PES UNIVERSITY
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Department of Electronics and Communication Engineering

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

PROJECT 2

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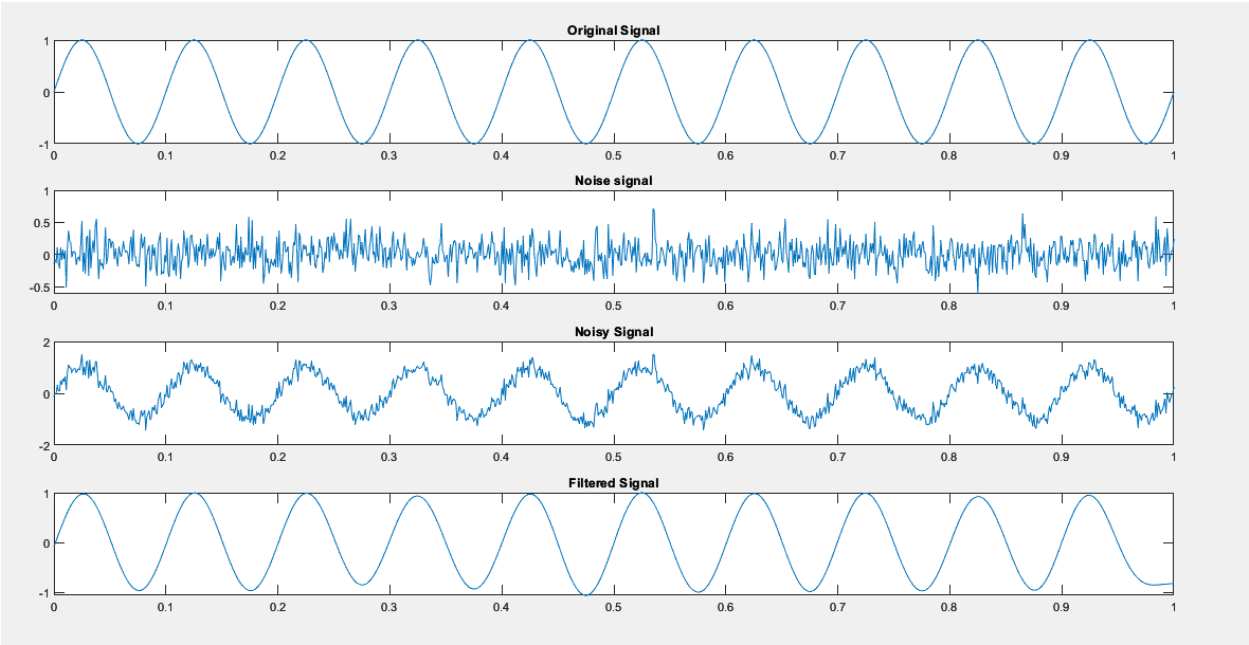
QUESTION 2:

CODE:

```
Fs=1000;%defining sampling frequency in Hz
t=0:1/Fs:1;% defining time to range to plot
y=sin(2*pi*10*t);% original signal with frequency = 10 and amplitude =1
noise=0.2*randn(size(y));% generating random gaussian noise with variance =0.2
y_noisy=y+noise;%generating noisy signal
order=4;  % defining order of filter
cutoff=15;  % defineing cutoff frequency in Hz
[b,a]=butter(order,cutoff/(Fs/2),'low'); % b,a are filter co-efficients of
numerator and denominator; takes order, normalised cutoff frequency and type as
input
y_filtered=filtfilt(b,a,y_noisy); % passing noisy signal throught filter,
filtfilt gives 0 phase delay
%plotting all the graphs
figure;
subplot(411);
plot(t,y);
title('Original Signal');
subplot(412);
plot(t,noise);
title('Noise signal')
subplot(413);
plot(t,y_noisy);
title('Noisy Signal');
subplot(414);
plot(t,y_filtered);
title('Filtered Signal');
snr_original=snr(y,Fs); % finding snr of original signal
snr_noisy=snr(y_noisy,Fs); % finding snr of noisy signal
snr_filtered=snr(y_filtered,Fs); % finding snr of filtered signal
%printing snr
fprintf('SNR of original signal %.2f dB\n', snr_original);
fprintf('SNR of signal with noise: %.2f dB\n', snr_noisy);
fprintf('SNR of the filtered signal: %.2f dB\n', snr_filtered);
```

OUTPUT:




```
>> PROJECT_2
SNR of original signal 289.44 dB
SNR of signal with noise: 11.44 dB
SNR of the filtered signal: 82.37 dB
```