



**Arab Academy for Science & Technology  
and Maritime Transport – Cairo Branch  
College of Engineering & technology  
Electronics & Communication Engineering Department**



Course: Analog & Digital Signal Processing

Course Code : EC534

**Sheet No.7: Stability, Realization of  
Discrete Systems & Z-Domain Analysis**

**P1.** For the IIR system described by the shown difference equation,

$$y(n) + 0.1y(n-1) - 0.2y(n-2) = x(n) + x(n-1)$$

Determine the:

- a. Transfer function  $H(z)$ . Discuss the system stability.
- b. Impulse response  $h(n)$ .

**P2.** An FIR filter is described by the following difference equation.

$$y(n] = x(n) + 2x(n-1) + 4x(n-2) + 2x(n-3) + x(n-4)$$

Find the:

- a. Impulse response,  $h(n)$ . Plot  $h(n)$ .
- b. Transfer function  $H(z)$ .
- c. Discuss the stability and causality of the system.

**P3.** Calculate and plot the response of the following transfer function.

$$H(Z) = \frac{3 - 2Z^{-1} + 6Z^{-2} + 2Z^{-3}}{1 + Z^{-1}}$$

**P4.** For the excitation shown in figure 4-2, calculate and plot the response  $y(nT)$  for the given difference equation.

$$y(n) = 3x(n) - 2x(n-1) + x(n-3) - y(n-1)$$

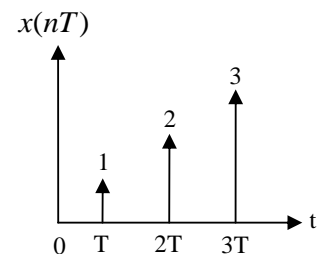


Figure 4-2

