SECTION - 08

Question Answer No- 02

Soln:- Given eqn- $\frac{d^2y}{dx^2} - y = x^2$

To find → Particular Integral (PI) = ?

$$\Rightarrow PI = \frac{1}{D^2-1}(x^2)$$

$$PI = \frac{1}{-1(1-D^2)}(x^2)$$

$$PI = -\frac{1}{(1-D^2)}(x^2)$$

$$PI = (-1)[1-D^2]^{-1}(x^2) \quad \text{— (I)}$$

By using formula - $(1-x)^n = 1 - nx + \frac{n(n-1)}{\lfloor 2}x^2 - \frac{n(n-1)(n-2)}{\lfloor 3}x^3 + \cdots$

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

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

from eqn - (I)

$$\Rightarrow PI = (-1)[1 + D^2 + D^4 + \cdots](x^2)$$

Neglecting Higher orders -

$$\Rightarrow PI = (-1)[1+D^2]x^2 = (-1)[x^2 + D^2(x^2)]$$

$$\Rightarrow PI = (-1)[x^2 + D(2x)] = (-1)[x^2 + 2(1)]$$

$$\Rightarrow \boxed{PI = -[x^2+2]}$$

A