

ANSWERS

1. (a) $y = C_1 \sin x + C_2 \cos x$

(b) $y = C_1 e^x + C_2 e^{-6x}$

(c) $y = C_1 e^{2x} + C_2 x e^{2x}$

(d) $y = \frac{1}{2} \sin 2x$

(e) $y = C_1 e^{-x/2} \sin \frac{\sqrt{3}}{2} x + C_2 e^{-x/2} \cos \frac{\sqrt{3}}{2} x$

(f) $y = y_h + y_p, \quad y_h = C_1 e^{2x} + C_2 e^{-3x}, \quad y_p = -\frac{1}{3}x^2 - \frac{1}{9}x - \frac{7}{54}$

(g) $y = y_h + y_p, \quad y_h = C_1 + C_2 e^{-4x}, \quad y_p = -\frac{1}{17} \cos x + \frac{4}{17} \sin x$

2. $x(t) = C_1 \sin \omega t + C_2 \cos \omega t$, initial conditions $\implies C_1 = 1/\omega, C_2 = 0$

3. $E(x) = C_1 \sin k_0 x + C_2 \cos k_0 x$, initial conditions $\implies C_1 = 1/k_0, C_2 = 0$

4. $\theta(t) = C_1 \sin \omega t + C_2 \cos \omega t$, initial conditions $\implies C_1 = 0, C_2 = \pi/16$