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 $x(n)=[2,2,2,2,1,1,1,1,1]$. (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)

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