PES UNIVERSITY
(Established under Karnataka Act No. 16 of 2013)
100 Feet Ring Road, BSK III Stage, Bengaluru-560 085
Department of Electronics and Communication Engineering

Course Title: Principles of digital signal processing
Course Code: UE21EC252B

PROJECT 3

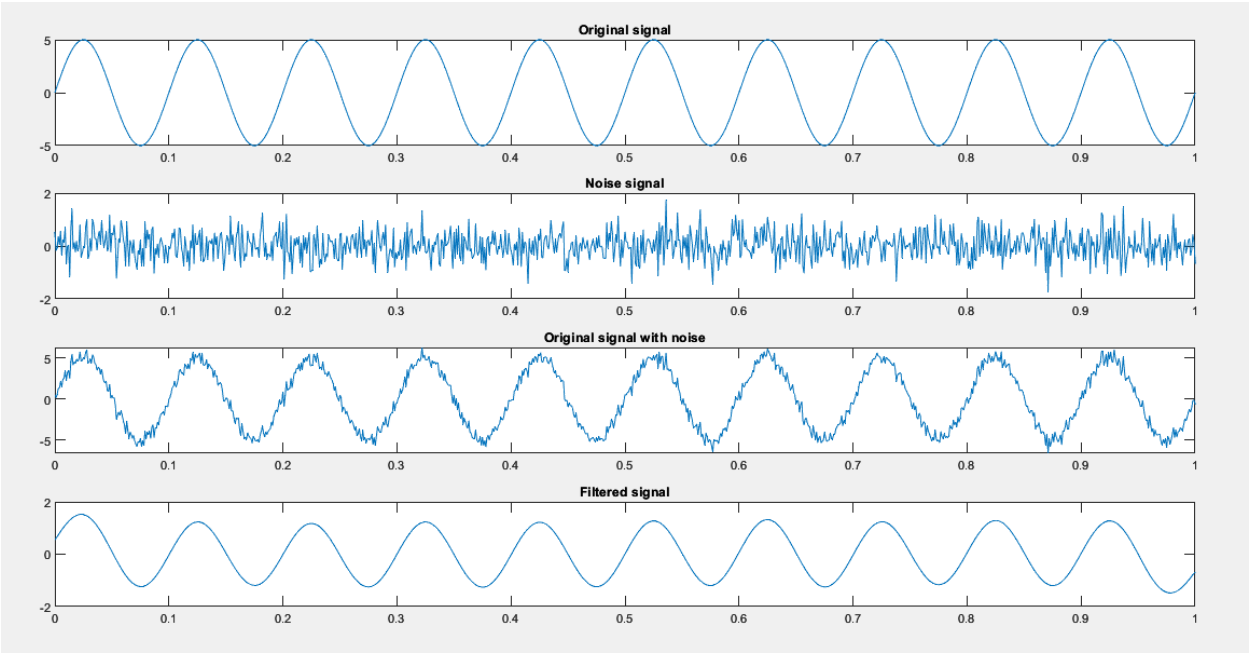
NAME: AKASH RAVI BHAT
SRN: PES1UG21EC025

QUESTION 3:

CODE:

```
Fs=1000; %defining sampling frequency in Hz
t=0:1/Fs:1; % defining time to range to plot
x=5*sin(2*pi*10*t); % original signal with frequency = 10 and amplitude = 5
noise=0.5*randn(size(x)); % generating random gaussian noise with variance =0.5
x_noisy=x+noise; %generating noisy signal
cutoff=10; % defineing cutoff frequency in Hz
order=200; % defining order of filter
nyquist_freq=0.5*Fs; % calculating nyquist frequency
cutoff_normalized=cutoff/ nyquist_freq; %normalising cutoff frequency
b=fir1(order,cutoff_normalized,"low",hamming(order+1)); % b is filter co
efficient, fir1 takes order, normalised cutoff frequency,type, window as
parameters
y=filtfilt(b,1,x_noisy); % passing noisy signal through filter designed,
filtfilt has 0 phase delay
snr_original=snr(x_noisy,Fs); % calculating snr of noisy signal
snr_filtered=snr(y,Fs); % calculating snr of filtered signal
%printing snr
fprintf('SNR of signal with noise: %.2f dB\n', snr_original);
fprintf('SNR of the filtered signal: %.2f dB\n', snr_filtered);
%plotting all signals
figure;
subplot(411);
plot(t,x);
title('Original signal');
subplot(412);
plot(t,noise);
title('Noise signal');
subplot(413);
plot(t,x_noisy);
title('Original signal with noise');
subplot(414);
plot(t,y);
title('Filtered signal');
```

OUTPUT:




```
>> PEOJECT_3
SNR of signal with noise: 17.14 dB
SNR of the filtered signal: 32.82 dB
>>
```