks)

a. Design the cross section for the column **ABC** as BFIB cross section, knowing that the forces in the column are as follows: **N= -40.0** ton and **M= 35.0 t.m**. [**15** marks]

b. Mention 3 problems that may occur during the welding process. [**5** marks]

With All Best Wishes,,,

Dr. Maher Elabd

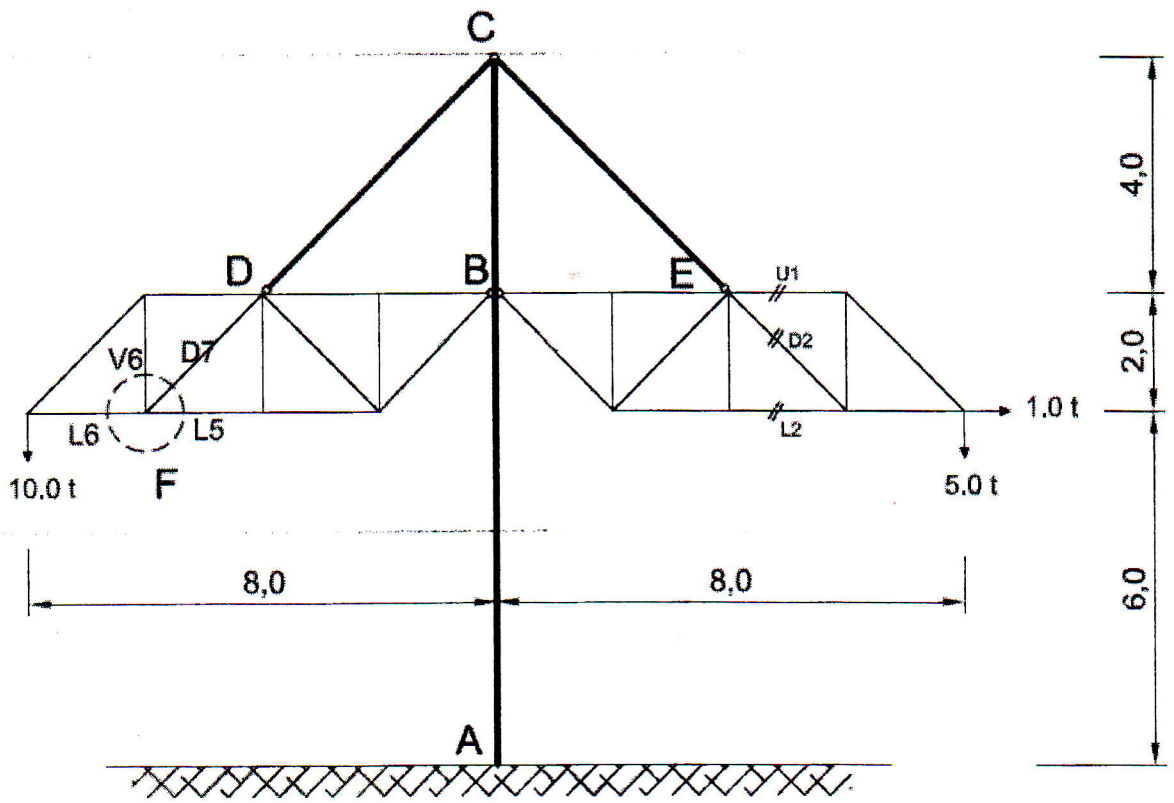
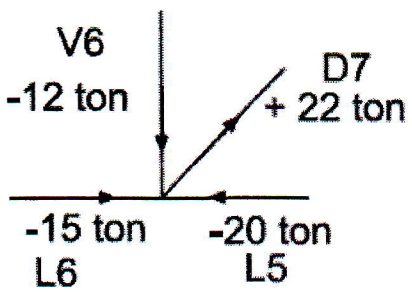


Figure (1)



Connection F