2074
B. E. (Information Technology)
Seventh Semester
PCIT-701: Digital Signal Processing

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Part.

x-x-x

Q.1a Find the DTFT of the unit step sequence.
  b Give the relationship between DFT and z transform.
  c Write computation efficiency of FFT over DFT.
  d What are the basic building blocks of realization structures?
  e List special features of DSP architecture.

(5x2)

PART A

Q.2a. Check the system: $y(n) = 3y^2(n-1) - nx(n) + 4x(n-1) - 2x(n+1)$ for linearity, time variance and causality. Explain the meaning of all these properties as well.
  b. A causal discrete time LTI system is described by: $y(n) - (3/4)y(n-1) + (1/8)y(n-2) = x(n)$, find
  i)   System function H(z)
  ii)   Impulse response h(n)
  iii)   Step response u(n)

(5,5)

Q.3a. Find the circular convolution of the following sequences $x(n) = \{0,1,2,3\}$ and $y(n) = \{2,1,1,2\}$.
  b. Compute the 8 point DFT of the sequence $x(n) = \{1/2,1/2,1/2,1/2,0,0,0,0\}$ using the radix-2 DIT Algorithms. Follow exactly the signal flow graph and calculate all intermediate values. (2,8)

Q.4 What is meant by the Transposed form? Obtain the direct form-II and transposed direct form-II structures of the system with transfer function

$$H(z) = \frac{3 + 3.5z^{-1} + 0.5z^{-2} - 1.3z^{-3}}{1 + 0.2z^{-1} + 0.3z^{-2} - 2z^{-3}}$$

(10)

PART-B

Q.5a. Comparison of FIR and IIR filters.
  b Find Hz using the impulse invariant transformation for the following analog system function. Assume T

$$Hs = \frac{1}{(s+0.5)(S^2 + 0.5s + 2)}$$

(5,5)

Q.6a. What are the applications of FIR filters?
  b. Explain the design of filters using the windows technique.

(5,5)

Q.7 Draw and explain the memory architecture of the TMS320C3X processor.

(10)

x-x-x