U.S.N.										

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

Autonomous Institute Affiliated to VTU

February 2025 Semester End Main Examinations

Programme: B.E. **Semester: IV**
Branch: Electronics and Telecommunication Engineering **Duration: 3 hrs.**
Course Code: 22ET4PCSSD **Max Marks: 100**
Course: Signals 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 systems and give one example each	CO1	-	**10**
	b)	(i) A signal is given by $x(n)=\sin(2n)$. Determine whether the signal is periodic or non-periodic. (ii) A signal is given by $x(n)=\begin{cases}1;0\le n\le 5\\0;otherwise\end{cases}$. Determine energy or power. (iii) A system is defined by $y(n)=x(n)+x(n-1)$. Determine whether it is causal or noncausal	CO2	PO1	**10**
		OR			
2	a)	Classify the signals and give one example each	CO1	-	**10**
	b)	A signal is defined by y(n)=x(n).u(n). Test the system for the following cases (i) Linearity (ii) Time invariance (iii) Stability (iv) Memory (v) Causality	CO2	PO1	**10**
		UNIT - II			
3	a)	Prove that $x(n)*h(n)=h(n)*x(n)$ for convolution sum. Where x(n) is the input signal and h(n) is the impulse response of the system.	CO1	-	**10**
	b)	Find the circular convolution of x1(n)={1,2,1} and x2(n)={1,2,3,4} using (i) Matrix method (ii) Concentric circle method	CO2	PO1	**10**
		OR			

	4	a)	convolute the following signals $x_1(n) = \alpha^n u(n)$ $x_2(n) = \beta^n u(n)$	*CO2*	*PO1*	**10**
		b)	Find the linear convolution of x1(n)={1,2,1,2,1,2} and x2(n)={1,2,1} using (i) Tabular method (ii) Circular convolution	*CO2*	*PO1*	**10**
			UNIT - III			
	5	a)	Find the DFT of x(n)={1,2,3,4,5,6,7,8}. Also sketch the magnitude and phase spectrum	*CO2*	*PO1*	**10**
		b)	State and prove following properties of DFT (i) convolution property in time (ii) Parsevals theorem	*CO1*	-	**10**
			OR			
	6	a)	Find the DFT of x(n)={8,7,6,5,4,3,2,1}. Also sketch the magnitude and phase spectrum			**10**
		b)	State and prove following properties of DFT (i) convolution property in frequency (ii) Time shift property	*CO1*	-	**10**
			UNIT - IV			
	7	a)	Find the relation between DTFT and Z transform	*CO1*	-	**05**
		b)	Design a low pass FIR digital filter that will have a -3dB cutoff at 30rad/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.	*CO4*	*PO3*	**10**
		c)	List the features of FIR filters			**05**
			OR			
	8	a)	Describe the procedure of designing FIR filters using frequency sampling method. Also draw the frequency sampling structure	*CO1*	-	**10**
		b)	Find the impulse response for the following system y(n)-0.5y(n-1)=x(n) . Also draw the pole zero plot	*CO2*	*PO1*	**10**
			UNIT - V			
	9	a)	Draw the direct form I and direct form II structures for the filter y(n)-0.75y(n-1)+0.125y(n-2)=x(n)+0.5x(n-1). Give necessary equations governing the structures.	*CO2*	*PO1*	**08**
		b)	Write a note on image compression technique	*CO1*	-	**06**
		c)	Describe wavelet transforms with necessary equations. Also give its applications in signal processing	*CO1*	-	**06**
			OR			

	10	a)	Design a second order low pass 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)	Describe the procedure of designing IIR filters using (i) Bilinear transformation (ii) Impulse invariant method	*CO1*	-	**10**

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