

- Material of Construction is Mild Steel 37
- Any Data Missing can be reasonably assumed.
- All Sketches Should be Clear. [Maximum Grade 70 marks+10 marks over]

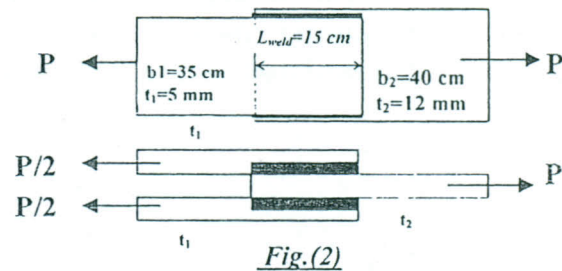
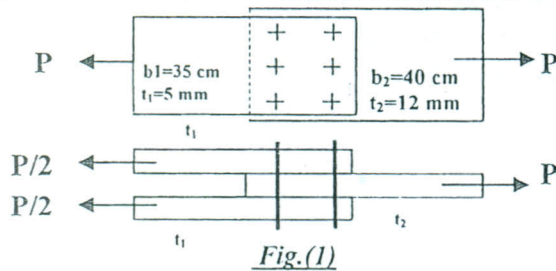
Question (1) (50 marks)

1) Write short notes with sketches about :-

- 1- Decrease the effect of M_y in roof purlins
- 2- Welding Process
- 3- Modes of failure of bolted connections

2) Find the maximum compression and tension forces that can be carried by $2 < 100 \times 100 \times 10$, if the $L_{bx}=2.0$ m and $L_{by}= 4.0$ m, using bolts M16 grade 4.6, and find the maximum length permitted in each case ?

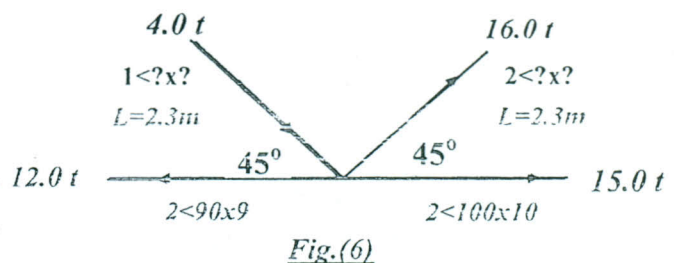
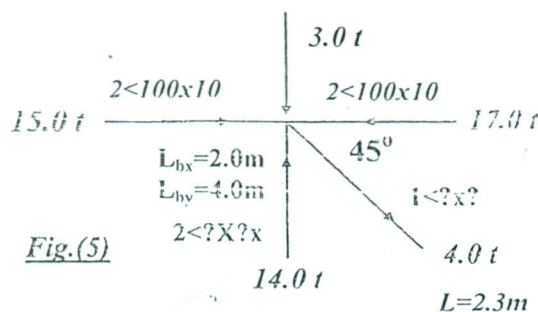
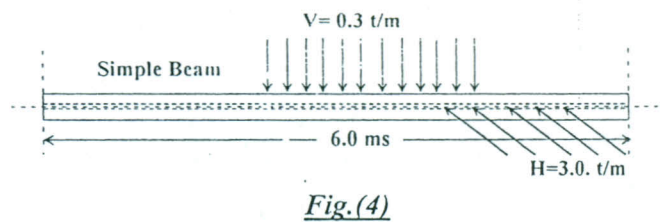
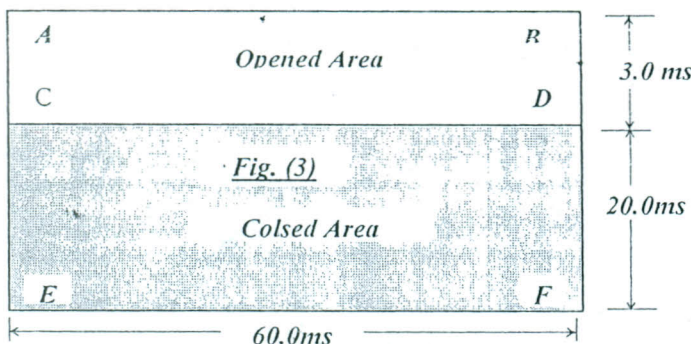
3) Find the maximum capacity (P) for the bolted connection shown in Fig. (1) using bolts M16 grade 5.6 and for the welded connection shown in Fig.(2)?



4) A steel structure is to be designed to cover the area (23.0 ms x 60.00 ms) as shown in Fig. (3). The area ABCD is opened while area CDEF is closed. The columns may be arranged only on the lines CDEF. The clear height of the total area is 8.0ms. Draw to a suitable scale a general layout showing the different elements of the structure and bracing systems (plan, elevations, side views and end gable) ?

5) Design the simple beam shown in Fig.(4) for the given uniform loads [$V=0.3$ t/m' and $H=3.0$ t/m']?

6) Design the bolted connection shown in fig. (5) [using bolts M16 grade 4.6, case A], if the connection with a continuous joint and design the welded connection shown in fig. (6), if the connection with a separated joint and [case B] draw its details to scale 1:10?



Question (2) (30 marks)

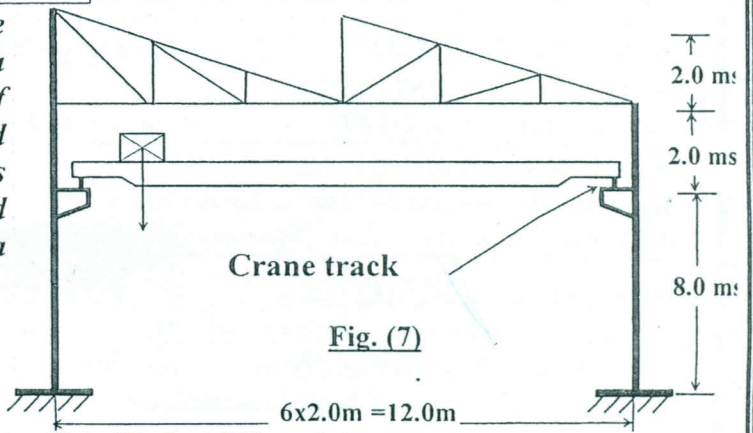
The steel frame shown in fig. (7) is one of series that form the skeleton of a workshop. The frames are composed of sawtooth steel framed truss with two fixed steel column 10.0 ms high. The truss is divided into 6 panels 2.0 ms each, spaced 5.0 ms apart. The roof covering is a corrugated steel sheet.

GIVEN DATA:-

- Weight of corrugated steel sheets = 15.0 kg/m²
- Weight of steel structure = 35.0 kg/m²
- Live load and wind load should be taken as Egyptian Code of Practice

REQUIREMENTS:

- 1) Draw the load distributions acting on the truss due to dead load, live load and wind load?
- 2) Design a suitable section for simply supported purlin ? [purlin span=5.0m]
- 3) Design a suitable rolled section [B.F.I.] for the simply supported crane track girder which subjected to two moving load 8.0 t each and 2.0 ms distance apart. [given the impact coefficient =25% and the lateral shock =10% of the maximum live load]?



GOOD LUCK
Dr. Fikry Salem