

Problem 4:- Solution

$$y(n) = 0.5 \times y(n-1) - 0.25 \times y(n-2) + x(n) + 0.4 \times x(n-1)$$

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

Using Z-transform,

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

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

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

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

