

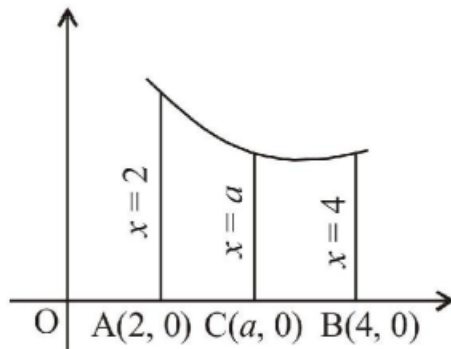
Que 2:

Find the area bounded by the x-axis, part of the curve $y = \left(1 + \frac{8}{x^2}\right)$ and the ordinates at $x = 2$ and $x = 4$. If the ordinate at $x = a$ divides the area into two equal parts, find a .

[1983 - 3 Marks]

solution:

The equation of curve is, $y = 1 + \frac{8}{x^2}$



$$\text{Req. area} = \int_2^4 y dx = \int_2^4 \left(1 + \frac{8}{x^2}\right) dx = \left[x - \frac{8}{x} \right]_2^4 = 4$$

If $x = a$ bisects the area then we have

$$\int_2^a \left(1 + \frac{8}{x^2}\right) dx = \left[x - \frac{8}{x} \right]_2^a = \left[a - \frac{8}{a} - 2 + 4 \right] = \frac{4}{2}$$

$$\Rightarrow a - \frac{8}{a} = 0 \Rightarrow a^2 = 8 \Rightarrow a = \pm 2\sqrt{2}$$

Since $2 < a < 4$ $\therefore a = 2\sqrt{2}$