ME101 Engineering Mechanics
(Tutorial 5)

Date: 13/02/2013

Note: Each question carries 10 Marks

Section 1 (To be discussed by the tutor)

Q. No 1   Locate the centroid of the plane area shown in Fig 1.
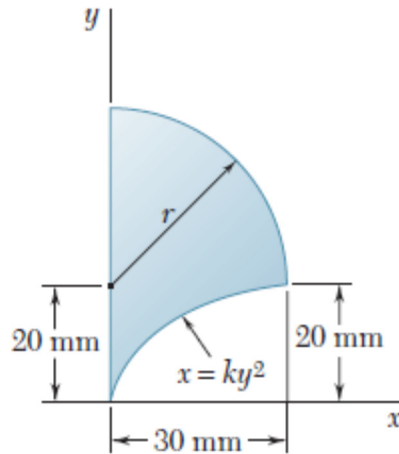

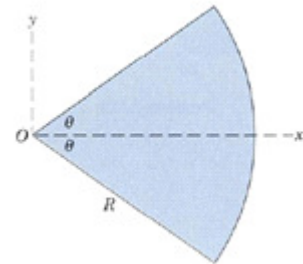Fig. 1   Fig. 2

Q. No 2   Determine moment of inertia of the circular section about x and y axis (Fig. 2)

Section 2: Tutorial Questions

Q. No 3   The aluminum shade for the small high intensity lamp shown in Fig. 3 has a uniform thickness of 1mm. Knowing that the density of aluminum is 2800 kg/m^3, determine the mass of the shade.
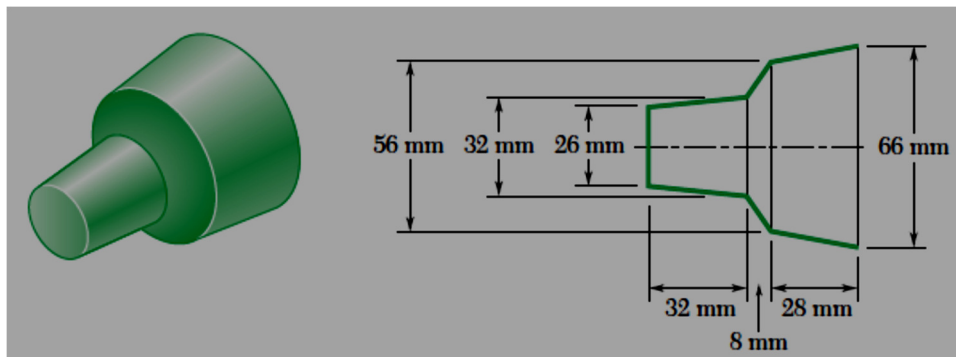

Fig. 3

Q. No 4   The shade for a wall mounted light is formed from a thin sheet of translucent plastic. Determine the surface area of the outside of the shade, knowing that it has the parabolic cross section as shown in Fig. 4.
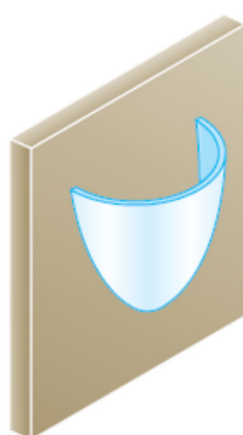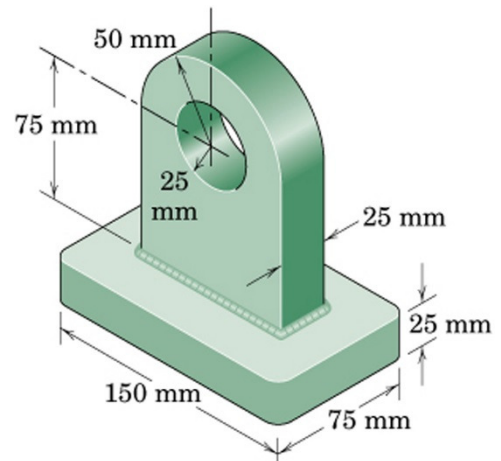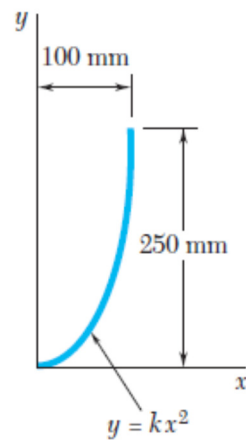

Fig. 4   Fig. 5

Q. No 5   Determine the distance $\bar{H}$ from the bottom of the base to the mass center of the bracket casting (Fig. 5).

