BTS(C) – VI– (S) – 09 – 046 – K

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.

$y(n)=2rCos\theta\ y(n-1)-r^2 y(n-2)+x(n)-rCos\theta\ x(n-1)$ 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*) $Y(z)=\dfrac{1}{(1+z^{-1})(1-z^{-1})^2}, ROC|z|>1$

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

$$x(n)=\{1,1,1,1,0,0,0,0\}$$

$$x_2(n)=Sin\frac{3\pi}{8}n, 0\le n\le 7.$$

VI. a. What is windowing? Explain any one window in detail. (7)

b. Realize the following linear phase FIR fitter 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)

$$y(n)=-0.1\,y(n-1)+0.2\,y(n-2)+3x(n)+3.6x(n-1)+0.6x(n-2).$$

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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