Q.P. Code: 19EC0403 **R19**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year I Semester Supplementary Examinations August-2022

SIGNALS, SYSTEMS AND RANDOM PROCESSES

(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1		What are the basic operations on signals? Illustrate with an example.	**L1**	**12M**
		OR		
2	**a**	Find which of the signals are causal or non-causal. (i) $x(t)= e^{2t} u(t-1)$ (ii) $x(n)=u(n+4)-u(n-2)$	**L3**	**6M**
	b	Sketch the following signals (i) $x(t)=2\,u(t+2)- 2\,u(t-3)$ (ii) $x(t)=r(t)-r(t-1)-r(t-3)+r(t-4)$	**L3**	**6M**

UNIT-II

3	**a**	Explain about representation of a signal in exponential Fourier series.	**L2**	**6M**
	b	Demonstrate how Fourier Transform derived from Fourier Series.	**L3**	**6M**
		OR		
4		State and Prove any four properties of Continuous time Fourier transform.	**L6**	**12M**

UNIT-III

5	**a**	Derive the Transfer function and impulse response of an LTI system.	**L3**	**6M**
	b	Define Linear time variant, Linear time-invariant, step response of the system.	**L1**	**6M**
		OR		
6	**a**	The impulse response of a continuous-time system is expressed as $h(t)=e^{-2t} u(t)$.Find the Frequency response of the system	**L3**	**6M**
	b	Define the Following Properties of LTI System i) Distributive Property (ii) Associative Property	**L1**	**6M**

UNIT-IV

7	**a**	Determine the Laplace transform of the signal $x(t)= e^{-at} u(t) - e^{-bt} u(-t)$ and alsofind its ROC.	**L5**	**6M**
	b	Find the Laplace transforms and region for the following signals (i)$x(t)=e^{-5t} u(t-1)$ (ii) $x(t)=e^{-a\|t\|}$	**L1**	**6M**
		OR		
8		Let X is a continuous random variable with density function $f_X(x) = x/9+k \quad 0<x<6$ $0 \quad$ Otherwise i) Find 'k' ii) Find p[2<x<5]	**L3**	**12M**

UNIT-V

9	**a**	Show that the autocorrelation function of a stationary random process is an even functionof τ.	**L2**	**6M**
	b	Explain the classification of Random Processes	**L2**	**6M**
		OR		
10		Prove the following (i) $\|R_{xx}(\tau)\| \le R_{xx}(0)$ ii) $R_{xx}(-\tau)= R_{xx}(\tau)$ iii)$R_{xx}(0) = E[X^2(t)]$	**L6**	**12M**

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