O.P.Code:23EC0401 | R23 | H.T.No.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech.II Year I Semester Regular Examinations February-2025
SIGNALS, SYSTEMS AND STOCHASTIC PROCESSES
(Electroniocs & Communications Engineering)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

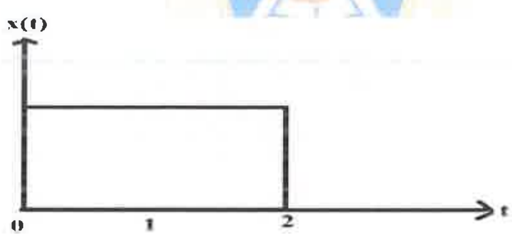
1	a	Test whether the signal y(t) = 3x(t) + 2 is linear or non linear.	CO1	L4	2M
	b	Define convolution and correlation.	CO1	L1	2M
	c	Explain the time shifting property of Fourier transform.	CO3	L1	2M
	d	Find the laplace transform impulse signal.	CO2	L2	2M
	e	Define LTI system.	CO1	L1	2M
	f	Define Energy and Power spectral densities.	C02	L1	2M
	g	Define wide sense stationary random processes.	CO6	L1	2M
	h	Define the cross correlation function between two random processes X(t) & Y(t).	CO6	L1	2M
	i	Give the statement of Wiener-Khinchin relation	CO6	L2	2M
	j	Define spectrum Band width and RMS bandwidth.	CO2	L1	2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2		Sketch the following signals for given x(t). (i) x (t-4) (ii) x(2t-4) (iii)2x(2-t)	CO1	L3	10 M



OR

3	a	State and Prove Linearity and Time reversal properties of Fourier series.	CO2	L1	5M
	b	Derive how exponential Fourier series is obtained from trigonometric series.	CO2	L3	5M

UNIT-II

4	a	Explain modulation property of Fourier transform.	CO2	L2	5M
	b	Find the Fourier transform of the function e^{at} u(-t).	CO2	L3	5M

OR

5	a	State initial and final value theorem of Laplace Transform.	CO2	L1	5M
	b	Find the initial and final values of $X(s)=\frac{2s+5}{s^2+5s+6}$	CO2	L1	5M

UNIT-III

6		Let x(t)= $e^{-at}u(t)$, where a > 0 ,be the input to an LTI system with impulse response h(t)= u(t). Calculate the response of the system.	CO4	L3	10M

OR

7	**a**	Explain the ideal filter characteristics.	**CO3**	**L2**	**5M**
	b	Explain causality and physical reliability of a system and hence give Paley-Wiener criterion.	**CO4**	**L2**	**5M**

UNIT-IV

8		Explain the following i. Stationarity ii. Ergodicity iii. Statistical independence with respect to random processes.	**CO6**	**L2**	**10M**

OR

9		Briefly explain the distribution and density functions in the context of stationary and independent random processes.	**CO6**	**L2**	**10M**

UNIT-V

10	**a**	Check the following power spectral density functions are valid or not $i)\ cos8\,(\omega)/(\,2+\omega^4\,)$ $ii)\ e^{-(\omega-1)\,2}$	**CO2**	**L6**	**5M**
	b	Derive the relation between input PSD and output PSD of an LTI system.	**CO2**	**L3**	**5M**

OR

11	**a**	Analyze the cross correlation function corresponding to the cross power spectrum SXY(ω)= $6\,/[(9+\omega^2\,)(3+j\omega)^2\,]$.	**CO2**	**L4**	**5M**
	b	Explain briefly about cross power density spectrum.	**CO2**	**L2**	**5M**

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