Kafrelsheikh University
Faculty of Engineering
Department of Civil Engineering
3rd year, Design of Steel Structures
Dr. Magdy Israel Salama

Date: 27 – 12 - 2017
Time allowed: (3) hours
Full Mark: 70
Final Exam: 2 pages
Academic Number: CES3010

Notes: - Assume any missing data reasonably.
- Only Egyptian code for steel structures and steel tables are allowed.
- Unless otherwise noted, steel used is St. 44.

1- a- The truss shown in Fig. (1) is used to cover an area in Kafrelsheikh city (32x21). The spacing between trusses is 6.40 m. the roof covering is sandwich panels of weight 20 kg/m^2 (inaccessible roof). The own weight of the steel skeleton can be assumed to be 40 kg/m^2. It is required to:

- Draw a general layout of the building (roof plan, main system elevation and side view) showing the arrangement of all bracing systems. Use a scale of 1:200.
- Calculate the loads at each joint of the truss due to dead load, live load and wind load from left to right (live load and wind load are according to Egyptian code requirements).
- Using channel section, design simply supported purlin at joint (*A*).

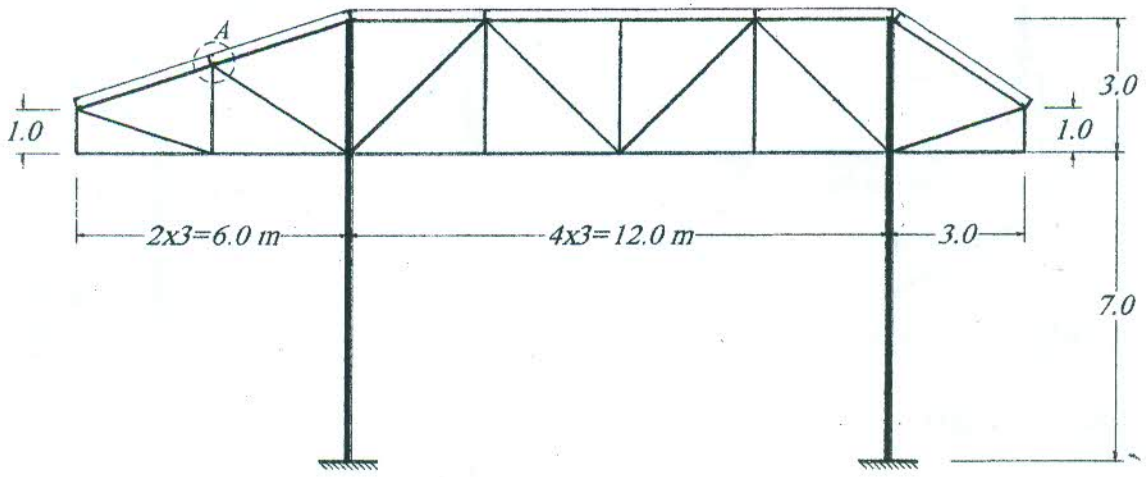

Fig.(1) **(24 Marks)**

b - If the forces in the following members (given in the table below) due to different cases of loading, find the design forces for these members.

member	Dead Load	Live Load	Crane Left			Crane Right			Wind Load	
			V	HR	HL	V	HR	HL	Left	Right
A	+18	+12	-8	-3	+3	+9	+4	-4	-10	+4
B	-16	-8	-6	+2	-2	+6	-2	+2	+8	-5

(6 Marks)

c – Choose a suitable cross section for the following members according to the following data. Assume welded connection with bolts 16 mm diameter.

Member	Force (ton)	Length (m)	shape
1	+22 (case I)	5.30	Two angles b. to b.
2	-15 (case II)	4.80	One angle
3	zero	5.90	Star shape

(12 Marks)

2- a. Find the maximum length L of a member composed of one angle 130x130x12 subjected to a compressive force equal to 10 ton (Case II) assuming $L_{bx} = L_{by} = L$. (welded connection). [Use steel 44]

(6 Marks)

b. For the connection shown in Fig.(3), determine the maximum distance (e) can be used assuming that:

- The size (s) of the welded connection between the gusset plate and the head plate is 12 mm.
- The connection between the head plate and the column is bolted connection with ordinary bolts 20 mm diameter, grade 5.6. The gusset plate is 20 mm thickness and the column is H.E.A. No. 500.

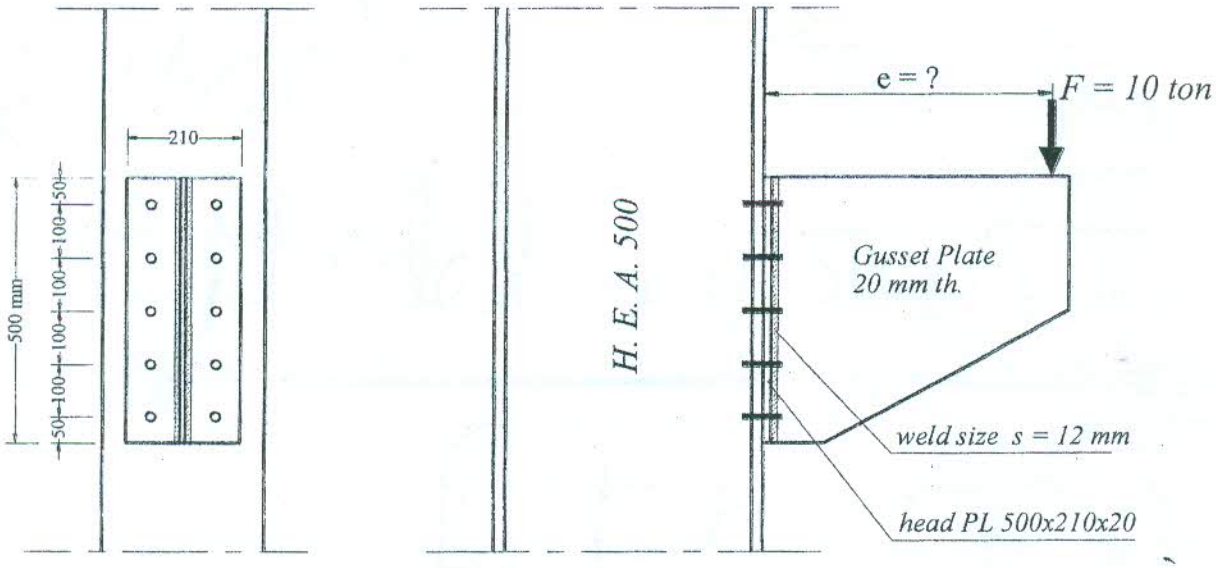

Fig.(3)

(24 Marks)

Best Wishes: Dr. Magdy Israel M. I. Salama