

94. If $x = t^2$, $y = t^3$, then $\frac{d^2y}{dx^2}$ is

(a) $\frac{3}{2}$

(b) $\frac{3}{4t}$

(c) $\frac{3}{2t}$

(d) $\frac{3}{2t}$

Sol. (b) We have, $x = t^2$ and $y = t^3$

$$\therefore \frac{dx}{dt} = 2t \text{ and } \frac{dy}{dt} = 3t^2$$

$$\therefore \frac{dy}{dx} = \frac{dy/dt}{dx/dt} = \frac{3t^2}{2t} = \frac{3}{2}t$$

Now differentiating above w.r.t. x , we get

$$\frac{d^2y}{dx^2} = \frac{d}{dx} \left(\frac{3}{2}t \right)$$

$$\Rightarrow \frac{d^2y}{dx^2} = \frac{d}{dt} \left(\frac{3}{2}t \right) \frac{dt}{dx}$$

$$\Rightarrow \frac{d^2y}{dx^2} = \frac{3}{2} \frac{dt}{dx}$$

$$\Rightarrow \frac{d^2y}{dx^2} = \frac{3}{2} \frac{1}{2t} = \frac{3}{4t}$$