O.P.Code: 18EC0403	R18	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year I Semester Supplementary Examinations June-2024

SIGNALS & SYSTEMS

(Electronics and Communications 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?	CO1	L1	2M
	b	What are the Dirichlet's conditions? State them.	CO2	L1	2M
	c	What is Nyquist rate and Nyquist interval?	CO2	L1	2M
	d	State Time convolution and Frequency convolution theorem.	CO3	L1	2M
	e	Find Z-transform and ROC of $x(n)=(1/2)^n u(n-2)$.	CO4	L1	2M

PART-B

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

UNIT-I

2		What are the basic operations on signals? Illustrate with an example.	CO1	L2	10M

OR

3		Find whether the following signals are periodic or not? If periodic determine the fundamental Period. (a) $\sin 12\pi t$ (b)$3\sin 200\pi t+4\cos 100t$ (c) $\sin 10\pi t+\cos 20\pi t$ (d)$\sin(10t+1)-2\cos(5t-2)$ (e) $e^{j4\pi t}$	CO1	L3	10M

UNIT-II

4	a	Derive the expression for Fourier transform from Fourier series.	CO2	L3	5M
	b	Find the Fourier transform of the following (i) sgn(t) (ii) $\sin \omega_0 t$ (iii)$\cos \omega_0 t$ (iv) 1(Constant Amplitude)	CO2	L3	5M

OR

5		Find the inverse Fourier transform of the following signals (i) $X(\omega)=4(j\omega)+6/(j\omega)^2+6(j\omega)+8$ (ii) $X(\omega)=1+3(j\omega)/(j\omega+3)^2$ (iii) $X(\omega)=e^{-2\omega} u(\omega)$.	CO2	L3	10M

UNIT-III

6	a	Find the Nyquist Rate and Nyquist Interval of the following signals (i)$x(t)=1+\cos 2000\pi t+\sin 4000\pi t$ (ii) $x(t)=10\sin 40\pi t\cos 300\pi t$	CO3	L3	5M
	b	Consider a stable LTI System characterized by the differential equation $dy(t)/dt+2y(t)=x(t)$, Find its impulse response.	CO3	L3	5M

OR

7		State and prove the sampling theorem for the band-limited signals with the help of graphical representation.	CO3	L3	10M

UNIT-IV

8	a	State and prove the Parseval's theorem for energy signals.	CO4	L3	5M
	b	Derive and Define the properties of Energy Spectral Density.	CO4	L3	5M

OR

9	a	Find the autocorrelation of the signal $x(t)= a\sin(\omega_0 t +\theta)$.	CO4	L3	5M
	b	Distinguish the ESD and PSD.	CO4	L3	5M

UNIT-V

10	a	Find the inverse z-transform of $X(z)=3z^{-1}/(1-z^{-1})(1-2z^{-1})$ (a)If ROC; $\|z\|>2$ (b) If ROC ; $\|z\|<1$ (c) If ROC ; $1<\|z\|<2$	CO4	L3	10M

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 is unity?	CO4	L3	5M
	b	Find the inverse Z-transform of $X(z)= z^{-1}/(3-4z^{-1}+z^{-2})$, ROC: $\|z\|>1$	CO4	L3	5M

*** END ***