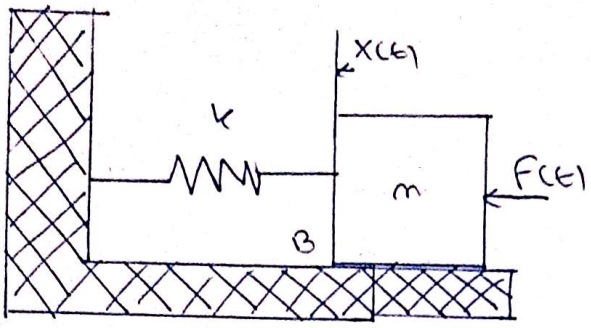
(2.) Str. 8



a) $k/m = 3$ i $B/m = 2$

b) $k/m = 4$ i $B/m = 4$

$f(t) = 0,\ x(0) = 1,\ x'(t) = 0$

a) $-mx'' - Bx' - kx + f(t) = 0$

$-mx'' - Bx' - kx = -f(t)$

$mx'' + Bx' + kx = f(t)$

$x'' + \frac{B}{m}x' + \frac{k}{m}x = \frac{f(t)}{m}$

$x'' + 2x' + 3x = 0 \rightarrow x'' = -2x' - 3x$

$s^2X(s) - sx(0) - x'(0) + 2sX(s) - 2x(0) + 3X(s) = 0$

$s^2X(s) - s + 2sX(s) - 2 + 3X(s) = 0$

$s^2X(s) + 2sX(s) + 3X(s) = s + 2$

$X(s)(s^2 + 2s + 3) = s + 2$

$X(s) = \frac{s+2}{s^2+2s+3}$

$\frac{s+2}{s^2+2s+3} = \frac{As+B}{s^2+2s+3} \quad / \cdot (s^2+2s+3)$

$s + 2 = As + B$

$\underline{A = 1}, \quad \underline{B = 2}$

$\frac{s+2}{s^2+2s+3} = \frac{s+2}{s^2+2s+3} = \frac{s+2}{(s+1)^2+2} = \frac{(s+1)-1+2}{(s+1)^2+2} = \frac{s+1}{(s+1)^2+2} + \frac{1}{(s+1)^2+2}$

$$y(t) = e^{-t}\cos\sqrt{2}t + \frac{1}{\sqrt{2}}e^{-t}\sin\sqrt{2}t \quad \checkmark$$

b) $x'' + \frac{B}{m}x' + \frac{k}{m}x = \frac{F(t)}{m}$

$x'' + 4x' + 4x = 0 \rightarrow x'' = -4x' - 4x$

$s^2X(s) - sx(0) - x'(0) + 4sX(s) - 4x(0) + 4X(s) = 0$

$s^2X(s) - s + 4sX(s) - 4 + 4X(s) = 0$

$s^2X(s) + 4sX(s) + 4X(s) = s + 4$

$X(s)(s^2 + 4s + 4) = s + 4$

$X(s) = \frac{s+4}{s^2+4s+4} = \frac{s+4}{(s+2)^2}$

$\frac{s+4}{(s+2)^2} = \frac{A}{s+2} + \frac{B}{(s+2)^2} \quad / (s+2)^2$

$s + 4 = A(s+2) + B$

$s + 4 = As + 2A + B$

$A = 1, \quad 2A + B = 4$

$B = 2$

$\frac{s+4}{(s+2)^2} = \frac{1}{s+2} + 2\frac{1}{(s+2)^2}$

$\boxed{y(t) = e^{-2t} + 2te^{-2t}}$ ✓