CIV100 – MECHANICS – SECTION 5

Assignment No. 8 – Thursday, November 7, 2013

Due: 11:10 a.m., Tuesday, November 12, 2013, stapled and on correct "engineering paper".

***Topics:** Centroids of Areas; Bending Moments in Beams*

***Note:** Quiz No.2 will be held during the Tutorial period next week, covering material up to Nov. 12*

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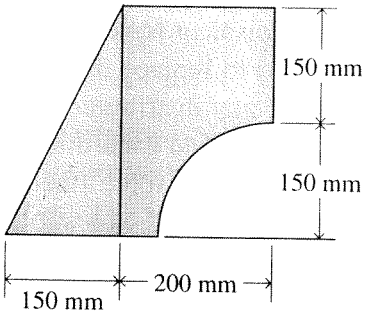
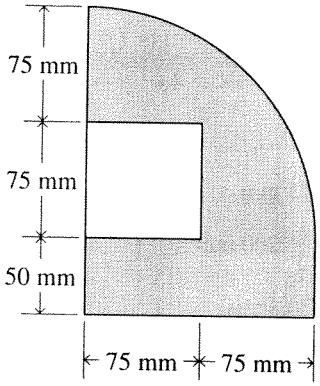
1. Find the location of the centroid of the following areas:

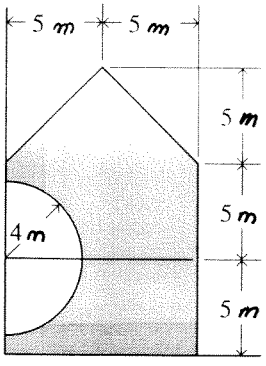
(a)



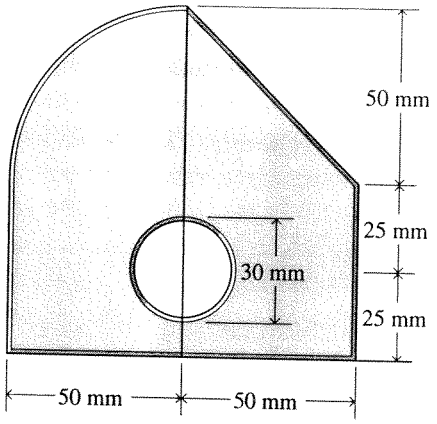
(b)



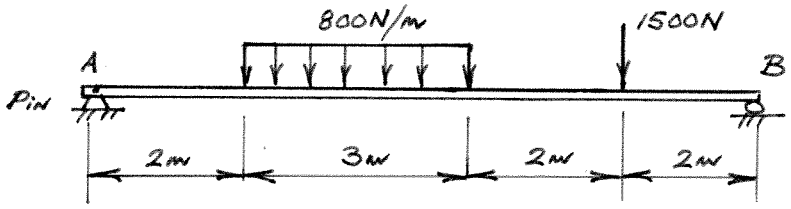
(c)



(d)



2. (i) Plot the shear force and bending moment diagrams for the simply-supported beam shown below, loaded by both distributed and point loads. Give ordinates at all critical points on the diagrams and label the shape of each part of the graph.
(ii) What are the values of the shear force and bending moment 6 metres to the right of A?
(iii) Determine the maximum bending moment, M_{max}.
(iv) If the maximum bending stress that is allowed anywhere in the beam = 200 MPa, design (select) the beam size using a steel rectangular Hollow Structural section of the lightest weight. (The bending stress in a beam = Bending Moment/Elastic Section Modulus. The Elastic Section Modulus (S) is a geometric property of the cross-section and is given in cross-section property tables).



3. Sketch the shear force and bending moment diagrams for each of the four beams loaded and supported as shown.