U.S.N.										

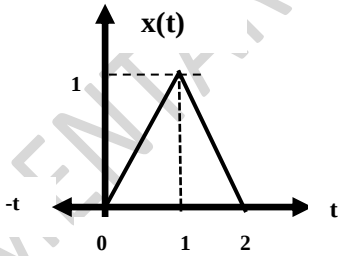
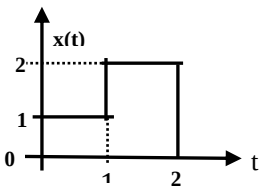
B.M.S. College of Engineering, Bengaluru-560019

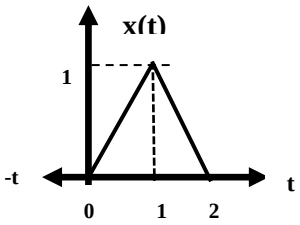
Autonomous Institute Affiliated to VTU

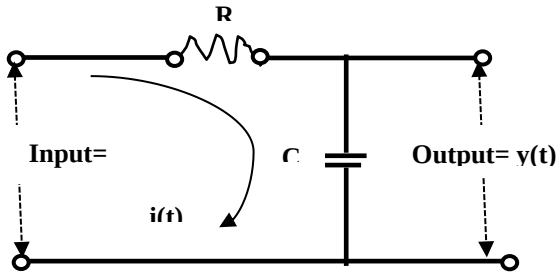
September / October 2024 Supplementary Examinations

Programme: B.E. **Semester: IV**
Branch: ES Cluster **Duration: 3 hrs.**
Course Code: 19ES4CCSAS **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.

		UNIT - I	CO	PO	Marks
1	a)	Determine whether the following signals are periodic or not. If periodic find the fundamental period. i) $x[n]=e^{j\frac{2\pi}{3}n}+e^{j\frac{3\pi}{4}n}$ ii) $z[n]=cos2n$	CO1	PO1	**07**
	b)	Find and sketch the even and odd components of the signal shown in Fig.1 (b)  **Fig.1 (b)**	CO1	PO1	**06**
	c)	Sketch and label for each of the signals for the given x(t) shown in Fig.1 (c) **(i).**x(2t-4)); **(ii).**x(-2t+1)  Fig.1 (c)	CO1	PO1	**07**
		OR			
2	a)	list the basic operations that can be performed on a signal.	CO1	PO2	**06**

		b)	Sketch and label for each of the signals for the given x(t) shown in Fig.2 (b) **(i).**x(2t-4)); **(ii).**x(-2t+1)  Fig.2 (b)	*CO2*	*PO2*	**08**
		c)	Analyze and Evaluate the average Power or Energy of the following signals after determining whether they are Energy or Power signals. $x(n) = \sin\left(\frac{1}{3}\pi n\right) * \cos\left(\frac{1}{3}\pi n\right)$	*CO2*	*PO2*	**06**
			UNIT - II			
	3	a)	A system is described by the differential equation given below: $\frac{d^2y(t)}{dt^2} + 3\frac{dy(t)}{dt} + 2y(t) = x(t) + \frac{dx(t)}{dt}$ Evaluate the forced response of the system if input x(t) =5u(t)	*CO1*	*PO2*	**08**
		b)	Explain the following system of properties with an example: i). linear and Non-linear Systems: ii). Time Variant and Time Invariant Systems:	*CO3*	*PO2*	**06**
		c)	Analyze and sketch the DT direct form-I and direct form-II of the signal: Y(n)+0.5y(n-1)-y(n-3)=3x(n-1)+2x(n-2)	*CO3*	*PO3*	**06**
			UNIT - III			
	4	a)	The impulse response of a system is given by h(t)= h(t)=u(t)& an input $\boldsymbol{x(t)} = e^{-\alpha t}u(t)$. Analyze and develop the CT convolution integral of the signal.	*CO4*	*PO3*	**10**
		b)	Analyze and develop the DT convolution sum of the output signal response **y(n); if x(n) = {1 2 3 2 } & h(n) = {1 2 2 };** and also verify results by tabular Convolution method.	*CO4*	*PO3*	**10**
			OR			
	5	a)	Analyze and develop the DT convolution sum of the output signal response **y(n); if x(n) = { 1 1 0.5 0.5 } & h(n) = { 1 1 0.5 0.25 };** and also verify results by tabular Convolution method.	*CO3*	*PO2*	**10**
		b)	State & prove properties of Commutative property and Associate property of the convolution integral of the signal.	*CO4*	*PO3*	**10**
			UNIT - IV			
	6	a)	Evaluate and analyze the DTFS representation for the signal x(n): and plot the magnitude and phase spectrum of $x(n) = cos(\frac{n\pi}{3})$.	*CO3*	*PO2*	**08**

		b)	Evaluate and analyze the FT representation for the signal x(t) and plot the magnitude and phase spectrum of $x(t) = e^{-at}u(t); a > 0$	*CO3*	*PO2*	**05**
		c)	Evaluate the Frequency response an impulse response of the system shown in Fig.6 (c). Analyze and evaluate the transfer function and also sketch magnitude and phase spectrum response.  **Fig.6 (c). RC Network**	*CO3*	*PO2*	**07**
			UNIT - V			
	7	a)	List out the properties for the ROC (Region of convergence) of Z-Transform.	*CO5*	*P02*	**05**
		b)	Apply the knowledge of properties of Z-Transform and Evaluate the Z-Transform: $\boldsymbol{x(n) = u(-n)}$	*CO5*	*PO1*	**05**
		c)	Evaluate the impulse response and step response of the causal system given below and discuss on stability: $y(n) - y(n-1) - 2y(n-2) = x(n-1) + 2x(n-2)$.	*CO5*	*P01*	**10**

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