

**B. Tech Degree VI Semester (Supplementary) Examination,  
October 2009**

**CS/EE 602 DIGITAL SIGNAL PROCESSING  
(2006 Scheme)**

Time : 3 Hours

Maximum Marks : 100

**PART A  
(Answer all questions)**

(8 x 5 = 40)

- I. a. Discuss the classification of Discrete-Time signals.  
b. State the initial and final value theorems of Z-transforms.  
c. Draw the basic butterfly structures for DIT and DIF algorithms.  
d. Find the DFT of the sequence  $x(n) = \{1, 1, 0, 0\}$ .  
e. Compare FIR and IIR filters.  
f. Realize the second order system.  
 $y(n) = 2r\cos\theta y(n-1) - r^2 y(n-2) + x(n) - r\cos\theta x(n-1)$  in direct form-II.  
g. Write short notes on truncation and rounding errors in digital filters.  
h. Write notes on specialized addressing modes for DSP processors.

**PART B**

(4 x 15 = 60)

- II. a. What is system function? What is its significance? (5)  
b. Obtain the inverse transforms of

$$(i) Y(z) = \frac{1}{(1+z^{-1})(1-z^{-1})^2}, \text{ ROC } |z| > 1$$

$$(ii) Y(z) = \frac{(1-1/2z^{-1})}{(1-1/4z^{-2})}, \text{ ROC } |z| > 1/2 \quad (10)$$

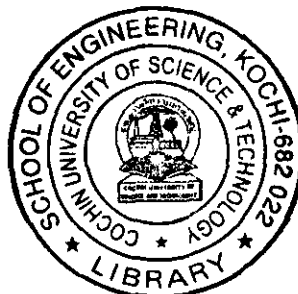
**OR**

- III. a. Prove that the response of a LTI discrete time system is the convolution sum of input  $x(n)$  and unit sample response  $h(n)$ . (5)  
b. The unit sample response and input of a linear shift invariant system is given by  
 $h(n) = 0.5^n U(n-2)$ ;  $x(n) = 2^n U(-n-3)$ . Find and sketch the output sequence. (10)

- IV. Compute the linear convolution of the two sequences  
 $x(n) = \{1, 2, 2, 1\}$  and  $h(n) = \{1, 2, 3\}$  using DIT-FFT. (15)

**OR**

(Turn over)



- V. Compute the eight point circular convolution for the following sequences using DFT (15)  
 $x(n) = \{1, 1, 1, 1, 0, 0, 0, 0\}$   
 $x_2(n) = \text{Sin} \frac{3\pi}{8} n, 0 \leq n \leq 7.$
- VI. a. What is windowing? Explain any one window in detail. (7)  
b. Realize the following linear phase FIR filter using direct form with minimum number of delays  $h(n) = \{1, 2, 3, 5, 3, 2, 1\}$ . (8)
- OR**
- VII. Obtain the direct form-II, cascade and parallel form realization for the following system. (15)  
 $y(n) = -0.1y(n-1) + 0.2y(n-2) + 3x(n) + 3.6x(n-1) + 0.6x(n-2).$
- VIII. With a functional block diagram explain the architecture of TMS 320C4X floating point processor. (15)
- OR**
- IX. Explain the effects of coefficient quantization in (15)  
(i) FIR filters  
(ii) IIR filters

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