U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

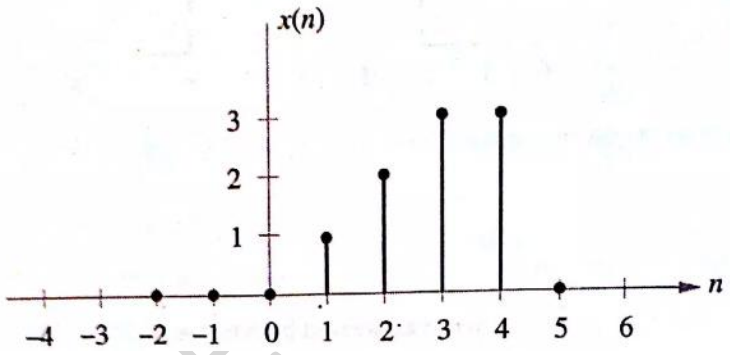
Autonomous Institute Affiliated to VTU

September / October 2023 Semester End Main Examinations

Programme: B.E. **Semester: IV**
Branch: Electronics and Telecommunication Engineering **Duration: 3 hrs.**
Course Code: 22ET4PCSSD **Max Marks: 100**
Course: Signal and Systems: Digital

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			UNIT - I	CO	PO	Marks
1	a)		Classify the signals with an example each	CO1	PO1	**06**
	b)		State and prove sampling theorem for low pass signal	CO1	PO1	**08**
	c)		For the signal shown below  Sketch (i)x(n-2) (ii) x(2n) (iii) x(-n)	CO1	PO1	**06**
			UNIT - II			
2	a)		An impulse response of an LTI system is given by $h(n) = (0.5)^n u(n)$ Test the system for memory, causality, and stability	CO2	PO2	**06**
	b)		Convolute the following signals $x_1(n) = (\alpha)^n u(n)$ and $x_2(\,(n) = (\beta)^n u(n)$ i) $\alpha = \beta$, $n \geq 0$ ii) $\alpha \neq \beta$, $n \geq 0$	CO2	PO2	**10**
	c)		Find the circular convolution of x(n) = {1,2,1} and y(n)= {1,2,3,4}	CO2	PO2	**04**
			UNIT - III			
3	a)		Find the output of a filter whose impulse response is h(n)= {1,1,1} and the input signal is x(n) = {3, -1,0,1,3,2,0,1,2,1} using overlap save method.	CO2	PO2	**08**

		b)	Find the 8-point DFT of the following sequence x(n) = {0.707, 1, 0.707, 0, -0.707, -1, -0.707, 0}	*CO2*	*PO2*	**08**
		c)	Find the IDFT of the sequence X(k)= {0,2,0,2} using DIT-IFFT algorithm.	*CO2*	*PO2*	**04**
			UNIT - IV			
	4	a)	Design a lowpass digital filter that will have a -3dB cutoff at 30π rad/sec and an attenuation of 50dB at 45π rad/sec. The filter is required to have a linear phase and the system will use a sampling rate of 100 samples/second.	*CO3*	*PO3*	**10**
		b)	Describe the procedure of designing FIR filters using frequency sampling method.	*CO3*	*PO3*	**06**
		c)	Find the impulse response for the following system y(n)-0.5y(n-1)=x(n) . Also draw the pole zero plot	*CO2*	*PO2*	**04**
			OR			
	5	a)	Derive the expression for system function if the unit sample response h(n) is obtained using frequency sampling technique.	*CO3*	*PO3*	**10**
		b)	Draw the linear phase structure for the following impulse response h(n)={1,0.5,-0.25,0.5,1}	*CO2*	*PO2*	**06**
		c)	With relevant equations explain the properties of FIR filters	*CO2*	*PO2*	**04**
			UNIT - V			
	6	a)	Design a second order lowpass digital butter worth filter with cut off frequency of 1kHz and sampling frequency of 10,000 samples/sec by bilinear transformation.	*CO3*	*PO3*	**10**
		b)	Draw the direct form I structure for the filter y(n)-0.75y(n-1)+0.125y(n-2)=x(n)+0.5x(n-1)	*CO2*	*PO2*	**04**
		c)	Describe the wavelet transform with respect to denoising applications	*CO2*	*PO2*	**06**
			OR			
	7	a)	Determine the order and poles of a Butterworth filter that has 3 dB bandwidth of 1000 Hz and an attenuation of 20 dB at 2000 Hz. Find the system function H(z) by bilinear transformation using T=1/10,000	*CO3*	*PO3*	**10**
		b)	Draw the direct form II structure for the filter y(n)-0.75y(n-1)+0.125y(n-2)=x(n)+0.5x(n-1)	*CO2*	*PO2*	**04**
		c)	Explain in detail image compression techniques	*CO2*	*PO2*	**06**

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