



Chitrangada Page 1

Q.4) $y(n) = 0.5y(n-1) - 0.25y(n-2) + x(n) + 0.4x(n-1)$

Step I \rightarrow

$$\begin{aligned} Y(z) &= z^{-1} 0.5 Y(z) \\ &- z^{-2} 0.25 Y(z) \\ &+ X(z) \\ &+ X(z) 0.4 \end{aligned}$$

$$\begin{aligned} Y(z) &= 0.5 z^{-1} Y(z) \\ &- 0.25 z^{-2} Y(z) \\ &+ X(z) \\ &+ 0.4 z^{-1} X(z) \end{aligned}$$

$$\begin{aligned} Y(z) - 0.5 z^{-1} Y(z) + 0.25 z^{-2} Y(z) \\ = X(z) + 0.4 z^{-1} X(z) \end{aligned}$$

$$\begin{aligned} \therefore Y(z) (1 - 0.5 z^{-1} + 0.25 z^{-2}) \\ = X(z) (1 + 0.4 z^{-1}) \end{aligned}$$

$$\frac{Y(z)}{X(z)} = \frac{1 + 0.4 z^{-1}}{1 - 0.5 z^{-1} + 0.25 z^{-2}}$$

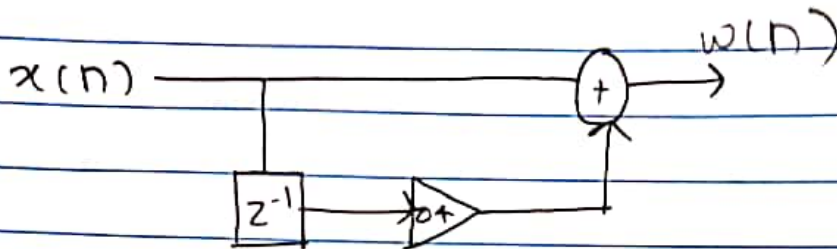
$$H_1(z) = 1 + 0.4 z^{-1}$$

$$H_2(z) = 1 - 0.5 z^{-1} + 0.25 z^{-2}$$

Step II →

Implement $H_1(z)$

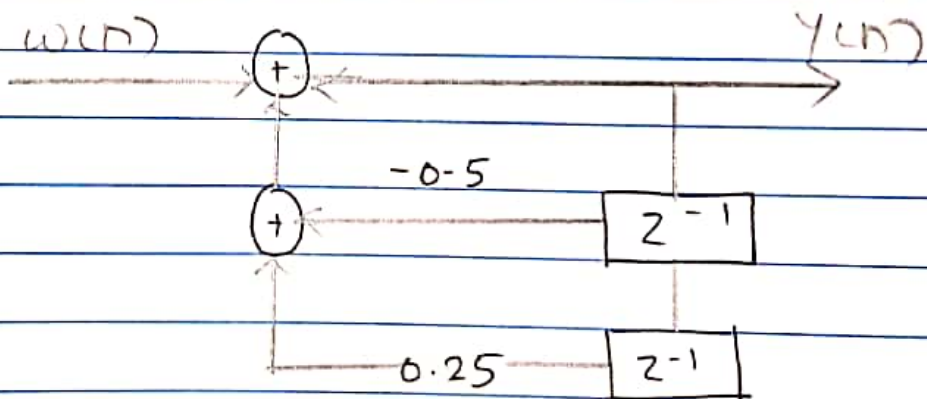
$$H_1(z) = 1 + 0.4z^{-1}$$



Step III →

Implement $H_2(z)$

$$H_2(z) = 1 - 0.5z^{-1} + 0.25z^{-2}$$



Step IV → cascade both

