PRN:		Course Code :	ELE 2404

Second Year **B. Tech** End Semester Examination Winter 2024

Signals And Systems 000946

Day and Date: Wed 4 Dec 2024 Max Marks: **100**

Time : 02:00PM To 05:00PM Duration: **03** hrs

Instructions: All questions are compulsory.

			Marks	Bloom's Level	CO
Q.1		**Attempt the following**			
	a)	Define the following I] Signal II] Signal Modeling III]Unit Step Signal IV] Ramp Signal V] Impulse Signal VI] Exponential Signal	08	L1	1
	b)	Explain the following types of signals with examples. I] Continuous time and Discrete time signals. II] Deterministic and Random signals III] Periodic and aperiodic signals IV] Even and Odd signals	08	L1	1
		OR			
	b)	Explain basic operations on signals in detail.	08	L1	1
Q.2		**Attempt the following**			
	a)	Explain classification of systems in detail.	08	L2	2
	b)	Sketch the following signals I]$u(-t+1)$ II] $-2u(t-1)$ III] $3r(t-1)$ IV]$-2r(t)$ V]$r(-t+2)$	08	L2	2
		OR			
	b)	Find the even and odd components of the following signals I] $x(t) = cost + sint + costsint$ II] $x(n) = \{-2,1,2,-1,3\}$	08	L2	2
Q.3		**Attempt any two from the following**			
	a)	Find the natural response of the system describes by difference equation $y(n) - 1.5y(n-1) + 0.5y(n-2) = x(n)$ $y(-1) = 1; y(-2) = 0$	08	L3	3
	b)	Find the forced response of the system describes by difference equation $y(n) - 1.5y(n-1) + 0.5y(n-2) = x(n)$ for an input $x(n)=2^n u(n)$	08	L3	3
	c)	Find the convolution of the sequences by matrix method $x_1(n) = \{1,-1,2,3\}$; $x_2(n) = \{1,-2,3,-1\}$	08	L3	3
Q.4		**Attempt any two from the following**			
	a)	Find the z-transform of the following sequences i. $x(n) = u(n) - u(n-3)$	08	L4	3

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	ii. $x(n) = \{1,2,3,2\}$				
	b) Find the z-transform and ROC for the signal	08	L4	3
	i. $x(n) = a^n u(n)$			
	ii. $x(n) = -b^n u(n-1)$			
	c) Find the z-transform of the following signals	08	L4	3
	i. $x(n) = u(n)$			
	ii. $x(n) = (1/2)^n u(-n)$			
Q.5	**Attempt any Two of the following**			
	a) Explain any four properties of z-Transform.	09	L4	4
	b) Using long division, determine the inverse z-Transform of $X(z) = 1+2z^{-1} / 1-2z^{-1}+z^{-2}$	09	L4	4
	a. if x(n) is causal			
	b. if x(n) is anticausal			
	c) Explain any properties of Laplace Transform.	09	L4	4
Q.6	**Attempt any Two of the following**			
	a) Find the Laplace transform and ROC of the following signals	09	L3	4
	i. $e^{-at} u(t)$			
	ii. $e^{-at} u(-t)$			
	b) Find the inverse Laplace transform of the following	09	L3	4
	i. $X(s) = s / s^2+5s+6$			
	ii. $X(s) = 3s^2+8s+6 / (s+2)(s^2+2s+1)$			
	c) Explain the any four properties of continuous time Fourier series	09	L3	4

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