

2123
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. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

I. Attempt the following:-

- Define the energy-type and power-type signals.
- What is the significance of ROC of $X(z)$?
- Find and plot the spectrum of $(n-1)$.
- Obtain the mapping formula for the impulse invariant transformation.
- What are the applications of multi rate DSP?

(5x2)

UNIT - I

- State the differentiation, time shifting, time-reversal and convolution properties of the z-transform.
 - The z-transform of a signal is given by $X(z) = (2z^3 - 5z^2 + z + 3) / (z - 2)(z - 1)$. Find the signal $x(n)$ if ROC is $|z| < 1$.
- Compute the 8 point DFT of the sequence $x(n) = \{1, 1, 1, 0, 0, 1, 1, 1\}$ using the radix-2 DIT Algorithm. Follow exactly the signal flow graph and calculate all intermediate values.
- Obtain the parallel and cascade realisation structures for the given signal.
$$y(n) = y(n-1) - 1/2y(n-2) + x(n) - x(n-1) + x(n-2),$$

(10)

(10)

UNIT - II

- Explain the Bilinear Transformation method of digital IIR filter design?
 - Design a digital IIR filter using this method, if the analog filter is specified by
$$H_a(s) = (s + 0.1) / (s + 0.1)^2 + 9, \omega_r = \pi/4.$$
 How is it better than Impulse Invariance?

(5,5)

P.T.O.

(2)

VI. The desired frequency response of a low pass filter is

$$H_d(e^{j\omega}) = e^{-j3\omega}, \text{ for } -3\pi/4 \leq \omega \leq 3\pi/4 \text{ and } 0, \text{ elsewhere}$$

Determine $H(e^{j\omega})$ for $M=7$ using a rectangular, hamming window. (10)

VII. Describe the architecture and features of ADSP 21 XX family of processors with block diagram. (10)

x-x-x