BLG 354E Signals and Systems for Computer Engineering Homework-3

ITU Computer and Informatics Faculty

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- You are asked to upload .py files and .pdf file (report) in your zip file. Give a brief explanation of your code in your report.
- Use comment outs on the necessary lines in your code.
- Put your name and number at the top of your code.
- The code you typed must WORK (as the manner of syntax). Otherwise, you will get zero points for that homework. Your code will not be fixed or debugged to work.
- In Case of Cheating and Plagiarism Strong disciplinary action will be taken.
- No late submissions will be accepted

Problem 1

Two audio record samples (music) are provided in the attachment as `.wav` files. Sampling rate of these 16bit mono files is 44100Hz.

a) Write a pseudo code that performs the (asymptotical) low pass filter (LPF) functions given below (Figure 1 for 0 gain and Figure 2 for 5dB gain)

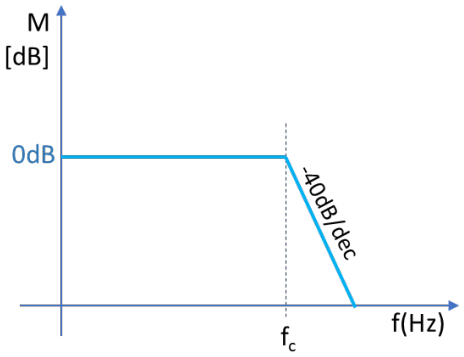

Figure 1: LPF with 0 gain

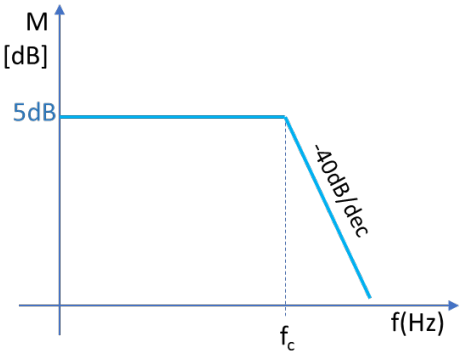

Figure 2: LPF with 5dB gain

b) Perform this LPF for fc=2000Hz in Python and write out the output data into a file for both audio samples (file names; `Africa5dBGainLPF.wav`, `Africa0dBGainLPF.wav`, etc.). Please, provide the code with explanatory comments and the filtered wave files.

c) Subtract the Low pass filtered audio signal (with 0 gain as in **b**) from the original audio signal and get 2000Hz High Pass Filter applied (equivalent) audio stream. Write out the output into a `.wav` file (file names as `AfricaHPF.wav` or `WinnerTakesAllHPF.wav`).