Course Code: 2030412 **Roll No:** **MLRS- R20**

MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
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II B.Tech I Sem Regular End Examination, February-2022

Signals and Systems
(ECE)

Max. Marks: 70

Note: 1. Question paper consists: Part-A and Part-B.
2. In Part – A, answer all questions which carries 20 marks.
3. In Part – B, answer any one question from each unit.
Each question carries 10 marks and may have a, b as sub questions.

PART- A

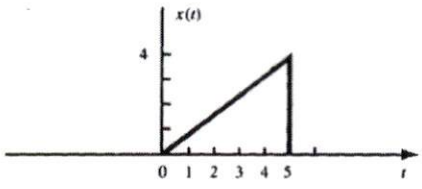
(10*2 Marks = 20 Marks)

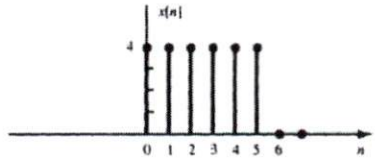
1.	a)	Show that the $sin(200\pi t)$, $cos(300\pi t)$ signals were orthogonal over one fundamental period 0 to 1/100.	2M	CO1	C1
	b)	Evaluate the following integrals. $\int_{-\infty}^{\infty}\left(t^3+sin(\pi t)\right)\delta(t-a)\,dt$	2M	CO1	C2
	c)	Give the list of Dirichlet's conditions for the existence of Fourier series.	2M	CO2	C2
	d)	Find the Fourier transform of $cos(w_0t)$ and $sin(w_0t)$.	2M	CO2	C1
	e)	Give the relationship between bandwidth and rise time.	2M	CO3	C1
	f)	Comment on causality and Paley-wiener criterion for physical realization of ideal filters.	2M	CO3	C2
	g)	Enumerate the relation between the Fourier transform and Laplace Transform.	2M	CO4	C1
	h)	Find the ZT of following sequence. $x(n)=\{2,-1,0,\underset{\uparrow}{4},0,-1,2\}$.	2M	CO4	C1
	i)	Give the statement of sampling theorem. Draw the waveform that illustrates the aliasing condition.	2M	CO5	C2
	j)	Explain how a correlation can be used in filtering the unwanted noise components from the desired signals.	2M	CO5	C3

PART- B

(10*5 Marks = 50 Marks)

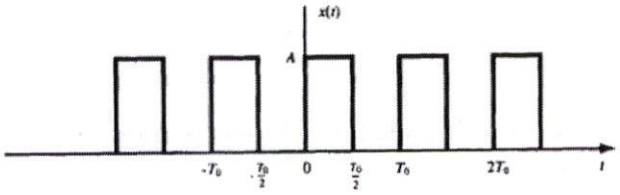
2	a)	Find whether the following signals are energy or power or neither. (i) $x(t)=e^{-4t}u(t)$; (ii) $x(n)=e^{-j6n\pi}$	5M	CO1	C1
	b)	Plot the even and odd components of the following signal.	5M	CO1	C2





OR

3		Check the linearity, time invariance, causality and stability of the following systems. (i) $y(t)=a\,x(t)+b$ (ii) $y(n)=n\,x(n)$ (iii) $y(t)=x(-t)$	10M	CO1	C1

4	a)	Evaluate the Fourier transform of the following signal. $x(t)=sgn(t)cos(\omega_0 t)$	5M	CO2	C2
	b)	State and prove the time convolution property of Fourier transform.	5M	CO2	C2
		OR			
5		Obtain the trigonometric Fourier series coefficients of the following periodic signal. Draw its magnitude and phase spectrum. Comment on the results. 	10M	CO2	C3
6	a)	Consider an ideal low pass filter with proper assumptions, find its impulse response, and suggest how it can be converted into a realizable filter.	5M	CO3	C3
	b)	Find the output of an LTI system whose impulse response and input signal are given respectively using graphical method. $x(t)=u(t)\ \ x(t)=e^{-\alpha t}u(t);\ \ \alpha<0$	5M	CO3	C2
		OR			
7		What is an LTI system? Explain its properties. Derive an expression for the transfer function of an LTI system. Obtain conditions for the distortion less transmission through a system.	10M	CO3	C1
8		Compute the Laplace transform of the following signal and sketch ROC of the same. (i) $e^{-2t}u(t-1)+e^{-4t}u(t)$ (ii) $-e^{2t}u(-t-1)-e^{3t}u(-t+1)$	10M	CO4	C1
		OR			
9		Find the Z-Transform of the following discrete time sequences and sketch the ROC of the same. (i) $x(n)=(0.25)^n u(-n-1)+(0.65)^n u(-n-1)$ (ii) $x(n)=n\left(\frac{1}{2}\right)^n u(n)+n\left(\frac{1}{3}\right)^{n+1}u(n+1)$	10M	CO4	C2
10	a)	State and prove sampling theorem for low pass signals. Discuss the effect of under sampling and over sampling with necessary waveforms.	5M	CO5	C2
	b)	Give the relation between autocorrelation function and energy/ power spectral density and prove the same.	5M	CO5	C2
		OR			
11		List the properties of cross correlation function. Prove any two properties of cross correlation function.	10M	CO5	C1

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