Total number of printed pages: 99 **B.Tech.(UG)/5th/UIE511**

2022

Digital Signal Processing

Full Marks: 100

Time: Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1	a	A discrete-time signal $x[n] = \{5, 2, 0, (5), -5, 3, 4\}$. Sketch and label each. $x(-n)$ $x\left(\frac{n}{2}\right)$	10
	b	Determine the power and RMS value of the following signals. $y(t) = 5\cos(50t + \pi/6)$;	05
	c	What is impulse response?	05
2	a	Compute the DFT of sequence $x(n) = [4,\ 4 + 3 * i,\ 2, -4]$	10
	b	Check for periodicity of $cos(0.01\pi n)$.	05
	c	What is aliasing?	05
3	a	A discrete time causal system has a transfer function $H(z) = \frac{(1 - z^{-1})}{(1 - z^{-1} - 6z^{-2})}$ i) Determine the difference equation of the system ii) Show pole zero diagram Find the impulse response	10
	b	Write down the Classifications of Signal. With example.	05
	c	What are the advantages of digital filters over analog filters?	05
4	a	Draw the complete signal flow graph of 8 points DIF FFT algorithm.	10
	b	Write the 4th order difference equation.	05
	c	Compute the convolution of these pairs of signals $x[n] = \{1,1,2\},\ h[n] = u[n]$	05
5	a	Find the inverse Z-transform of $X(z) = \frac{z(z^2 - 4z + 5)}{(z-3)(z-1)(z-2)}$ for ROC $2 < \lvert z \rvert < 3$	10
	b	Draw the block diagram of linear convolution using DFT.	05
	c	Find out the circular convolution $y_C[n] = x[n](4)h[n]$, Where x[n]={1, -2, 4, 1.5}, h[n]={3, 0, -2, 5}.	05
6	a	Write down the all the classification of systems with proper example and explain it.	10

	b	What are the conditions for a system to be LTI systems. Explain.	05
	c	Find out $u(n\text{-}3) - u(n-5)$	05
7	a	i) Compute the convolution and correlation of this pair of signals $x[n] = \underset{\uparrow}{\{1,0,2,3,6\}}, \quad h[n] = \underset{\uparrow}{\{1,0,4,3,5,1\}}$	10
	b	Find the fundamental period T of the following signal x(t) = 4cos (2.5πt)	05
	c	A discrete-time signal $x[n] = \{5, 2, \underset{\uparrow}{(5)}, -5, 3, 4\}$. Find $x(n-2)\delta(n-2)$	05

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