U.S.N.										

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

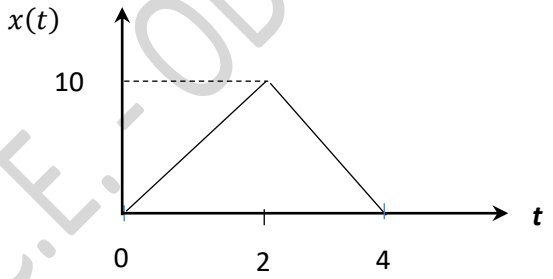
Autonomous Institute Affiliated to VTU

April 2024 Semester End Main 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)	Discuss the classifications of signals with a neat plots and expressions.	CO 1	PO 1	08
	b)	Determine whether the following signals are periodic or not. If periodic find its fundamental period. i) $x(t)=\cos\left(\frac{\pi}{3}t\right)+\sin\left(\frac{\pi}{4}t\right)$ ii) $x(n)=\sin(2n)$	CO 1	PO 1	06
	c)	For the signal $x(t)$ shown in the Fig.Q1(c), find and plot the following, i) $x(-2t-4)$ ii) $x(-3t+2)$  Fig.Q1(c)	CO 1	PO 1	06
		UNIT - II			
2	a)	Define system. Discuss different properties of systems	CO 1	PO 1	08
	b)	Determine whether the system $y(t)=e^{x(t)}$ is, i) Linear ii) Time-Invariant iii) Causal iv) Memory v) stable	CO 2	PO 2	06
	c)	Find the overall operator of a system whose output signal y(n) is given by, $y(n)=\frac{1}{3}\left[x(n+1)+x(n)+x(n-1)\right]$. Also draw the block diagram representation.	CO 1	PO 1	06
		UNIT - III			
3	a)	Evaluate discrete time convolution sum x(n)=u(n)-u(n-3), h(n)=u(n)	CO 1	PO 1	08

		b)	Determine a continuous time LTI system characterized by impulse response $h(t)=e^{-4\|t\|}$ is i) stable ii) causal	*CO 2*	*PO 2*	**06**
		c)	Draw direct form-I and direct form-II implementations for the system, $\frac{d^3y(t)}{dt^3}+2\frac{dy(t)}{dt}+3y(t)=x(t)+3\frac{dx(t)}{dt}$	*CO 1*	*PO 1*	**06**
			OR			
	4	a)	Evaluate the convolution integral y(t)=x(t)*h(t) where $x(t)=e^{-at}$ u(t) and h(t)=u(t) for a>0.	*CO 2*	*PO 2*	**08**
		b)	Determine the step response of discrete time LTI system characterized by impulse response $h(n)=\left(\frac{1}{2}\right)^n u(n)$	*CO 2*	*PO 2*	**06**
		c)	Find the natural response for the system described by the following difference equation $y(n)-\frac{9}{16}y(n-2)=x(n-1)$ with y(-1)=1 and y(-2)=-1	*CO 2*	*PO 2*	**06**
			UNIT - IV			
	5	a)	State and prove sampling theorem for continuous time, band limited signal with relevant sketches.	*CO 1*	*PO 1*	**08**
		b)	Obtain the frequency response of discrete LTI system represented by the impulse response $h(n)=\left(\frac{1}{2}\right)^n u(n)$	*CO 2*	*PO 2*	**06**
		c)	State and prove convolution property of DTFT.	*CO 1*	*PO 1*	**06**
			UNIT - V			
	6	a)	A LTI discrete time system is given by the system function $H(z)=\frac{3-4z^{-1}}{1-3.5z^{-1}+1.5z^{-2}}$ Specify the ROC of H(Z) and find h(n) (i) for stable system. (ii) for causal system	*CO 2*	*PO 2*	**10**
		b)	A causal system has input x(n) and output y(n). Find the impulse response of the system if $\delta(n)+\frac{1}{4}\delta(n-1)-\frac{1}{8}\delta(n-2)$ and $y(n)=\delta(n)-\frac{3}{4}\delta(n-1)$	*CO 2*	*PO 2*	**10**
			OR			
	7	a)	Solve the following difference equation using unilateral Z-transform $y(n)-\frac{3}{2}y(n-1)+\frac{1}{2}y(n-2)=x(n)$ for n≥0 With initial conditions y(-1)=4, y(-2)=10 and $x(n)=(1/4)^n x(n)$	*CO 2*	*PO 2*	**10**
		b)	For the system having transfer function, $H(z)=\frac{1-4z^{-1}+4z^{-2}}{1-0.5z^{-1}+0.25z^{-2}}$ find the transfer function of the inverse system and check whether it is stable and causal.	*CO 2*	*PO 2*	**06**
		c)	Discuss the properties of ROC.	-	-	**04**

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