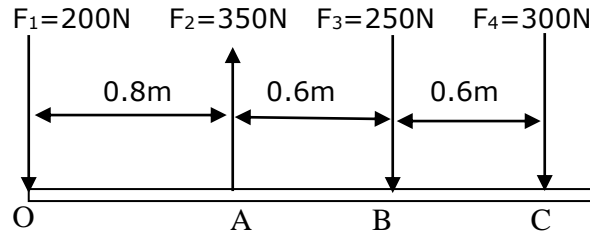


Q- The horizontal bar is acted upon by four vertical forces as shown in the figure. What is the horizontal distance from point O to the line of action of the resultant of the given forces?



The resultant force is given by just adding the forces with their sign (taking downward positive and upward negative). Thus

$$R = F_1 - F_2 - F_3 + F_4 = 200 - 350 + 250 + 300 = 400 \text{ N (downwards)}$$

Now the moment of the forces about point O is given by (anticlockwise positive)

$$\tau = F_1 \cdot 0 - F_2 \cdot OA - F_3 \cdot OB + F_4 \cdot OC$$

$$\text{Or } \tau = 0 - 350 \cdot 0.8 + 250 \cdot 1.4 + 300 \cdot 2.0 = 670 \text{ N m}$$

The resultant of the force R is 400 N downward will have its line of action passing through such a point that the moment produced by it about O will be same as that due the actual moment due to all forces. Let the distance of the line of action of R from O is d then

$$R \cdot d = \tau$$

$$\text{Or } 400 \cdot d = 670$$

$$\text{Gives } d = 1.675 \text{ m}$$