

8/11/13

B.E Degree End Semester Examinations, Nov/Dec 2013

Electrical and Electronics Engineering

Fourth Semester/ R- 2002/2004/2008

EE 337/ EE383 /EE9254 Digital Signal Processing

Time: 3 Hours

Max. Marks: 100

Answer ALL Questions

PART – A (10 x 2 = 20 Marks)

1. How is a Causal system different from a non-causal system?
2. Perform Addition & one delay shift of the discrete time signals given  
 $X1(n)=\{1,-2,-1,-2\}$  &  $X2(n)=\{1,-3,1,2\}$
3. Given  $x(n)=\{1,-1,0,-2\}$  ,  $y(n)=\{2,0,-1,1\}$  find  $H(z)$
4. Find the inverse of z-transform of  $1/(1-4Z)$ ?
5. Explain the Butterfly structure in FFT computation.
6. What is the effect of windowing on spectral response?
7. Give one difference between DTFT; DFT& FFT.
8. What is a Gibbs phenomenon?
9. What is product round off error & truncation error?
10. What is need for pipeline operation in DSPProcessors?

PART – B ( 5 x 16 = 80 Marks)

11. Derive the Frequency response of the system described by,  $Y(n)=2x(n)+y(n-2)$  and explain how the frequency spectrum can be plotted using DTFT. (16)

12 a) For the sequence  $x(n) = \{-2,-1,-2,-2,1\}$ ,  $h(n)=\{2,-1,-1,1,-1\}$ , Obtain the linear convolution, circular convolution, Z- transform of sequences and transfer function of system. (16)

(OR)

12b) Explain on the choice and type of Windows selection for Signal Analysis .Compare the effect of Hamming & Hanning windows in design of FIR filter if (8+8)

*cutoff frequency = 300Hz; sampling Frequency = 1200 Hz; order of Filter=2 ; Filter Length=6*

13 a) Compute the 8-point DFT by radix 2 DIT-FFT given  $x(n)=\{2,-1,1,2,3,2,-1,2\}$ . What is the advantage of the radix2-FFT? (12+4)

(OR)

13 b) Give the stepwise procedure to Compute the 8 point DFT using radix 2 DIF-FFT. What is need for the bit reversal and twiddle factor computed in this algorithm? (12+4)

14a) For the following analog transfer function

$$H_a(s) = \frac{2}{(s+1)(s+2)} \text{ Determine } H(z) \text{ if } T=0.25 \text{ using } (8+8)$$

(i) Impulse Invariance method and (ii) Bilinear transformation method.

(OR)

14 b) Write Briefly on any TWO of the Following: (8+8)

- i) Low pass to High pass filter using analog transformation method
- ii) Sub Band Coding for Filter realization
- iii) Give the block diagram representation for the functional stages of digital signal analysis.

15a. Write Briefly on any TWO of the Following: (8+8)

- i) Error types & Effects in DSPProcessor
- ii) Addressing Modes of a DSPProcessor
- iii) Multiplier Accumulator unit of one type of a DSPProcessor

(OR)

15 b). With neat figures explain the Architecture for one type of Digital Signal Processor with specifying the special function registers. Give the Algorithm to obtain the multiplication of two Floating point numbers on the processor. (16)