淡江大學八十七學年度碩士班入學考試試題

系別： 機械工程學系　　科目： 材料力學

1. (20%) Draw bending moment diagrams for the machine members as shown in Figure 1.1 and Figure 1.2.

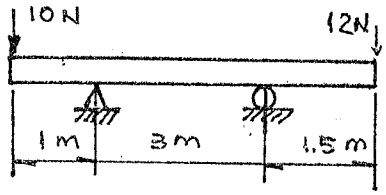


Figure 1.1

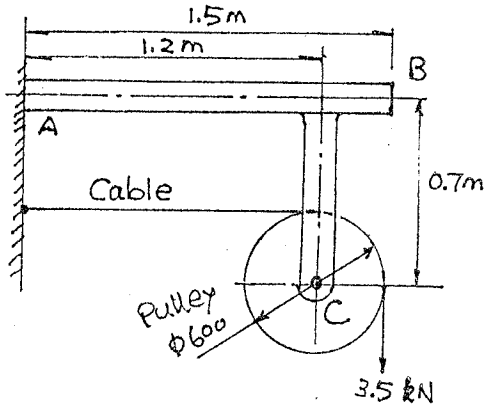


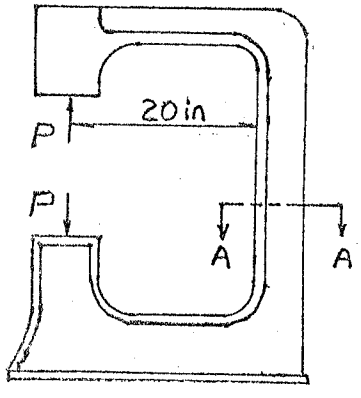
Figure 1.2

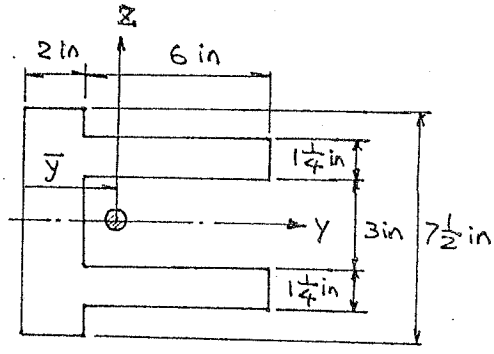
2. A cast iron frame for a punch press has the dimensions shown in Figure 2. The cross-section at A-A is also shown in Figure 2.

(a) (10%) Determine the centroid of the cross-section $\bar{y}$.

(b) (10%) Determine the force P that may be applied to the frame controlled by the stresses in section A-A, if the allowable stresses is 4000 psi intension.

(c) (10%) Determine the force P that may be applied to the frame controlled by the stresses in section A-A, if the allowable stresses is 12000 psi in compression.





Section A-A

Figure 2.

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3. A plate is made of a material for which E = 0.7 GPa and $\nu = 0.36$. It is constrained in the xy-plane by a rigid frame as shown in Figure 3. The plate is initially free of stress and then the top surface is moved downward 2 mm. All surfaces are lubricated and the plate is not constrained in the z-direction.

(a) (10%) Compute the stresses of σ_{xx}, σ_{yy} and σ_{zz}.

(b) (10%) Compute the strains of ε_{xx}, ε_{yy} and ε_{zz}.

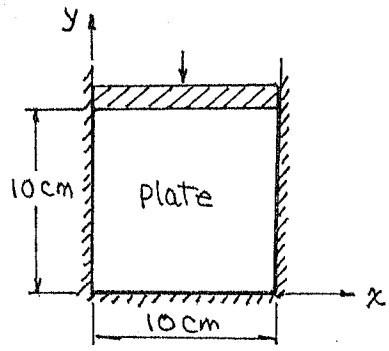
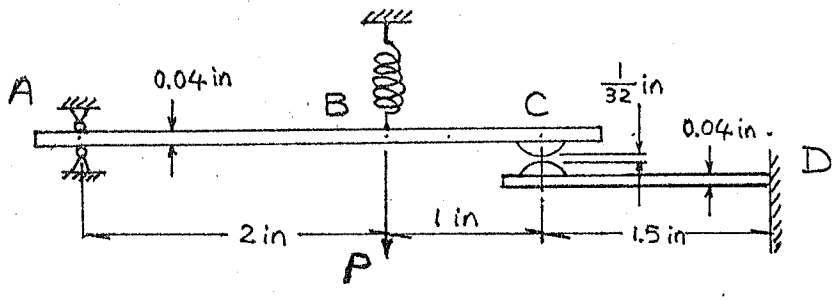


Figure 3

4. (30%) The left member shown in Figure 4 is held open by a spring with 10 Lb/in. When not engaged with the cantilever member on the right, there is a clearance of 1/32 in. Contact is made by applying a force *P*, and it is desired to have a force of 5 LB exerted at the contact points when it is closed. Both members are made of brass with E= 15(10⁶) psi, and have a width of 1/2 in. perpendicular to the paper. When the switch is engaged, determine the maximum defection of the spring, neglecting the beam weight.



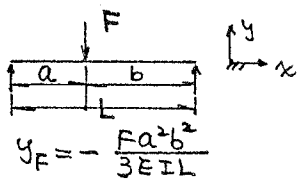


Figure 4