Applied Mechanics Department
S V National Institute of Technology, Surat.
B.Tech – I – [Division G To K]
ODD SEMESTER 2019-20
ENGINEERING MECHANICS

Topic: CG & MI - TUTORIAL- 2

Q1. Locate the centroid of the homogeneous bent wire in figure.

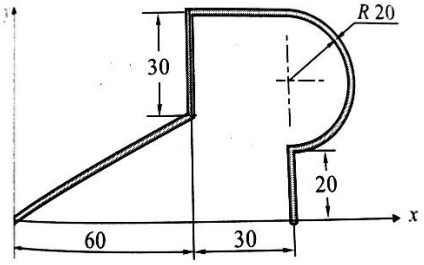


Fig. 5.E21

[Ans. $\bar{x}$ = 68.2 mm and $\bar{y}$ = 31.77 mm.]

Q2. Determine the centroid of the wire OABCDO bent into the shape shown in the figure.

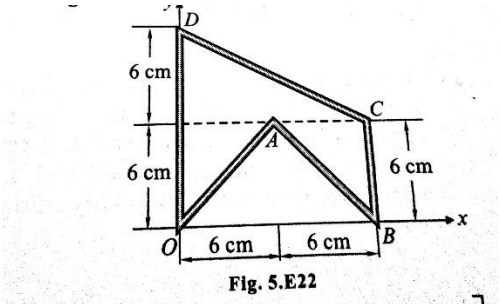


Fig. 5.E22

[Ans. $\bar{x}$ = 5.26 cm and $\bar{y}$ = 5.41 cm.]

Q3. Find the centroid of the following shaded plane areas shown in figure

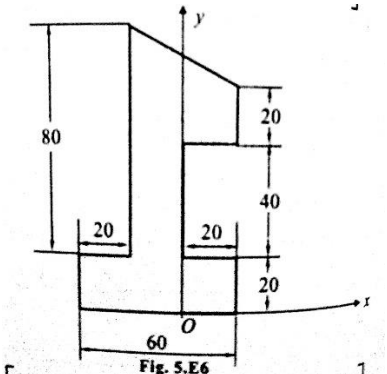


Fig. 5.E6

[Ans. $\bar{x}$ = –7.1 mm and $\bar{y}$ = 42.1 mm.]

Q4. Find the centroid of the following shaded plane areas shown in figure.

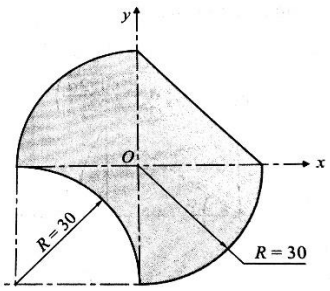
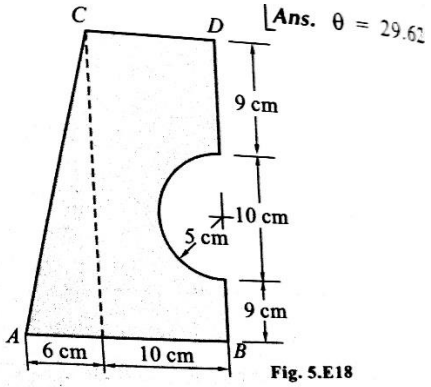


Fig. 5.E12

[*Ans.* $\bar{x} = \bar{y} = 1.563$ mm.]

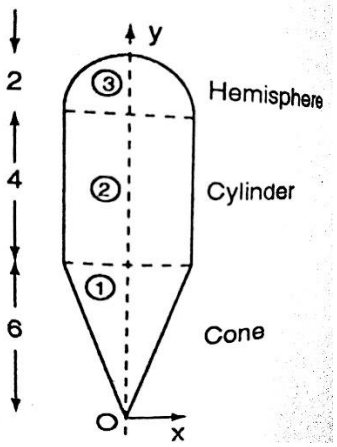
Q5. A plane lamina is hung freely from point D in figure. Find the angle made by BD with the verticals.



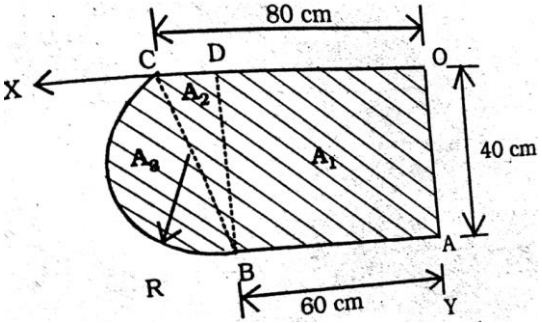
[*Ans.* θ = 29.62

Fig. 5.E18

Q6. Locate centroid for the volume shown in figure. All dimensions are in cm.



Q7. Find position of centroid of a composite lamina, with respect to origin O as shown in figure.[Ans: x = 41.37 mm, y = 20.09 mm]



Q8. Find the M.I. about the centroid axis in figure.

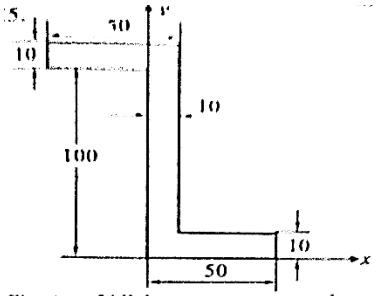


Fig. 6.E5 *[All dimensions are in mm]*

[Ans. $\bar{x} = 5$ mm, $\bar{y} = 55$ mm, $I_{xx} = 3.12 \times 10^6$ mm^4 and $I_{yy} = 0.526 \times 10^6$ mm^4.]