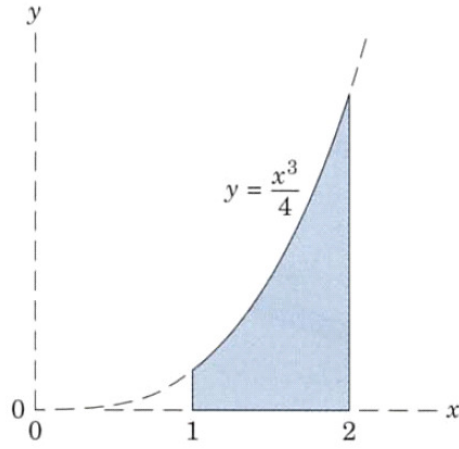Q. No 6   Determine the rectangular radii of gyration of the shaded area (Fig. 6) about the axes shown.

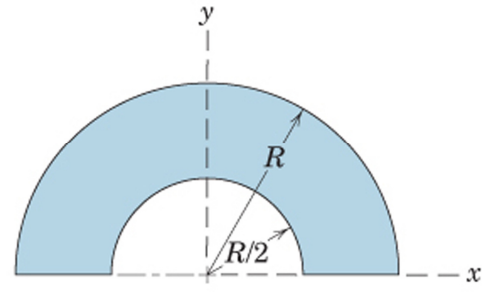

$$y = \frac{x^3}{4}$$

Fig. 6

R

$R/2$

Fig. 7

Section 3: Assignment

Q. No 7   Determine the y coordinate of the centroid of the area shown in Fig. 7 by direct integration.

Q. No 8   Find the $\bar{z}$ from the vertex of the right circular cone to the centroid of its volume (Fig. 8)
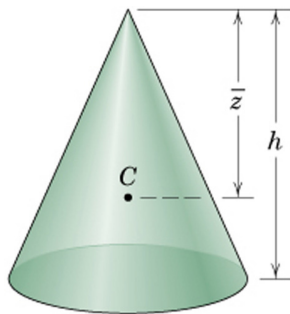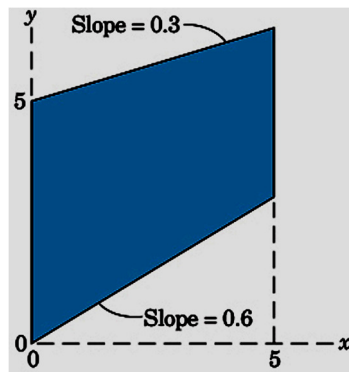

Fig. 8

Slope = 0.3

Slope = 0.6

Fig. 9

Vertex

Parabola
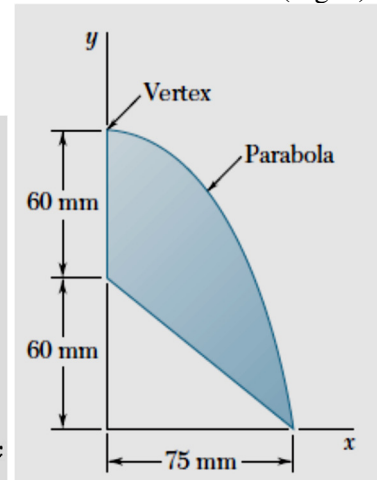
60 mm

60 mm

75 mm

Fig. 10

Q. No 9   By direct integration, determine the coordinate of the centroid of the trapezoidal area shown in Fig. 9.

Q. No 10   Locate the centroid of the plane area shown in Fig 10.