First we solve the homogeneous version of the DE

$$y_h'' + 4y_h = 0.$$

Set $y_h = e^{\lambda t}$ to get the characteristic equation

$$\lambda^2 + 4 = 0 \quad \Rightarrow \quad \lambda = \pm 2i$$

so $y_h(t) = C_1 \cos(2t) + C_2 \sin(2t)$.

Use the ICs: $y(0) = 0$ means $C_1 \cdot 1 + C_2 \cdot 0 = 0$

so $C_1 = 0$.

$$y_h(t) = C_2 \sin(2t)$$

$$y_h'(t) = 2C_2 \cos(2t)$$

$y'(0) = 1$ means $2C_2 \cdot 1 = 1$

so $C_2 = 1/2$.

Now we look for a particular solution using the method of undetermined coefficients:

Let $y_p = At^2 + B$

$$y_p' = 2At$$

$$y_p'' = 2A$$

$$y_p'' + 4y_p = 2A + 4(At^2 + B) = t^2$$

so $4A = 1$ and $2A + 4B = 0$.

$A = 1/4$ so $B = -1/8$

Final answer: $y = y_h + y_p = \frac{1}{2}\sin(2t) + 1/4\, t^2 - 1/8$