Q9. Find the M.I. about the centroidal axis in figure.

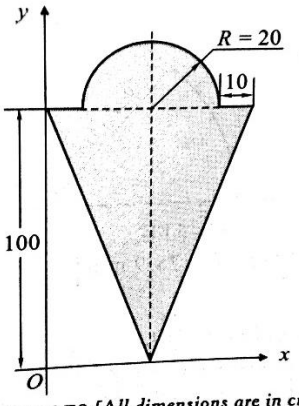


Fig. 6.E8 *[All dimensions are in cm]*

[Ans. $I_{xx} = 2.59 \times 10^6$ cm^4 and $I_{yy} = 512831$ cm^4.]

Q10. Find the M.I about the centroidal axis in figure.

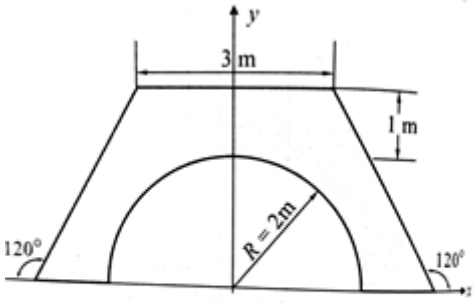
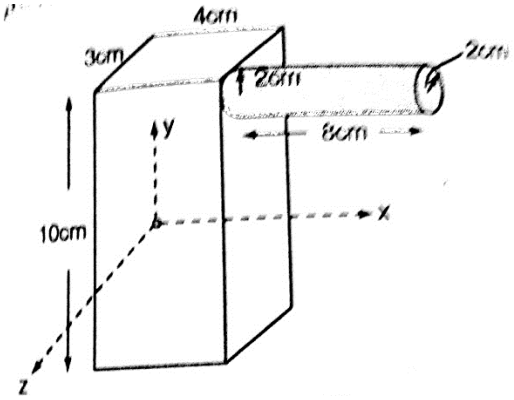


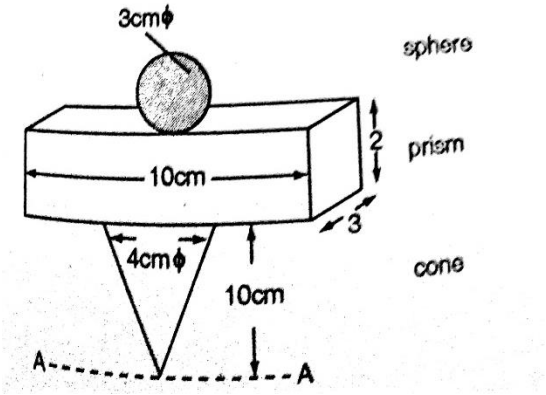
Fig. 6.E11

[Ans. $I_{xx} = 28.51$ m^4 and $I_{yy} = 23.757$ m^4.]

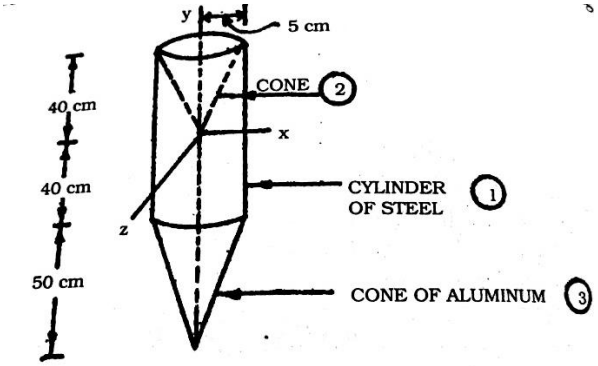
Q11. Find the moment of inertia of solids shown in figure with respect to XX, YY, ZZ axes. Assume $\rho = 7850$ kg/m^3.[Ans: Ixx = 41.127 x 10^6 mm^4, Iyy = 21.976 x 10^6 mm^4, Izz = 55.917 x 10^6 mm^4, Ixy = 15.730 x 10^6 mm^4, Iyz = 8.642 x 10^6 mm^4, Izx = 4.404 x 10^6 mm^4]



Q12. Find the mass moment of inertia about 'AA' for the solid shown in figure. Assume ρ = 7850 kg/m^3.[Ans: I_{AA} = 111.231 x 10^6 mm^4]



Q13. Determine the mass moments of inertia of the composite shown below with respect to the respect to the coordinate axes. (Density of steel = 7850 kg/m^3 and density of Aluminium = 4000 kg//m^3.)[Ans. Ix = 33644 Kg.cm^2, Iy = 620.35 Kg.cm^2, Iz = 33644 Kg.cm^2]



Q14. Determine the polar M.I. of the shaded area in a figure with respect to and axis through the origin.[Ans.

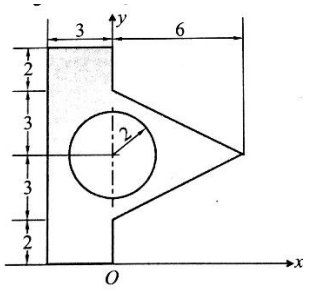


Fig. 6.E10 *[All dimensions are in cm]*

[*Ans.* 1336 cm^4]