

B. Tech Degree VI Semester Examination April 2011

CS/EE/EI 601 DIGITAL SIGNAL PROCESSING

(2002 Scheme)

Time : 3 Hours

Maximum Marks : 100

- I. (a) Check linearity causality, time invariance and stability of the following system.
 (i) $y(n) = ex(n)$ (ii) $y(n) = n.x(n)$ (10)
- (b) Determine the impulse response and the unit step response of the system described by the difference equation
 $y(n) = 0.7y(n-1) - 0.1y(n-2) + 2x(n) - x(n-2)$. (10)
- OR**
- II. (a) What is system function? What is its significance? (5)
 (b) Explain the properties of Z-Transform. (15)
- III. (a) Explain the properties of discrete Fourier transform. (10)
 (b) Find the DFT of sequence $x(n) = [2, 2, 2, 2, 1, 1, 1, 1]$. (10)
- OR**
- IV. (a) Find the output $y(n)$ of a filter whose impulse response $h(n) = [1, 1, 1]$ and input signal $x(n) = [3, -1, 0, 1, 3, 2, 0, 1, 2, 1]$ using overlap save method. (10)
 (b) Find the DFT of sequence $x(n) = [1, 2, 3, 4, 4, 3, 2, 1]$ using DIT algorithm. (10)
- V. (a) Explain sampling method of FIR filter design. (10)
 (b) Obtain the direct and cascade realization of the system function.
 $H(z) = 1 + \frac{5}{2}z^{-1} + 2z^{-2} + 2z^{-3}$. (10)
- OR**
- VI. (a) Explain the following window function with their response.
 (i) Hanning window (ii) Hamming window. (10)
 (b) Explain Fourier series method of filter design. (10)
- VII. (a) Explain the bilinear transformation and impulse invariant transformation method for the design of digital filters. (15)
 (b) Compare IIR and FIR filters. (5)
- OR**
- VIII. (a) Convert the analog filter with system function
 $Ha(s) = S + 0.1/(S + 0.1)^2 + 16$. (10)
 (b) Explain Warping effect on magnitude and phase response in an IIR filter and explain how this can be eliminated. (10)
- IX. (a) Explain the block diagram of typical DSP processor. (10)
 (b) Explain any two application of DSP. (10)
- OR**
- X. Write short notes on :
 (i) Fixed point and floating point arithmetic
 (ii) Truncation and rounding errors in digital filter
 (iii) Product quantization error
 (iv) Limit cycle oscillation. (5 x 4 = 20)