Nepal college of information echnology

Assessment

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| Level: Bachelor | Semester – Fall | Year : 2014 | |
| Programme: BE-IT Day Morning | | Full Marks : 100 | |
| Course: Signal & System Processing | | Time : 3hrs. | |
| *Candidates are required to give their answers in their own words as far as practicable.* | | |
| *The figures in the margin indicate full marks.* | | |
| Attempt all the questions. | | |

1. a) What are basic elements of Digital signal processing? What are the advantages of digital signal processing over analog signal processing? 7

b) ”An LTI system is BIBO stable if its impulse response is absolutely summable.” Justify mathematically. 8

2. a) Find the output of the system with impulse response h[n]={1,2,2,1} to the input x[n]={-1,2,-1} using convolution sum. 8

b) Find out the inverse z-transform of following expression 7

X(z)= with ROC: 0.5<|z|<1

3. a) Determine the zero-input response of the system described by the homogenous second-order difference equation 7

y[n] – 3y[n-1] – 4y[n-2] =0

b. Determine the lattice coefficients corresponding to the FIR filter with system function and draw the lattice structure also. 8

H(z)= A3(z)= 1+ 13/24 z-1 + 5/8 z-2 + 1/3 z-3

4. a) Design a digital low pass Butterworth filter using impulse- invariance method to meet the following specifications: 10

Passband edge frequency= 1.25 KHz

Stopband edge frequency= 2.75 KHz

Passband Ripple ≤ 0.5 dB

Stopband Attenuation ≥ 15 dB

Sampling frequency = 10 KHz

b) What is frequency warping effect? Discuss about the advantages of bilinear transformation method over impulse invariance method. 5

5. a) Perform the circular convolution of the following two sequences. 8

x1[n] = {2,1,2,1}

x2[n]= {1,2,3,4}

b) Perform the FFT of the following sequence using Radix-2 algorithm. 7

x[n]= {1, 2, 3}

6. a) Find out the z-transform of following function. Also indicate ROC 7

i) x[n] = 3 (-1/2)n u[n] – 2(1/4)n u[-n-1]

ii) x[n]=(0.5)n u[n]

b) Realize the following system by its direct form I and form II structure 8

y[n]= x[n] - 2x[n-1] + 0.5x[n-2] + 0.8 y[n-2]

7. Write short notes on: (Any two ) 2×5

a) Limit Cycle oscillation

b) Sampling theorem

c) Chebyshev Filter