$$y'' + 4y' + 8y = e^{2x}\left(\operatorname{sen}(2x) + \cos(2x)\right)$$

$$\left(D^2 + 4D + 8\right)y = 0 \qquad Q = e^{2x}\cos(2x) + e^{2x}\operatorname{sen}(2x)$$

$$m^2 + 4m + 8 = 0$$

$$m = \frac{-4 \pm \sqrt{4^2 - 4(8)}}{2}$$

$$m = -2 \pm \sqrt{\frac{4^2 - 4(8)}{4}}$$

$$m = -2 \pm \sqrt{4 - 8}$$

$$m = -2 \pm \sqrt{-4}$$

$$m = -2 \pm 2i \qquad \text{CASO III}$$

$$y_h = C_1 e^{-2x}\cos(2x) + C_2 e^{-2x}\operatorname{sen}(2x)$$

$$\left(D^2 + 4D + 8\right)y = e^{2x}\cos(2x) + e^{2x}\operatorname{sen}(2x)$$

$$\left(D^2 + 4D + 8\right)\left(D^2 - 4D + 8\right)y = 0$$

$$y_{n\text{-}h} = C_1 e^{-2x}\cos(2x) + C_2 e^{-2x}\operatorname{sen}(2x) + Ae^{2x}\cos(2x) + Be^{2x}\operatorname{sen}(2x)$$

$$y_p = Ae^{2x}\cos(2x) + Be^{2x}\operatorname{sen}(2x)$$

$$16A + 16B = 1$$
$$-16A + 16B = 1$$
$$32B = 2$$
$$B = \frac{1}{16}$$

$$16A = 1 - 16\left(\frac{1}{16}\right)$$
$$16A = 1 - \frac{16}{16} \Rightarrow 0$$
$$A = 0$$

$$y^{IV} + 4y'' + 4y = x \operatorname{sen}(\sqrt{2}x)$$

$$(D^4 + 4D^2 + 4)y = x \operatorname{sen}(\sqrt{2}x)$$

$$m^4 + 4m^2 + 4 = 0$$

$$(m^2 + 2)^2 = 0$$

$$m_1 = \sqrt{2} \quad m_2 = -\sqrt{2} \quad m_3 = \sqrt{2} \quad m_4 = -\sqrt{2}$$

$$y_h = C_1 \cos(\sqrt{2}x) + C_2 \operatorname{sen}(\sqrt{2}x) + C_3 x \cos(\sqrt{2}x) + C_4 x \operatorname{sen}(\sqrt{2}x)$$

$$(D^4 + 4D^2 + 4) \cdot (D^4 + 4D^2 + 4)_A y = 0$$

$$(D^4 + 4D^2 + 4)^2 y = 0$$

$$y = C_1 \cos(\sqrt{2}x) + C_2 \operatorname{sen}(\sqrt{2}x) + C_3 x \cos(\sqrt{2}x) + C_4 x \operatorname{sen}(\sqrt{2}x) +$$

$$+ Ax^2 \cos(\sqrt{2}x) + Bx^2 \operatorname{sen}(\sqrt{2}x) + Dx^3 \cos(\sqrt{2}x) + Ex^3 \operatorname{sen}(\sqrt{2}x)$$