Q.P. Code: 18EC0403 **R18**

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year II Semester Regular Examinations October-2020

SIGNALS & SYSTEMS

(Electrical & Electronics Engineering)

Time: 3 hours Max. Marks: 60

PART-A

(Answer all the Questions **5 x 2 = 10** Marks)

1	**a**	Distinguish between periodic and non-periodic signals.	**2M**
	b	Define Linearity Property of Fourier Transform.	**2M**
	c	State Sampling theorem.	**2M**
	d	What are the properties of cross correlation for energy signals.	**2M**
	e	State initial value theorem and final value theorem of Laplace transform.	**2M**

PART-B

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

UNIT-I

2	**a**	Find which of the signals are causal or non-causal. (i) $x(t)= e^{2t} u(t-1)$ (ii) $x(t)=3 \text{ sinc } 2t$ (iii) $x(n)=u(n+4)-u(n-2)$ (iv) $x(t)=u(-n)$	**5M**
	b	Sketch the following signals (i) $2 u(t+2)- 2 u(t-3)$ (ii) $u(t+4) u(-t+4)$ (iii) $r(t)-r(t-1)-r(t-3)-r(t-4)$ (iv) $\pi(t-2)$	**5M**

OR

3		Explain the classification of signals in both continuous time and discrete time with suitable examples.	**10M**

UNIT-II

4	**a**	State and prove any three properties of the DTFT.	**5M**
	b	Find the Fourier Transform of the Signal (i) Triangular Pulse (ii) $e^{-a\|t\|}$	**5M**

OR

5 Find the Fourier transform of the following signals **10M**

(i) $x(t)=e^{-3t}u(t)$

(ii) $x(t)=te^{-at}u(t)$

(iii) $x(t)=e^{-t}\sin 5t\,u(t)$

(iv) $x(t)=e^{-t}\cos 5t\,u(t)$

UNIT-III

6 **a** Derive the transfer function and impulse response of an LTI system. **5M**

b Define Linear time variant, Linear time-invariant, step response of the system. **5M**

OR

7 **a** Let the system function of an LTI system be $1/(j\omega+2)$. What is the output of the system for an input $(0.8)^t u(t)$. **5M**

b Consider a causal LTI system with frequency response $H(\omega)=1/4+j\omega$, for a input x(t), the system is observed to produce the output $y(t)=e^{-2t}u(t)- e^{-4t}u(t)$. Find the input x(t). **5M**

UNIT-IV

8 **a** State and prove the Parseval's theorem for energy signals. **5M**

b Derive and Define the properties of Power Spectral Density. **5M**

OR

9 **a** Find the autocorrelation of the signal $x(t)= a \sin(\omega_0 t +\theta)$. **5M**

b Explain the detection of periodic signals in the presence of noise by cross correlation. **5M**

UNIT-V

10 **a** Find the Laplace transforms and region for the following signals: **5M**

(i)$x(t)=e^{-5t}u(t-1)$ (ii)$x(t)= e^{2t}\sin 2t$ for $t \le 0$ (iii) $x(t)=t\,e^{-2|t|}$

b Find the inverse Laplace transform of the following: **5M**

(i) $X(s) = 1/ s(s+1)(s+2)(s+3)$

(ii) $X(s) = s/(s+3)(s2 +4s+5)$

OR

11 **a** Using the Properties of Z-transform. Find the Z-transform of following signals: **5M**

(i) $x(n)=u(-n)$

(ii) $x(n)=2^n u(n-2)$

(iii) $2(3)^n u(-n)$

b Find the inverse Z-transform of $X(z)= z^{-1} /(3-4z^{-1} +z^{-2})$, ROC: $|z|>1$ **5M**

END