

35. The sides of an equilateral triangle are increasing at the rate of 2 cm/sec. The rate at which the area increases, when side is 10 cm is

- (a) $10 \text{ cm}^2/\text{s}$ (b) $\sqrt{3} \text{ cm}^2/\text{s}$ (c) $10\sqrt{3} \text{ cm}^2/\text{s}$ (d) $\frac{10}{3} \text{ cm}^2/\text{s}$

Sol. (c) Let the side of an equilateral triangle be x cm.

$$\therefore \text{Area of equilateral triangle, } A = \frac{\sqrt{3}}{4} x^2 \quad \dots(i)$$

Also, $\frac{dx}{dt} = 2 \text{ cm/s}$ (given)

Differentiating equation (i) w.r.t. 't', we get

$$\frac{dA}{dt} = \frac{\sqrt{3}}{4} \cdot 2x \cdot \frac{dx}{dt} = \frac{\sqrt{3}x}{2} \frac{dx}{dt}$$

When $x = 10$

$$\frac{dA}{dt} = \frac{10\sqrt{3}}{2} \cdot 2 = 10\sqrt{3} \text{ cm}^2/\text{s}$$