U.S.N.										

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

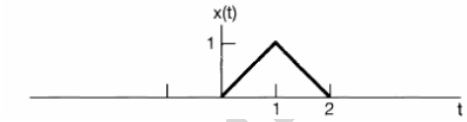
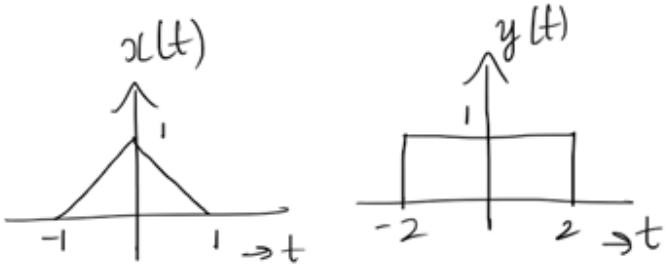
Autonomous Institute Affiliated to VTU

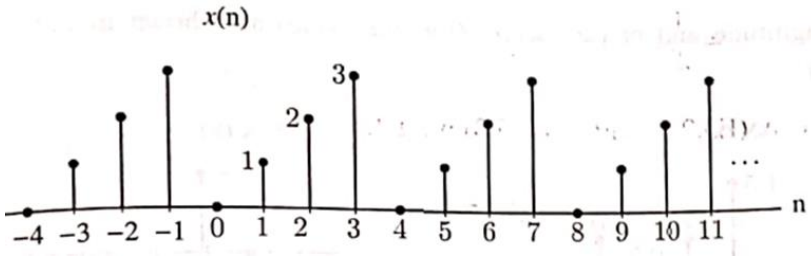
October 2024 Supplementary Examinations

Programme: B.E. **Semester: III**
Branch: Electronics and Communication Engineering **Duration: 3 hrs.**
Course Code: 23EC3PCSAS **Max Marks: 100**
Course: Signals and Systems

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)		Identify whether the system is periodic or non-periodic, if periodic find the fundamental period i) $x[n] = \sin\left(\frac{3\pi}{4}n\right) + \cos(\frac{5\pi}{7}n)$ ii) $x(t) = a\cos\left(\sqrt{2t}\right) + b\sin(\frac{t}{4})$	CO 1	PO1	5
	b)		a) Determine and sketch the even and odd parts of the signals depicted in figure. (i)  (ii) x[n]= $\alpha^n u[n]$, whereα<1	CO 1	PO1	5
	c)		Given the signal x(t) & y(t), Plot i. x(t)+y(t) ii. y(t)-x(t) iii. y(t/2) iv. x(2t-3) v. x(t+5)  	CO1	PO1	10

			UNIT - II			
	2	a)	Determine whether the following systems are Memory based, Causal, Time invariant, Linear, Invertible and Stable. a. y[n]=nx[n] b. y(t)=2t+x(t)	***CO*** 2	***PO2***	**10**
		b)	Represent following equations in Direct form-I and Direct form-II block diagram representation. i) y(n) + 0.5y(n-1)-0.25y(n-2) +0.33y(n-3) = x(n)+3x(n-1) +2x(n-2) ii) $20\left(\frac{dy}{dt}\right)\left(\frac{dy}{dt}\right)+1\left(\frac{dy}{dt}\right)+23\,y(t)=x(t)+0.7(\frac{dx}{dt})$	***CO*** 2	***PO2***	**10**
			UNIT - III			
	3	a)	Analyze the given equation and determine the convolution of two signal using convolution integral x(t) = u(t)-u(t-4) h(t) =t (u(t)-u(t-4))	***CO*** 2	***PO2***	**10**
		b)	A discrete time LTI system is characterized by the impulse response h[n]=u[n] Find its output when the input is x[n]=[1,1,2,5] Also find y[-19], y[0],y[2], y[15] and y[28]	***CO*** 2	***PO2***	**10**
			OR			
	4	a)	Determine whether the system given below is memoryless, causal and stable i) h[n]=2u[n]-2u[n-1] ii) $h(t)=e^{-4\|t\|}$	***CO*** 2	***PO2***	**10**
		b)	For the given LTI system, Evaluate the convolution sum using graphical method. x[n]={-1,1,0,1,-1} ; h[n]={1,2,3}. Assume that the origin of the input signal and the impulse response is at 0 and 2 respectively.	***CO*** 2	***PO2***	**10**
			UNIT – IV			
	5	a)	Find the DTFS co-efficients of the given waveform 	***CO*** 2	***PO2***	**10**

		b)	State all the properties of DTFT with relevant equations.	***CO*** 2	***PO2***	**10**
			UNIT – V			
	6	a)	For the signal given Determine the Z-transform , ROC and pole zero plot. $i)\ \ x(n) = 7\left(\frac{1}{3}\right)^n u(n) - 6\left(\frac{1}{2}\right)^n u(n)$ $ii)\ \ x(n) = (-a^n)u(-n-1)$	***CO*** 2	***PO2***	**10**
		b)	Find the inverse Z-transform using partial fraction expansion method $X(Z) = \frac{1+2Z^{-1}+Z^{-2}}{1-\frac{3}{2}Z^{-1}+\frac{1}{2}Z^{-2}} \qquad \lvert Z\rvert > 1$	***CO*** 2	***PO2***	**10**
			OR			
	7	a)	Find the natural response of the system described by the difference equation y[n]-(1/4)y[n-1]-(1/8)y[n-2]=x[n]+x[n-1 with y[-1]=0 and y[-2]=1	***CO*** 2	***PO2***	**10**
		b)	A causal LTI system is described by the difference equation y[n]=y[n-1] +y[n-2] +x[n-1] i) Find the system function H[z]. ii) Plot the poles and zeros and indicate the ROC. iii) Also determine the impulse response of the given system.	***CO*** 2	***PO2***	**10**

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