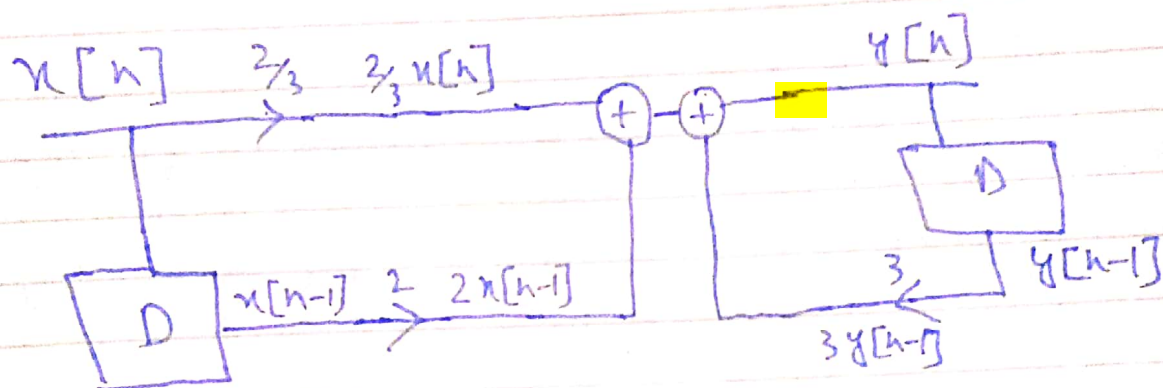


Q3(1)

$$(i) \quad y[n] - 3y[n-1] = \frac{2}{3}x[n] + 2x[n-1]$$

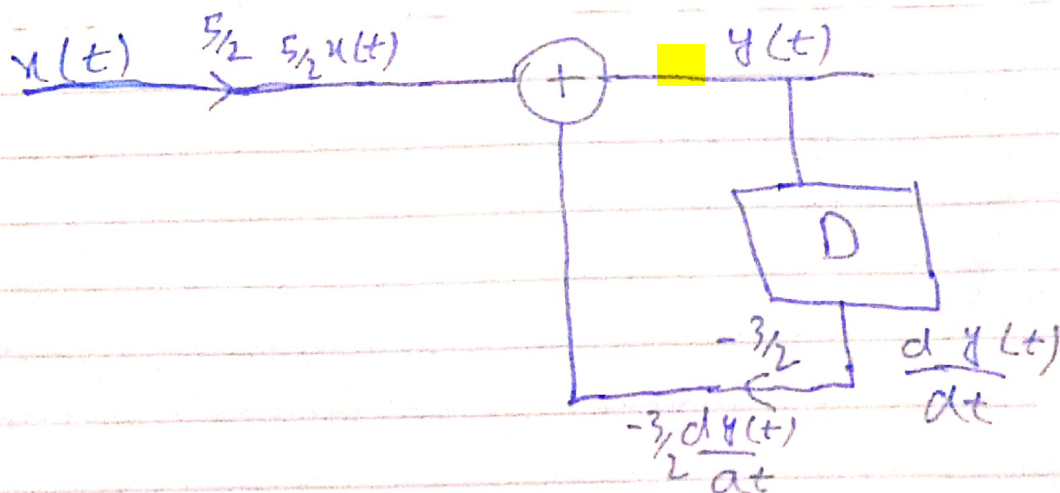
$$y[n] = \frac{2}{3}x[n] + 2x[n-1] + 3y[n-1]$$



$$(ii) \quad 3 \frac{dy(t)}{dt} + 2y(t) = 5x(t)$$

$$2y(t) = 5x(t) - 3 \frac{dy(t)}{dt}$$

$$y(t) = \frac{5}{2}x(t) - \frac{3}{2} \frac{dy(t)}{dt}$$



(Q3) (2)

$$A = 5$$

$$B = 8$$

$$x(t) = 5 + 8 \cos\left(\frac{\pi}{4}t + \frac{\pi}{6}\right) + 8 \cos\left(\frac{\pi}{2}t + \frac{\pi}{2}\right) + 5 \sin\left(\frac{3\pi}{4}t + \frac{\pi}{4}\right)$$

$$h(t) = e^{-2t} u(t)$$

$$x(t) = 5 + \frac{8}{2} \left[e^{j(\frac{\pi}{4}t + \frac{\pi}{6})} + e^{-j(\frac{\pi}{4}t + \frac{\pi}{6})} \right] + \frac{8}{2} \left[e^{j(\frac{\pi}{2}t + \frac{\pi}{2})} + e^{-j(\frac{\pi}{2}t + \frac{\pi}{2})} \right] + \frac{5}{2} \left[e^{j(\frac{3\pi}{4}t + \frac{\pi}{4})} - e^{-j(\frac{3\pi}{4}t + \frac{\pi}{4})} \right]$$

$$y(t) = x(t) \times H(\omega_0)$$

$$x(t) = 1 + \left(\frac{8}{2} e^{j(\frac{\pi}{6})} \right) e^{j\frac{\pi}{4}t} + \left(\frac{8}{2} e^{-j(\frac{\pi}{6})} \right) e^{-j\frac{\pi}{4}t} + \left(\frac{8}{2} e^{j(\frac{\pi}{2})} \right) e^{j\frac{\pi}{2}t} + \left(\frac{8}{2} e^{-j(\frac{\pi}{2})} \right) e^{-j\frac{\pi}{2}t} + \left(\frac{5}{2} e^{j(\frac{\pi}{4})} \right) e^{j\frac{3\pi}{4}t} + \left(\frac{5}{2} e^{-j(\frac{\pi}{4})} \right) e^{-j\frac{3\pi}{4}t}$$

$$H(\omega_0) = \int h(\tau) e^{-j\omega_0 \tau} d\tau$$