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

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year II Semester Supplementary Examinations March-2021

SIGNALS & SYSTEMS

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 60

PART-A

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

1	**a**	Define stable and unstable systems.	**2M**
	b	What are the Dirichlet's conditions? State them.	**2M**
	c	What are the properties of LTI systems?	**2M**
	d	What is the relation between convolution and correlation?	**2M**
	e	Find Z-transform and ROC of $x(n)=(1/2)^n u(n-2)$.	**2M**

PART-B

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

UNIT-I

2	**a**	Check whether the following systems are causal or not? (i) $y(t)=x^2(t)+x(t-4)$ (ii) $y(t)=x(t/2)$ (iii) $y(n)=x(2n)$	**5M**
	b	Find whether the following systems are stable or not (i) $y(t) = (t+5)\,u(t)$ (ii) $y(t) = (2+e^{-3t})\,u(t)$ (iii) $h(n) = a^n$ for $0<n<11$	**5M**

OR

3	**a**	Find the even and odd components of the following signals (i) $x(t)= e^{j2t}$ (ii) $x(t) =(1+ t^2 +t^3)\cos^2 10t$ (iii) $x(n)=\{-3,1, \underset{\uparrow}{2}, -4,2\}$ (iv) $x(n)=\{5,4,3,2,1\}$	**5M**
	b	Determine whether the following signals are Energy signals or Power signals. Calculate their Energy or Power. (i) $x(t)= 8\cos 4t \cos 6t$ (ii) $x(t)= \sin^2 \omega_0 t$ (iii) $x(t)= e^{j[3t+(\pi/2)]}$ (iv) $x(n)=(1/2)^n u(n)$	**5M**

UNIT-II

4		State and Prove any Five Properties of the Fourier Series.	**10M**

OR

5	**a**	Find the Fourier transform of the following (i) sgn(t) (ii) $\sin \omega_0 t$ (iii) $\cos \omega_0 t$ (iv) 1(Constant Amplitude)	**5M**
	b	Find the inverse Fourier transform of the following signals (i) $X(W)= \frac{1+3jw}{2(jw+3)}$ (ii) $X(w)=e^{-2w}u(w)$	**5M**

UNIT-III

6 a Consider a stable LTI System characterized by the differential equation $\frac{dy(t)}{dt} + 2y(t) = x(t)$, 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) $x(t)=10 \sin 40\pi t \cos 300\pi t$

OR

7 a Discuss about effects of the under sampling. 5M

b A system produces an output of $y(t)= e^{-3t} u(t)$ for an input of $x(t)= e^{-5t} u(t)$. Determine the impulse response and frequency response of the system. 5M

UNIT-IV

8 a Derive and Define the properties of Energy Spectral Density. 5M

b Determine the autocorrelation function and energy spectral density of $x(t)=e^{-at} u(t)$. 5M

OR

9 a State and prove the Parseval's theorem for power signals. 5M

b Verify Parseval's theorem for the energy signal $x(t)=e^{-4t} u(t)$. 5M

UNIT-V

10 a Find the convolution of the sequences: $x_1(n)= (1/2)^n u(n)$ and $(1/3)^{n-2} u(n)$. 5M

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

OR

11 a Find the Laplace transform of the following signals using properties of Laplace transform 5M

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

(ii) $x(t)=t e^{-2t} \sin 2t\, u(t)$

b State and prove time differentiation and time integration property of Laplace transform. 5M

END