CE 469 Advanced Mechanics of Solids HW6

1. Determine the coordinates of shear center of the thin-walled section with respect to its centroid. Assume $t_1, t_2 << b, h$.

2. At the base section of the cantilevered beam shown, find:
   (a) σ_{xx} at A
   (b) the total shear stress at A in the yz plane

3. Find the twist per unit length for the section with loading as shown.

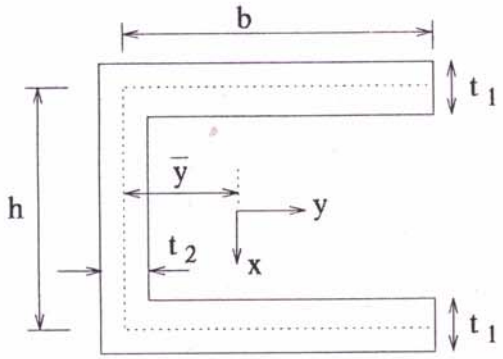
4. A simply supported aluminium beam with a span of 2.0m and cross section as shown carries a load $P = 5\,\text{kN}$ at the mid-span.. The load makes an angle $\phi = 1.40$ rad with the x-axis. Determine the maximum tensile and compressive stresses in the beam.

5. A simply supported 6.0m span girder that supports a wall is made of an I-beam ($A_1 = 6032$ mm^2, $I_{x1} = 90.7\times10^6$ mm^4, $I_{y1} = 3.9\times10^6$ mm^4), a channel ($A_2 = 3929$ mm^2, $I_{x2} = 53.7\times10^6$ mm^4, $I_{y2} = 1.61\times10^6$ mm^4), and a cover plate (300×10 mm^2). The load is uniformly distributed with $w = 20$ kN/m. Determine the orientation of the neutral axis and the maximum tensile and compressive stresses.

6. Determine the location e of the shear center for the cross section shown.

7. Determine the circumferential stresses at B and C for the curved beam with triangular section as shown, for load $P = 40$ kN.

8. For the curved beam with a U-shaped cross section and loading as shown, the ultimate tensile strength is $\sigma_u = 320$ MPa. Determine:
   (a) the maximum load based on ultimate strength and a factor of safety $SF = 4$
   (b) the maximum radial stress when this load is applied.



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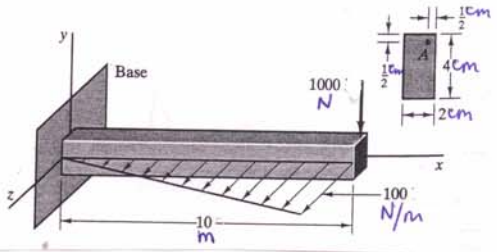

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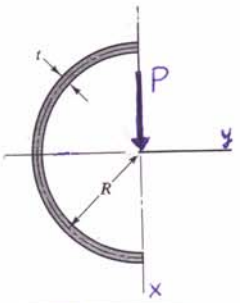

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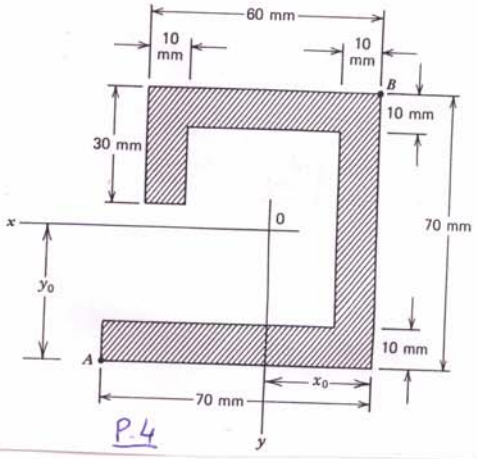

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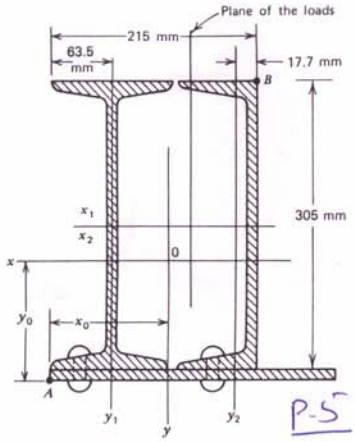

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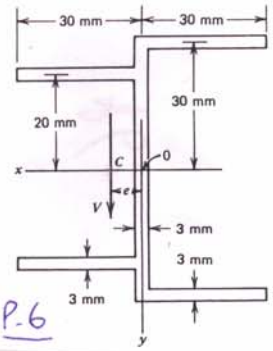

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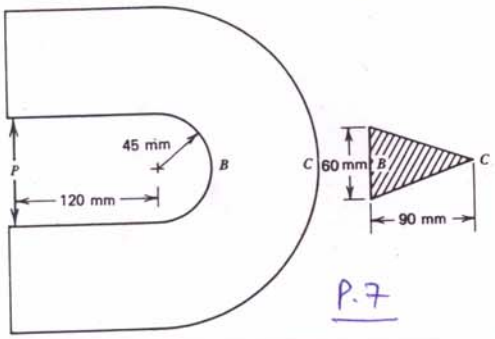

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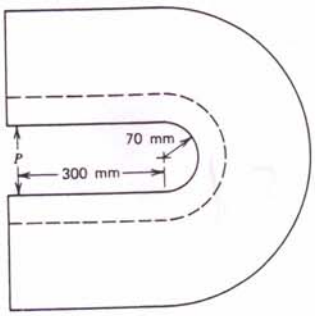

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