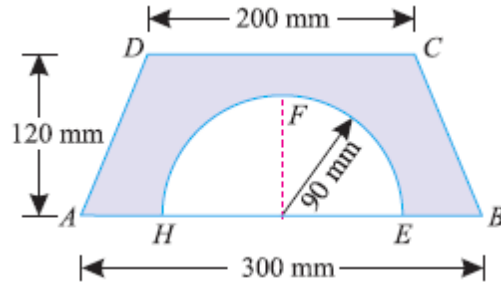


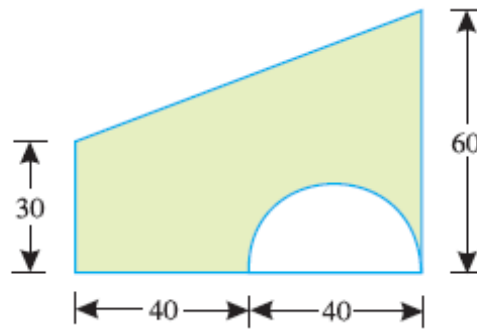
## Session 25

### Numerical problems on Centroids

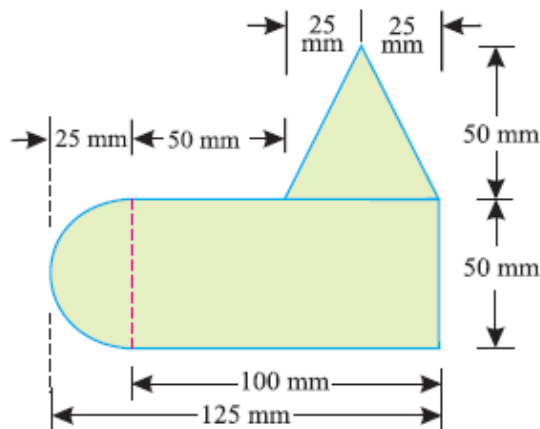
1. An I-section has the following dimensions in mm units: Bottom flange =  $300 \times 100$ , Top flange =  $150 \times 50$ , Web =  $300 \times 50$ . Determine the position of centre of gravity of the section. [Ans. 160.7 mm]
2. A semicircle of 90 mm radius is cut out from a trapezium as shown in Figure. Find the position of the centre of gravity of the figure. [Ans. 69.1 mm]



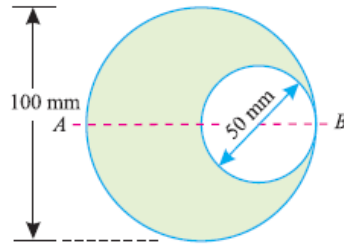
3. A semicircular area is removed from a trapezium as shown in Figure (dimensions in mm). Determine the centroid of the remaining area (shown hatched). [Ans. 41.1 mm, 26.5 mm]



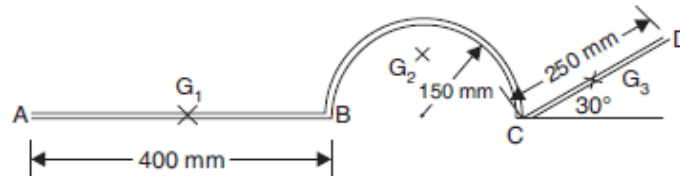
4. A uniform lamina as shown in Figure consists of a rectangle, a circle and a triangle. Determine the centre of gravity of the lamina. All dimensions are in mm. [Ans. 71.1 mm, 32.2 mm]



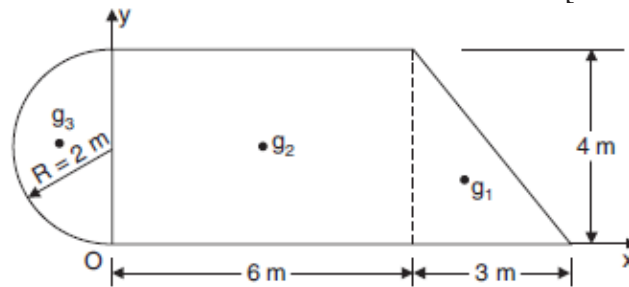
5. A circular hole of 50 mm diameter is cut out from a circular disc of 100 mm diameter as shown in Fig. 6.31. Find the centre of gravity of the section from A. [Ans. 41.7 mm]



