Digital Signal Analysis

END EXAM – 2024

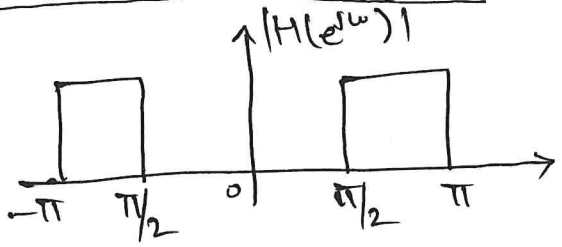
Answer all questions.

MAXTIME: 2:30 Min

Max Marks: 40

1. Design the below filter using FIR [8M]
   a) without window
   b) with window $w(n) = 0.5\left[1 - \cos\left(\frac{2\pi n}{N}\right)\right]$

   Assume N as 7.



2. a) Derive and explain how speech production is modeled with all pole system. [4M]
   b) How to obtain spectrogram and what is the need for it? Is spectrogram lenique? justify. [4M]

3. Draw direct form-I and II implementation of digital system [4M]
   $$y(n) = x(n) - 0.5x(n-1) + 0.4y(n-1) + 0.6y(n-2)$$

4. Find the impulse response of h(n) of a causal discrete system characterized by following difference equation [4M]
   $$y(n) - \frac{3}{4}y(n-1) + \frac{1}{8}y(n-2) = 2x(n)$$

5. a) What is the need of DSP processor and how they are different with general purpose processor. [3M]
   b) What is the need of linear phase FIR filter and how to acheive it? [3M]

6. Find Inverse ~~DFT~~ (IDFT) using any FFT algorithm. [4M]
   $$\{28, -4+4j, -4, -4-4j\}$$

7. a) If we have 8KHz sampled signal and we took 20ms window and applied FFT. If we take 256 point FFT X[4] value show which frequency? If we take 512 point X[4] show which frequency? [4M]
   b) When digital system called minimum phase? Give example [2M]

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