

DSA-Assignment-4

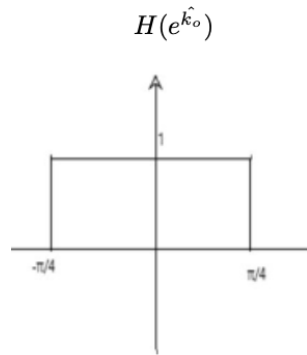
Deadline: 23rd April 2024

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1. Solve all the question and submit a handwritten document
 2. Plagiarism will be penalised
 3. Submit a pdf of the form <roll_no>_dsa4.pdf
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1 FIR Filter Design

1. Design the below filter using:

- (a) without window
- (b) with Hamming window



2. A popular method for designing FIR filters is windowing. Start with an ideal filter $H_D(\Omega)$ (e.g., LPF) whose impulse response $h_d[n]$ is an IIR filter. Then design the desired FIR filter $h[n] = w[n]h_d[n]$, where w is a window function.

Assume H_d to be a LPF and a rectangular window:

$$w[n] = \begin{cases} 1 & \text{if } n = 0, 1, 2 \\ 0 & \text{otherwise} \end{cases}$$

1. Find the effect of windowing (in the time domain) on the frequency response $H(\Omega)$ by deriving and plotting it.
2. Establish the relationship between the window length $L = 3$, resulting filter length M

2 Speech Production

3. Record your name in Wavesurfer software and observe different sounds. Submit spectrogram, formants, and other plot figures obtained using Wavesurfer.