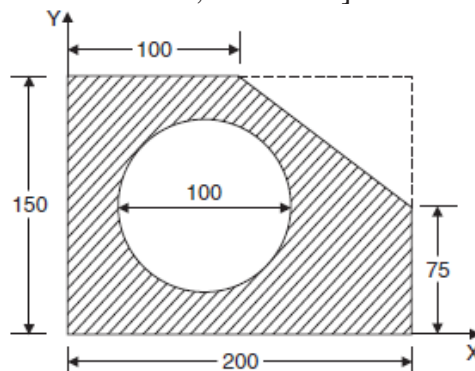
6. Locate the centroid of the uniform wire bent as shown in Figure. [Ans. 451.2 mm, 54.1 mm]



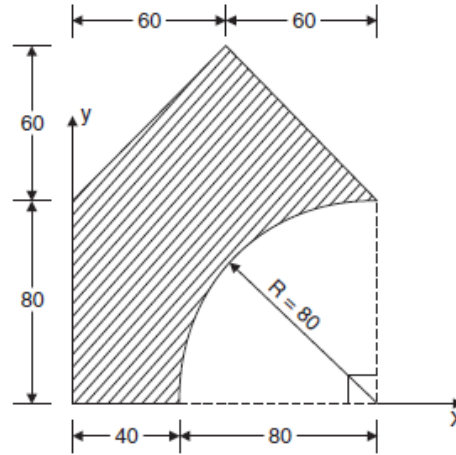
7. Determine the centroid of the area as shown in Fig with respect to the axis shown. [Ans. 2.995 m, 1.89 m]



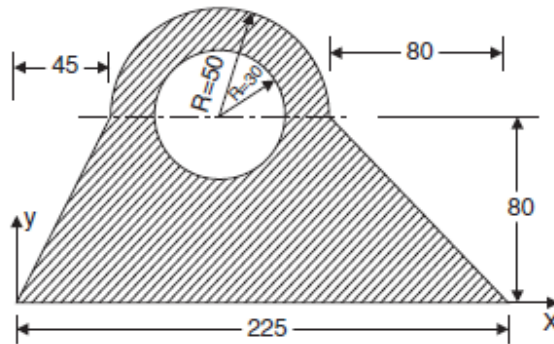
8. Determine the coordinates of the centre of a 100 mm diameter circular hole cut in a thin plate so that this point will be the centroid of the remaining shaded area as shown in Figure (All dimensions are in mm). [Ans. 90.48 mm, 67.86 mm]



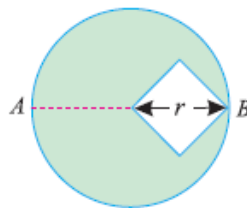
9. Find the centroid of the shaded area as shown in the Figure. [Ans. 43.98 mm, 70.15 mm]



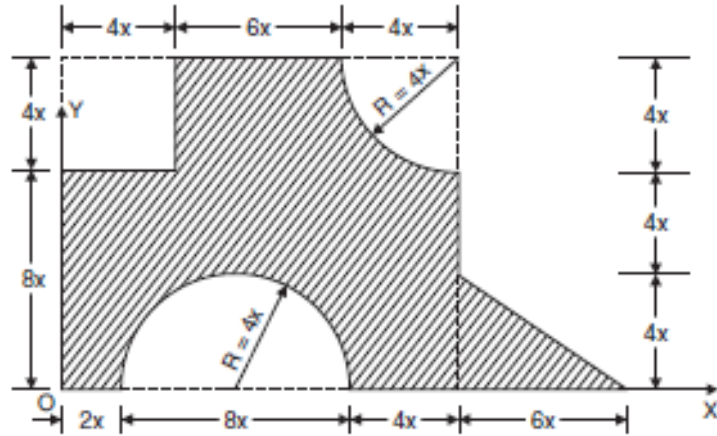
10. Locate the centroid of the plane area as shown in Figure. [Ans. 104.1 mm, 44.3 mm]



11. A square hole is punched out of circular lamina, the diagonal of the square being the radius of the circle as shown in Figure. Find the centre of gravity of the remainder, if  $r$  is the radius of the circle.



12. Determine the coordinates of the centroid of the plane area shown in Figure with reference to the axis shown. Take  $x = 40$  mm. [Ans.  $x = 326.4$  mm;  $y = 219.12$  mm]



13. Determine the centroid of the built-up section in Figure. Express the coordinates of centroid with respect to  $x$  and  $y$  axes shown. [Ans.  $x = 48.91$  mm;  $y = 61.30$  mm]

