**Experiment 1-A**

**Write a MATLAB program to plot five cycles of continuous and discrete sine wave with given amplitude, frequency, phase, and sampling frequency.**

**Experiment 1-B**

**Write a MATLAB program to plot the discrete sine wave with given amplitude, frequency, phase, sampling frequency and length of the sequence. Also observe first alias.**

**Experiment 1-C**

**Write a MATLAB program for generation of DT unit impulse, step, and ramp sequence for a given initial time, final time and start of sequence.**

**Experiment 2**

1. **Find rational Transfer function H(z) = B(z)/A(z) of given DT LTI systems analytically.**
2. **Write a MATLAB program to find and plot pole-zero pattern in z-plane, to determine stability, to find and plot unit impulse and unit step responses, to find and plot magnitude and phase responses (Frequency response plots) if the given system is stable.**
3. Accumulator

Z-1

x(n)

y(n)

1. Filter

1/3

Z-1

y(n)

-1/2

x(n)

Z-1

**Note:** Use inbuilt functions: tf2zpk, zplane, isstable, impz, freqz.

**Experiment 3**

1. For M-tap moving average filter, plot the magnitude and phase response for different values of M using MATLAB.

Note: Use inbuilt function: freqz.

1. Reverberation is similar to the echo effect we can hear when we shout across an open valley or canyon, or in a large empty room. The following figure gives one such model of reverberation. Find the transfer function and frequency response. Write a program to display its frequency response and impulse response.

0.8

y(n)

x(n)

0.9

Z-240

x1(n)

Note: Use inbuilt function: impz, freqz.

**Experiment 4**

1. Write a MATLAB program to generate a signal x(n)=2n (0.95)n; 0≤n≤99. Corrupt it by additive random noise with amplitude in interval [-0.5 0.5]. Apply the signal to a Moving average filter with given tap length. Plot the input signal, noise signal, corrupted signal and filtered signal in same plot. Use proper labels and legends.

Note: Use inbuilt functions: rand, filter

1. Write a MATLAB program to plot time and frequency domain characteristics of rectangular, Bartlett, Blackman, Hamming and Hanning window functions with given length. Plot time domain characteristics in one plot for all windows and frequency domain characteristics in one plot for all windows.

Note: Use inbuilt functions: window.

**Experiment 5**

1. Design a digital linear phase FIR highpass filter with following specifications using proper window function: (Select window function analytically)



Write a MATLAB program to calculate all the required parameters (only select window analytically), plot the frequency response in 0 to pi range. Determine stop band attenuation and passband ripple of the designed filter. Display the filter is meeting the designed specifications or not.

Note: Use the inbuilt function fir1.

1. Repeat the above problem for bandpass filter with given specifications:

