

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****Note:**

- Specific approved THREE text books (Printed or photocopy) recommended for the course.
- 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] (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 ----- (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 (A) $x[n] + h[n]$ (B) $x[n] - h[n]$ (C) $x[n] * h[n]$ (D) $x[n] \cdot h[n]$	18	3	1
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 Marks] (b) Write the advantages and disadvantages of digital filters. [6 Marks] ii. The duration of the unit sample response of a digital filter is _____. (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 _____. (A) Right half of s-plane (B) Left half of s-plane (C) On the imaginary axis (D) At origin	18	3	2
3	i. (a) Determine the direct form realization of system function $H(z) = 1 + 2z^{-1} - 3z^{-2} - 4z^{-3} + 5z^{-4}$ (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 _____. (A) Finite Impulse Response (B) Infinite Input Response (C) Finite Impedance Response (D) Finite Impulse realization iii. FIR filter is also called _____. (A) Recursive filter (B) Lower resistance (C) Higher resistance (D) Non-recursive	18	4	3
4	i. (a) Illustrate the architecture of TMS320C54x processor. [12 Marks] (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 (A) Signal distortion (B) Quantization effects (C) Signal distortion & Quantization effects (D) New sampling rate can be arbitrarily selected	18	4	4

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	i. Design the discrete-time models using the AR Model and MA model and illustrate the model structure.	18	4	5
	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			
	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			
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
	(a) concentric circle method [14 Marks]			
	(b) Matrix method [4 Marks]			
	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) $X(k-1)$			
	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) $X(N+k)$			
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]			
	ii. _____ is the Butter worth polynomial of order 1	1	1	3
	(A) $(s+1)$			
	(B) $(s-1)$			
	(C) $(s+2)$			
	(D) $(s-2)$			
	iii. The poles of Butter worth filter lie on _____	1	1	3
	(A) Hyperbola			
	(B) Parabola			
	(C) Circle			
	(D) Ellipse			

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