

Q.92 Section - 08

Given as - $\frac{d^2y}{dx^2} - y = x^2$

To find: particular Integral (P.I) = ?

$$\Rightarrow P.I = \frac{1}{D^2 - 1} (x^2)$$

$$\Rightarrow P.I = \frac{1}{-1(1 - D^2)} (x^2)$$

$$\Rightarrow P.I = \frac{-1}{(1 - D^2)} (x^2)$$

$$\Rightarrow P.I = (-1) [1 - D^2]^{-1} (x^2) \quad \text{--- (1)}$$

By using formula - $(1-x)^n = 1 - nx + \frac{n(n-1)x^2}{2}$

$$- \frac{n(n-1)(n-2)x^3}{6} + \dots$$

$$\Rightarrow (1 - D^2)^{-1} = 1 - (-1)D^2 + \frac{(-1)(-2)(D^2)^2}{2 \times 1} - \frac{(-1)(-2)(3)(D^2)^3}{3 \times 2 \times 1}$$

$$\Rightarrow (1 - D^2)^{-1} = 1 + D^2 + D^4 + D^6 + \dots$$

from eqn (1)

$$\Rightarrow P.I = (-1) [1 + D^2 + D^4 + \dots] (x^2)$$

Neglecting high order

$$\Rightarrow P.I = (-1) [1 + D^2] x^2 = (-1) [x^2 + D^2(x^2)]$$

$$\Rightarrow P.I = -[x^2 + 2x] \text{ Ans}$$