SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech II Year I Semester Supplementary Examinations August-2021
SIGNALS & SYSTEMS
(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 60

PART-A
(Answer all the Questions 5 x 2 = 10 Marks)

1	a	How are the signals are classified?	2M
	b	What is the Relationship between exponential Fourier series and trigonometric Fourier series coefficients?	2M
	c	Define impulse response of a system.	2M
	d	State Parseval's energy theorem.	2M
	e	What are the properties of ROC?	2M

PART-B
(Answer all Five Units 5 x 10 = 50 Marks)
UNIT-I

2		Define a system. How are systems classified? Define each one of them.	10M

OR

3 a Find the even and odd components of the following signals   5M

(i) $x(t) = e^{j2t}$ (ii) $x(t) = (1+t^2+t^3) \cos 210t$ (iii) $x(n) = \{-3, 1, 2, -4, 2\}$

b Determine whether the following signals are energy signals or power signals. Calculate their energy or power.   5M

(i) $x(t) = t$ (ii) $\sin 2\omega_0 t$ (iii) $x(n) = (1/2)^n u(n)$

UNIT-II

4	Derive the expressions for the trigonometric Fourier series coefficients.	10M

OR

5	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

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 Consider a stable LTI System characterized by the differential equation $dy(t)/dt + 2y(t) = x(t)$, Find its impulse response.   5M

b Find the Nyquist Rate and Nyquist Interval of the following signals.   5M

(i) $x(t) = 1 + \cos 2000\,\pi t + \sin 4000\,\pi t$ (ii) $x(t) = 10 \sin 40\pi t \cos 300\pi t$

UNIT-IV

8 a Write the properties of convolution.   4M

b Find the convolution of the following signal   6M

$x_1(t) = e^{-2t} u(t)$, $x_2(t) = e^{-3t} u(t)$.

OR

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

   b   Distinguish the ESD and PSD.   5M

UNIT-V

10   a   Find the inverse Z-transform of $X(z) = 1/(1-az^{-1})$, ROC; $|z| > |a|$ 5M

   b   Find the convolution of the sequences: 5M
       $X_1(n) = (1/2)^n u(n)$ and $(1/3)^{n-2} u(n)$

OR

11   a   Prove that the final value of $x(n)$ for $X(z) = z^2/(z-1)(z-0.2)$ is 1.25 and its final value   5M
       is unity?

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

END