

5. By using Pappus theorem, determine the volume of sphere having radius r .
6. State the relationship between the second moment of area and mass moment of inertia for a uniform plate.
7. Equation of motion of a body is $s = 5t^3 + 4t^2 + 3t + 2$. Find velocity and acceleration.
8. Define Instantaneous velocity.
9. Define Rolling Resistance.
10. Define Coefficient of Friction.

PART - B

(5×16=80 Marks)

11. a) Three links PQ, QR and RS connected as shown in Fig. 11 (a) support loads W and 50 N . Find the weight W and the force in each link if the system remains in equilibrium.

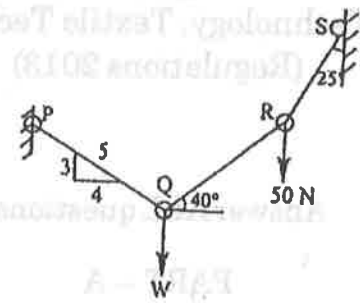


Fig. 11 (a)

(OR)

- b) Two identical rollers each of weight 2.5 kN rest in between an inclined wall and a vertical wall as shown in Fig. 11 (b). Determine the reactions at the points of contact P, Q and R. Assume the wall surfaces to be smooth.

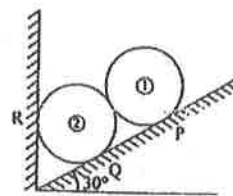


Fig. 11 (b)



12. a) Reduce the given system of forces acting on the beam AB in figure, 12 (a) to (i) an equivalent force couple system at A (ii) an equivalent force couple system at B.

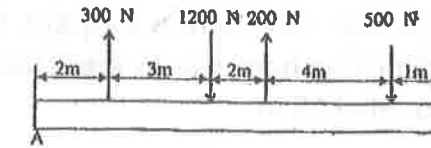


Fig. 12 (a)

(OR)

- b) Find the pin reaction of A and the Roller reaction at B. For the beam shown in Fig. 12 (b).

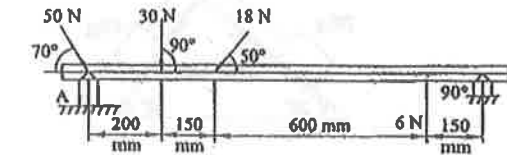


Fig. 12 (b)

13. a) Determine the second moment of area of a triangle about its base and along the axis passing through the centre of gravity.

(OR)

- b) Find the mass moment of inertial of the rectangular block shown in figure 13 (b), about the vertical y axis. A cuboid of $20\text{ mm} \times 20\text{ mm} \times 20\text{ mm}$ has been removed from the rectangular block as shown in figure. The mass density of the material of the block is 7850 kg/m^3 .

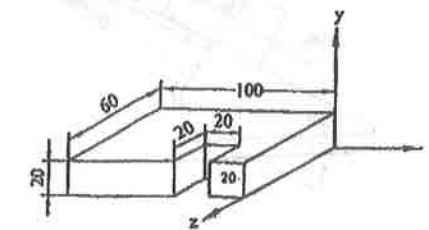


Fig. 13 (b)