

Time: 3hours

Max Marks: 80

- N.B. : (1) Question No 1 is Compulsory.
 (2) Attempt any three questions out of the remaining five.
 (3) All questions carry equal marks.
 (4) Assume suitable data, if required and state it clearly.

1. Attempt any FOUR [20]

- a Differentiate between Butterworth and Chebyshev filters.
- b Explain the concept of pipelining in DSP processor
- c State and prove any two properties of DFT
- d What is multirate DSP? State its applications.
- e Compute 4-point DFT of a causal four sample sequence given by $x(n) = \{1, 2, 3, 4\}$

2. a Obtain the DFT of the sequence $x(n) = \{1, 1, 1, 1, 1, 1, 0\}$ using DIT FFT algorithm. [10]

b Convert an analog filter with system function $H(s)$ into digital IIR filter using Bilinear Transformation method. [10]

$$H(s) = 10 / (S^2 + 7S + 10). \text{ Assume } T = 0.1\text{sec}$$

Explain advantages of BLT over IIM method

3. a Write down design steps for FIR filter using window techniques. Compare window functions. [10]

b Realize the following FIR filter function by lattice realization structure. [10]

$$H(z) = 1 + \frac{3}{4}z^{-1} + \frac{1}{2}z^{-2} + \frac{1}{4}z^{-3}$$

4. a Design a Butterworth digital IIR low pass filter using Bilinear transformation by taking $T=1$ seconds, to satisfy the following specifications. [10]

$$0.9 \leq |H(e^{jw})| \leq 1.0; \quad 0 \leq w \leq \pi/2$$

$$|H(e^{jw})| \leq 0.2; \quad 3\pi/4 \leq w \leq \pi$$

b Explain concept of interpolation by Integer I. [10]

5. a Obtain the linear convolution of the following sequences using overlap add method. $x(n) = \{3, 0, -2, 0, 2, 1, 0, -2, -1, 0\}$ and $h(n) = \{2, 2, 1\}$ [10]
- b Explain Quantization and effects of truncation and rounding [10]
6. a Write a short note on an application of DSP processor in Radar signal processing [10]
- b Write short note on Gibbs phenomenon [10]
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