$$\frac{d^2y}{dt^2} + 6\frac{dy}{dt} + 12y(t) = 10$$

driving Function → I/P

$$\mathcal{L}\left[\frac{d^2y(t)}{dt^2}\right] = s^2Y(s)$$

$$\mathcal{L}\left[6\frac{dy}{dt}\right] = 6sY(s)$$

$$\mathcal{L}[12y] = 12Y(s)$$

$$\mathcal{L}[10(t)] = \frac{10}{s}$$

$$s^2Y(s) + 6sY(s) + 12Y(s) = \frac{10}{s}$$

$$[s^2 + 6s + 12]Y(s) = \frac{10}{s}$$

$$Y(s) = \frac{10}{s[s^2+6s+12]}$$

① $y(t=0)$

$$y(0) = \lim_{s\to\infty} s \cdot \frac{10}{s(s^2+6s+12)}$$

$$= \frac{10}{\infty} = \phi$$

② $y(t=\infty) = \lim_{s\to 0} s \cdot Y(s)$

$$= \lim_{s\to 0} \not{s} \cdot \frac{10}{\not{s}(s^2+6s+12)}$$

$$y(\infty) = \frac{10}{12} \approx 0.85 \text{ (steady state o/p) } y_{ss}$$

Initial Value Theorem

$x(t) = 10$ ——— (1)

$x(t) = \delta(t)$ impulse Function (2)

$$\mathcal{L}[10] = \frac{10}{s}$$

$$\mathcal{L}[\delta(t)] = 1$$

$x(t) = e^{-3t}$ exponential Func (3)

$$\mathcal{L}[e^{-3t}] = \frac{1}{s+3}$$

$x(t) = \cos(7t)$ (4)

$$\mathcal{L}[\cos 7t] = \frac{s}{s^2+7^2}$$

$$f(t) = e^{-5t} + 3\cos(4t) + 3\delta(t)$$

$F(s) = ?$

$$\mathcal{L}[e^{-5t}] = \frac{1}{s+5}$$

$$\mathcal{L}[3\cos(4t)] = \frac{3s}{s^2+16} \quad (4^2)$$

$$\mathcal{L}[3\delta(t)] = 3$$