MATLAB CODE FOR AUDIO PROCESSING IN HEARING AID

```
clc;

close all;

recObj = audiorecorder;

recDuration = 5;

disp("Begin speaking.")

recordblocking(recObj,recDuration);

disp("End of recording.")

y = getaudiodata(recObj);

sound(y);

pause(10);

figure,plot(y);

title('input');

xlabel('time');

ylabel('amplitude');

y = awgn(y,40);

noi = y;

figure;

plot(y);

title('awgn');

figure;

plot(abs(fft(y)));

xlabel('frequency');

ylabel('amplitude');

title('awgn');

disp('playing added noise...');

sound(y);

pause(10)

%'Fp,Fst,Ap,Ast' (passband frequency, stopband frequency, passband ripple, stopband attenuation)

hlpf = fdesign.lowpass('Fp,Fst,Ap,Ast');

D = design(hlpf);
```

```matlab
freqz(D);

x = filter(D,y);

disp('playing denoised sound');

figure;

plot(x);

title('denoise');

xlabel('time');

ylabel('amplitude');

sound(x);

figure;

plot(abs(fft(x)));

xlabel('frequency');

ylabel('amplitude');

title('denoise');

pause(10);

m= input('Enter the amount of loss in hearing in db: ');

gainRequired=db2mag(m);

amplifiedSignal=y*gainRequired;

soundsc(amplifiedSignal);

figure;

plot(amplifiedSignal);

title('Amplified signal');

pause(5);

% freq shaper using band pass

len = length(x);

p = log2(len);

q = ceil(p);

N = 2^q;

f1 = fdesign.bandpass('Fst1,Fp1,Fp2,Fst2,Ast1,Ap,Ast2');

hd = design(f1,'equiripple');

y = filter(hd,x);
```

```matlab
freqz(hd);

disp('playing frequency shaped...');

sound(y);

pause(10);

% amplitude shaper

disp('amplitude shaper')

out1=fft(y);

phase=angle(out1);

mag=abs(out1)/N;

[magsig,~]=size(mag);

threshold=1000;

out=zeros(magsig,1);

for i=1:magsig/2

 if(mag(i)>threshold)

 mag(i)=threshold;mag(magsig-i)=threshold;

 end

 out(i)=mag(i)*exp(1i*phase(i));

 out(magsig-i)=out(i);

end

outfinal=real(ifft(out))*10000;

disp('playing amplitude shaped...');

sound(outfinal);

pause(10);

figure;

subplot(2,1,1);

specgram(noi);

title('Spectrogram of Original Signal');

subplot(2,1,2);

specgram(outfinal);

title('Spectrogram of Adjusted Signal');
```