BLG354E - Signals and Systems for Computer Engineering

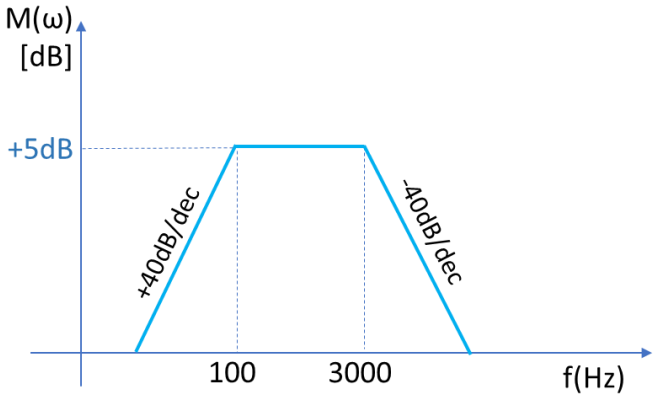
Assignment #2

- Upload your answers to Ninova. Written parts should be scanned and submitted as a pdf file. Programming assignments and audio outputs should be submitted separately.

- Only two randomly selected parts will be graded!

An audio record sample (music) is provided in the attached file (africa.wav). Sampling rate of this 16bit mono file is 44100Hz. Asymptotic frequency response (magnitude) of a band pass filter (BPF) is given in the below diagram

a) Write the transfer function of the below defined BPF in "s" domain.
b) Write the transfer function of the LPF in "z" domain for the sampling frequency f_s=44100Hz .
c) Write a pseudo code that performs the below given (asymptotical) BPF function by using the direct programming method.



d) Implement this BPF by using Python and write the output data into a file by appending BPF to its name (for example AfricaBPF.wav). Please provide the Python code that includes comments. BPF filter function should be implemented in accord with the pseudo code in part c. Python code and filtered audio output file (AfricaBPF.wav) should be submitted to Ninova.
e) Provide a Python code that draws the actual Bode plot (Magnitude and phase) of the transfer function in part a. Logarithmic scale should be used in the frequency (Hz) axis. (Magnitude axis unit: dB, range: 10Hz-10kHz , Phase axis unit: degrees. There is no restriction in using the Python libraries for the Bode plot drawing code). Python code and bode plot should be submitted to Ninova.