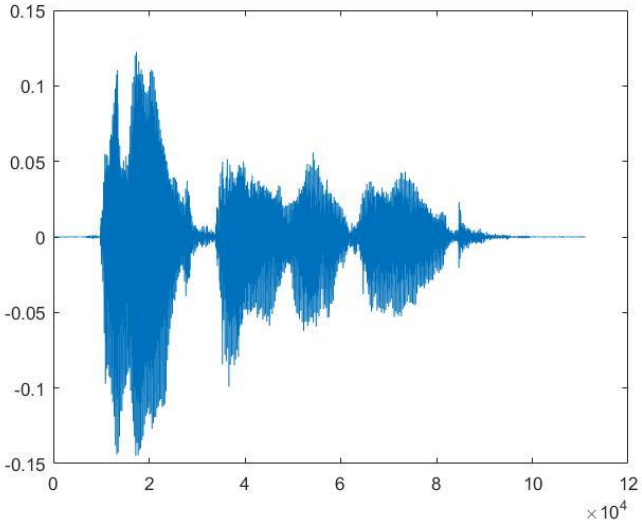
DSP PROJECT

Objective: Write a program to read a speech file and filter it to the bandwidth of 5.5khz 4khz 3. 2khz.Listem to each of the resultant filter speech files and describe the effect of low pass filtering on speech intelligibility and quality.

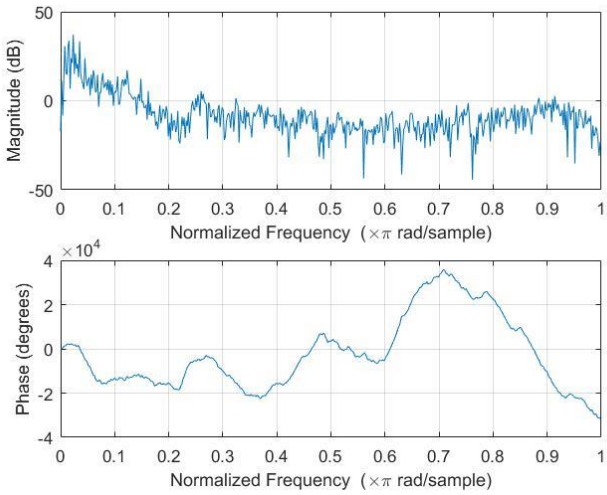
Software used: MATLAB 2016a

Code

```
clc;
close all;
clear all;
[y, fs]=audioread('sample1.wav');
y1=y;
figure(1);
plot(y1);
fs1=fs;
figure(2);
freqz(y1); %frequency response of original speech
signal
fc1=5500; %cutoff freq
w1=fc1/(2*fs1); %normalised freq
%Design a LPF with above specification

[b1, a1]=butter(5,w1,'low'); %5th order butterworth
filter
[h1, w1]=freqz(b1, a1, 1024); %freq response of the
filter
x1=filter(b1,a1,y1); %pass the i/p signal from filter
figure(3);
freqz(x1);
title('cut off 5.5kHz');
figure(4);
plot(w1/(pi*2*fs1),abs(h1));

title('frequency response of 5th order filter');
ylabel('Magnitude');
xlabel('Freq(Hz)');
grid on
soundsc(x1,fs1);



fc2=4000; %cutoff freq
w2=fc2/(2*fs1); %normalised freq
%Design a LPF with above specification

[b2, a2]=butter(5,w2,'low'); %5th order butterworth
filter
[h2, w2]=freqz(b2, a2, 1024); %freq response of the
filter
x2=filter(b2,a2,y1); %pass the i/p signal from filter
figure(5);
freqz(x2);
title('cut off 4kHz');
figure(6);
plot(w2/(pi*2*fs1),abs(h2));

title('frequency response of 5th order filter');
ylabel('Magnitude');
xlabel('Freq(Hz)');
grid on
soundsc(x2,fs1);



fc2=3200; %cutoff freq
w2=fc2/(2*fs1); %normalised freq
%Design a LPF with above specification

[b2, a2]=butter(5,w2,'low'); %5th order butterworth
filter
[h2, w2]=freqz(b2, a2, 1024); %freq response of the
filter
x3=filter(b2,a2,y1); %pass the i/p signal from filter
figure(7);
freqz(x2);
title('cut off 3.2kHz');
figure(8);
plot(w2/(pi*2*fs1),abs(h2));

title('frequency response of 5th order filter');
ylabel('Magnitude');
xlabel('Freq(Hz)');
grid on
soundsc(x3,fs1);
```



Original Signal



Magnitude and Phase response of origina