Reg. No | | | | | | | | | | | | | | | | | |

B.Tech DEGREE EXAMINATION, NOVEMBER 2023

Sixth Semester

18EIC306T - DISCRETE TIME SIGNAL PROCESSING

(For the candidates admitted during the academic year 2018-19 to 2021-22)

OPEN BOOK EXAMINATION

18EIC306TO

Note:

    i. Specific approved THREE text books (Printed or photocopy) recommended for the course.

    ii. Handwritten class notes (certified by the faculty handling the course / Head of the Department).

Time: 3 Hours   **Max. Marks: 100**

Answer **FIVE** Questions

(Question No. 2 is Compulsory)

		Marks	BL	CO

1. i. (a) Determine the 8 point DFT of a sequence (n) = {1,1,1,1,1,1,1,1} using Decimation- in- Time (DIT) algorithm. [14 Marks]   18   3   1

    (b) Compare DFT and FFT with an example [4 Marks]

  ii. The DFT of the four point sequence x(n) = {0,1,2,3} is --------------   1   1   1

    (A) {6,-2+2j-2,-2-2j}   (B) {6,-2-2j,2,-2+2j}

    (C) {6,-2+2j,-2,-2-2j}   (D) {6,-2-2j,-2,-2+2j}

  iii. The representation of discrete-time convolution is denoted by   1   2   1

    (A) x[n] + h[n]   (B) x[n] – h[n]

    (C) x[n] * h[n]   (D) x[n] + h[n]

2. i. (a) Obtain the direct form I and direct form II realization for the system $y(n) = -0.1(n - 1) + 0.2y(n - 2) + 3x(n) + 3.6x(n - 1) + 0.6x(n - 2)$. [12 Makrs]   18   3   2

  ii. (b) Write the advantages and disadvantages of digital filters. [6 Marks]

  ii. The duration of the unit sample response of a digital filter is _____.   1   1   2

    (A) Finite   (B) Infinite

    (C) Impulse   (D) Zero

  iii. For an analog LTI system to be stable, the poles of system function H(s) lie on _____   1   2   2

    (A) Right half of s-plane   (B) Left half of s-plane

    (C) On the imaginary axis   (D) At origin

3. i. (a) Determine the direct form realization of system function $H(z) = 1 + 2z^{-1} - 3z^{-2} - 4z^{-3} + 5z^{-4}$ 18   4   3

    (b) Determine the cascade form realization of system function $H(z) = (1 + 2z^{-1} - z^{-2})(1 + z^{-1} - z^{-2})$

  ii. FIR stands for _____   1   1   3

    (A) Finite Impulse Response   (B) Infinite Input Response

    (C) Finite Impedance Response   (D) Finite Impulse realization

  iii. FIR filter is also called _____   1   1   3

    (A) Recursive filter   (B) Lower resistance

    (C) Higher resistance   (D) Non-recursive

4. i. (a) Illustrate the architecture of TMS320C54x processor. [12 Marks]   18   4   4

  ii. (b) List the six major features of digital signal processors. [6 Marks]

  ii. _____ is the disadvantage of sampling rate conversion by converting the signal into an analog signal   1   1   4

    (A) Signal distortion   (B) Quantization effects

    (C) Signal distortion & Quantization effects   (D) New sampling rate can be arbitrarily selected

c. iii. _____ is the process of increasing the sampling rate by a factor I   1   1   4
(A) Multirate signal   (B) Sampling rate conversion
(C) Decimation   (D) Interpolation

5 a. i. Design the discrete-time models using the AR Model and MA model and illustrate the model structure.   18   4   5

b. ii. _____ method is not used for implementing an FIR system   1   1   5
(A) Parallel form   (B) Direct form
(C) Cascade form   (D) Lattice structure

c. iii. What is the node that replace the adders in the signal flow graph?   1   1   5
(A) Source node   (B) Sink node
(C) Branch node   (D) Summing node

a. 6 i. Determine the circular convolution of the 2 sequences $x(n) = \{1,2,2,1\}$, $h(n) = \{1,2,3,1\}$ using   18   3   1
   i) (a) concentric circle method   [14 Marks]
   ii) (b) Matrix method   [4 Marks]   4   3   1

b. ii. If $x(n)$ and $X(k)$ are an N-point DFT pair, then $X(k+N)$ is _____   1   1   1
(A) $X(-k)$ (B) $-X(k)$
(C) $X(k)$ (D) $X(k-1)$

c. iii. If $X(k)$ is the N-point DFT of a sequence $x(n)$, then the DFT of $x^*(n)$ is ____   1   1   1
(A) $X^*(k)$ (B) $X^*(N-k)$
(C) $X(N-k)$ (D) $X(N+k)$

a. i) ii) 7 i. (a) Illustrate any one practical application of DSP in speech processing   [14 Marks]   18   3   3
      (b) Summarize the advantages of speech processing   [4 Marks]   4   3   3

b. ii. _____ is the Butter worth polynomial of order 1   1   1   3
(A) $(s+1)$ (B) $(s-1)$
(C) $(s+2)$ (D) $(s-2)$

c. iii. The poles of Butter worth filter lie on _____   1   1   3
(A) Hyperbola   (B) Parabola
(C) Circle   (D) Ellipse

* * * * *

                                       27NA6-18EIC306T