B.E Full Time Degree EXAMINATIONS, April /May 2014

Fourth Semester, EEE / R-2008

EE 9254 Digital Signal Processing

Time: 3 Hours

Max. Marks: 100

Answer ALL Questions

$PART - A (10 \times 2 = 20 \text{ Marks})$

- 1. Determine if the following y(n)=x(-n-5) is Causal, Time -invariant system?
- 2. Give the difference between aperiodic, asymmetric & random signals.
- 3. Given $x(n)=\{2,-1,0,-2\}$, $y(n)=\{2,0,-1,1\}$ find H(z)
- 4. Find the inverse of z-transform of $1/(1-1.5Z^{-1}+.5Z^{-2})$?
- 5. State the difference between Floating & Fixed point computation.
- 6. Explain the need for zero padding?
- 7. What is the advantage of windowing on spectral response?
- 8. Write briefly on the effect of warping on magnitude and phase response?
- 9. What is product round off error & truncation error?
- 10. What is the role of the pipeline operation in a DSProcessor?.

$PART - B (5 \times 16 = 80 Marks)$

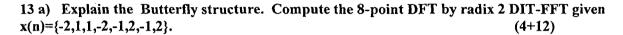
- 11. Derive the Frequency response of the system described by, Y(n)=2x(n)+.5y(n-2) and obtain the magnitude & phase response plot. (8+8)
- 12 a) For the sequence $x(n) = \{1,-1,-2,-2\}$, $h(n) = \{-2,-1,-3,-1\}$. Obtain the linear convolution, circular convolution, Z- transform of sequences and transfer function of system. (16)

(OR)

12 b) Write on any TWO of the Following:

(8+8)

- (i) Z-transform of $x(n) = \cos w_0 n$ for $n \ge 0$
- (ii) Compute the ROC, stability for y(n)=y(n-1)+y(n-2)+x(n-1) if x(n) is input & y(n) is the output.
- (iii) Aliasing effect during Low pass to High pass filter transformation



(OR)

13 b) Give the stepwise procedure to Compute the 8 point DFT using radix 2 DIF-FFT. What is advantage of the radix2-FFT, the bit reversal and twiddle factor computed in this algorithm?

(12+4)

14a) For the following analog transfer function

$$H_a(s) = \frac{2}{(s+1)(s+2)}$$
Determine H(z) if T=0.5 using
Impulse Invariance method
Bilinear transformation method.
(OR)

14 b) Explain on the choice and type of windows selection for signal analysis. Compare numerically the effect of Hamming and Hanning windows and design the filter if

$$Hd(ejw) = 1; \text{ for } \frac{\pi}{4} \le lwl \le \pi$$

=0; for
$$IwI \leq \frac{\pi}{4}$$

Find the values of h(n) for N=11. Find H(z). Plot the magnitude response.

(8+8)

15a) Write Briefly on any TWO of the Following:

(8+8)

- i) block diagram representation for the functional stages of DSProcessor
- ii) Addressing Modes of a DSProcessor
- iii) Multiplier Accumulator unit of one type of a DSProcessor

(OR)

15 b) With neat figures explain the Architecture for one type of Digital Signal Processor with specifying the special function registers and give one application. (16)