Exercise 22. Second moments of area of regular sections

1. Determine the second moment of area and radius of gyration for the rectangle shown in Fig. 46 about (a) axis *AA* (b) axis *BB*, and (c) axis *CC*

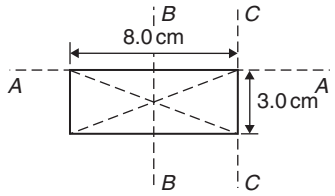

Figure 46

2. Determine the second moment of area and radius of gyration for the triangle shown in Fig. 47 about (a) axis *DD* (b) axis *EE*, and (c) an axis through the centroid of the triangle parallel to axis *DD*

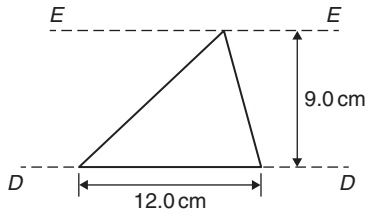

Figure 47

3. For the circle shown in Fig. 48, find the second moment of area and radius of gyration about (a) axis *FF*, and (b) axis *HH*

(a) $201\,\text{cm}^4$, 2.0 cm
(b) $1005\,\text{cm}^4$, 4.47 cm

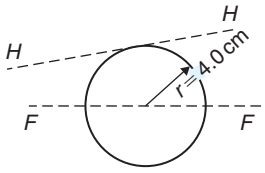

Figure 48

4. For the semicircle shown in Fig. 49, find the second moment of area and radius of gyration about axis *JJ* [3927 mm^4, 5.0 mm]

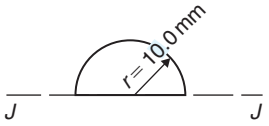

Figure 49

5. For each of the areas shown in Fig. 50 determine the second moment of area and radius of gyration about axis *LL*, by using the parallel axis theorem

[(a) 335 cm^4, 4.73 cm
(b) 22 030 cm^4, 14.3 cm
(c) 628 cm^4, 7.07 cm]

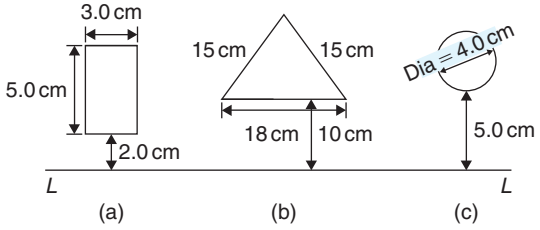

Figure 50

6. Calculate the radius of gyration of a rectangular door 2.0m high by 1.5m wide about a vertical axis through its hinge

7. A circular door of a boiler is hinged so that it turns about a tangent. If its diameter is 1.0 m, determine its second moment of area and radius of gyration about the hinge

Exercise 23. Section moment of areas of composite areas

1. For the sections shown in Fig. 53, find the second moment of area and the radius of gyration about axis *XX*.

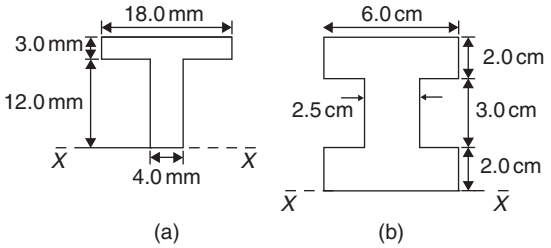

Figure 53

2. Determine the second moment of area about the given axes for the shapes shown in Fig. 54. (In Fig. 54(b), the circular area is removed.)

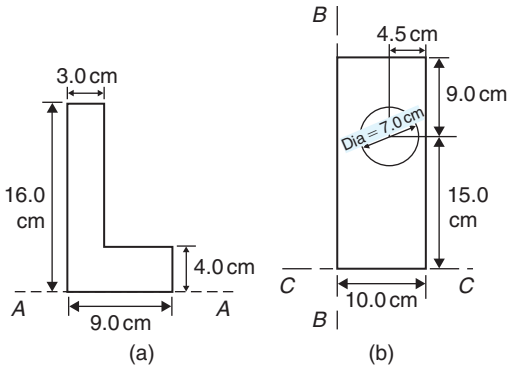

Figure 54

3. Find the second moment of area and radius of gyration about the axis *XX* for the beam section shown in Fig. 55.

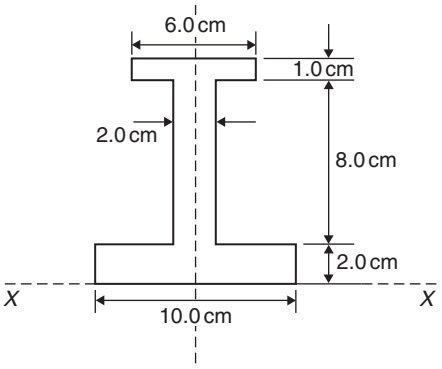

Figure 55