

The particular solution of  $y' + 3xy = x$  which passes through  $(0, 4)$  is:

Solution:

$$\text{Given, } \frac{dy}{dx} + 3xy = x$$

$$\text{IF} = e^{\int 3x dx} = e^{\frac{3x^2}{2}}$$

$\therefore$  Solution is given by:

$$\begin{aligned} y \cdot e^{\frac{3x^2}{2}} &= \int x \cdot e^{\frac{3x^2}{2}} dx + C \\ &= \frac{1}{3} e^{\frac{3x^2}{2}} + C \end{aligned}$$

$\therefore$  the curve passes through  $(0, 4)$ , then

$$4 = \frac{1}{3} + C \Rightarrow C = \frac{11}{3}$$

$$\therefore y = \frac{1}{3} + \frac{11}{3} e^{-\frac{3x^2}{2}}$$

$$\therefore 3y = 11e^{-\frac{3x^2}{2}} + 1$$