COLLEGE OF ENGINEERING & TECHNOLOGY

Department: Mechanical Engineering

Lecturer : Dr. Ahmed Naguib and Dr. Rola Afify

Course : Machine Design I.

Course No .: ME 356   **Marks** : **40**.

Date : 12-1-2013   Time: 11.30 – 13.30

FINAL Examination Paper

Answer the following questions:

Question No. 1. [7 marks]

The joint, shown in **Figure 1**, is subjected to a force **P = 1 KN** and F = **0.64 KN**. Determine the components of the stresses at points *A* and *B*. The member has a rectangular cross section of width **18 mm** and thickness **12 mm**.
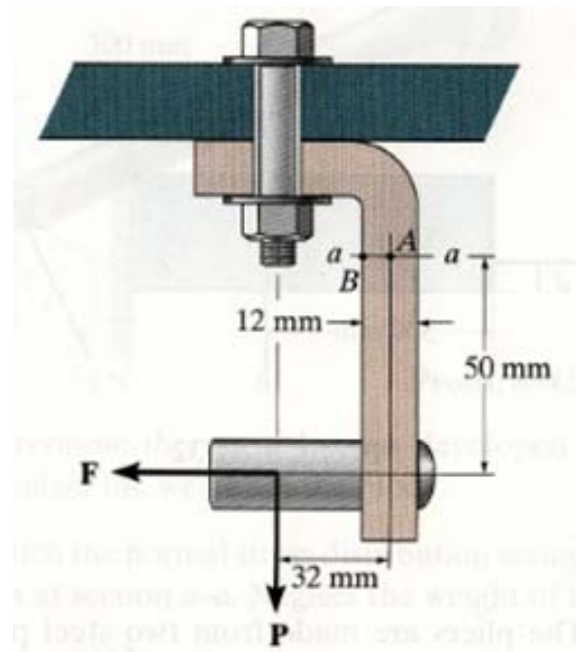

Figure 1.

Question No. 2. [10 marks]

A C-clamp, as shown in **Figure 2**. has single square threads of **12 mm** outside diameter and **2 mm** pitch. The coefficient of friction for screw threads is **0.12** and for the collar is **0.25**. The mean diameter of the collar is **10 mm**. If the force exerted by the operator at end of the handle is **80 N**, find:

  a. The length of the handle,

  b. The maximum shear stress in the body of the screw and where does this exist, and
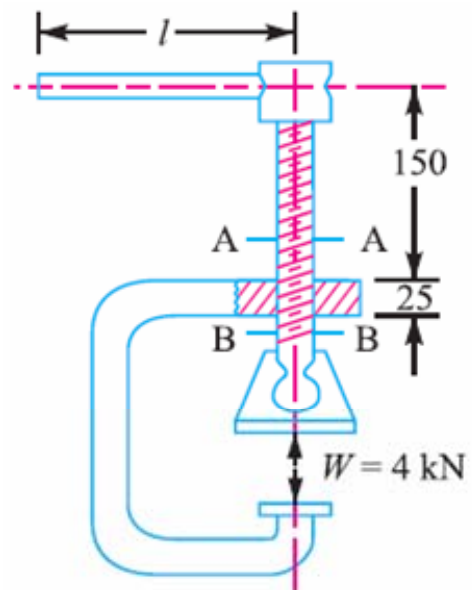
  c. The bearing pressure on the threads.

Figure 2.

Question No. 3. [7 marks]

A vertical channel has a cantilever beam bolted to it by three bolts of **12 mm** diameter as shown in **Figure 3**. If the permissible shear stress of the bolt's material is **60 MPa**, find the safe force F that can be applied to the cantilever.
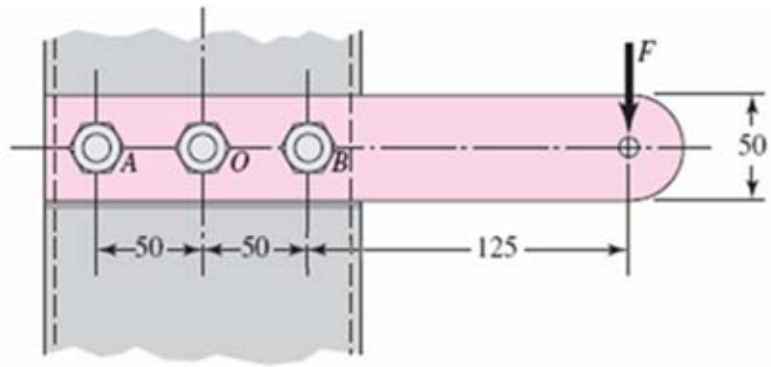

Figure 3.

Question No. 4. [8 marks]

A bracket, shown in **Figure 4**, is to carry a load of **10 KN**. Find the size of the weld, h, if the allowable shear stress is not to exceed **80 MPa**.
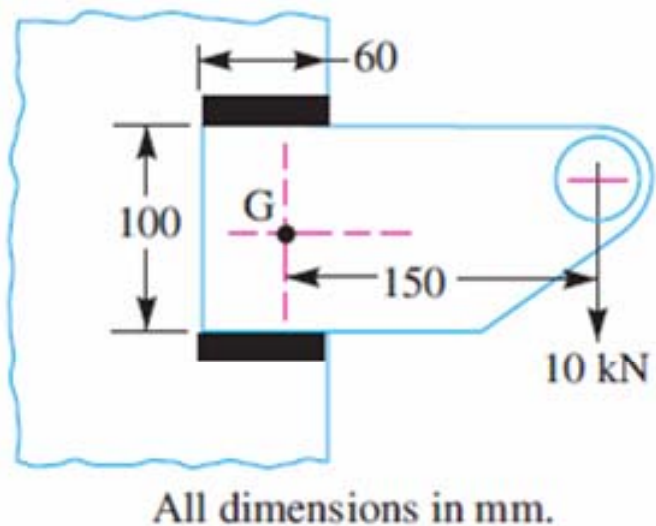

All dimensions in mm.

Figure 4.

Question No. 5. [8 marks]

When a compression helical spring compressed by force of **500 N** it deflects **25 mm**. the spring index, $C = 8$. If the permissible shear stress is **350 MPa** and the modulus of rigidity is **84 GPa**, determine the wire diameter, the mean diameter and the number of the coils of the spring.

Exam committee

Head of department	Prof. Elsayed Saber	
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