Q.P. Code: 16EC403 **R16**

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B. Tech II Year I Semester Supplementary Examinations August-2021

SIGNALS AND SYSTEMS

(Electronics and Communication Engineering)

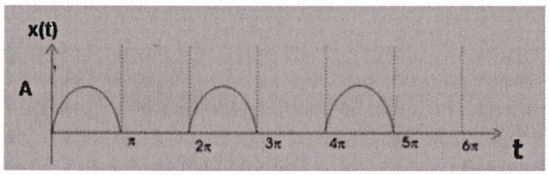
Time: 3 hours Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1 **a** Determine whether the following signals are energy signals or power signals and calculate their energy or power? **6M**
(i) x(t)= rect(t/T) (ii) x(t)=u(t) (iii) x(t)=$sin^2(\omega_0 t)$

b Find the Fourier series expansion of the half wave rectified sine wave shown in figure. **6M**



OR

2 **a** What are the basic operations on signals? Illustrate with an example. **6M**

b Define the following signals in functional form and sketch them **6M**
(i) unit step (ii) unit ramp (iii) sinc function

UNIT-II

3 **a** State and prove the time shifting and frequency shifting properties of Continuous time Fourier transform. **6M**

b Find the Fourier transform of $i)\ x(t) = e^{-a|t|}$ $ii)\ x(t) = e^{-t}\cos(5t)\,u(t)$ **6M**

OR

4 **a** State and prove the time reversal and time scaling properties of Discrete time Fourier transform. **6M**

b Find the inverse Fourier transform of **6M**
$X(\omega) = \frac{3j\omega+1}{(j\omega+3)^2}$

UNIT-III

5 **a** Consider a stable LTI system with differential equation $\frac{d}{dt}y(t) + 2y(t) = x(t)$ **6M**
find its impulse response

b State and prove sampling theorem for band limited signals. **6M**

OR

6 **a** Obtain the conditions for distortion less transmission through a system. **6M**

b Find the Nyquist rate and Nyquist interval for the following signals **6M**
i) rect(300t) ii) -10 sin 40πt cos 300πt

UNIT-IV

7 **a** Show that R(r) and ESD form Fourier transform pair. **6M**

b Write the properties of convolution. **6M**

OR

8 **a** Determine the autocorrelation function and energy spectral density of x(t)= e-at u(t) **6M**

b Explain the detection of periodic signals in the presence of noise by auto correlation. **6M**

UNIT-V

9	a	State and prove initial and final value theorems of Laplace transform	6M
	b	Find the Z-Transform of $i)\ x(n) = a^n u(n)\ \ ii)\ x(n) = na^n u(n)$	6M
		OR	
10	a	State the properties of ROC of Z-Transform	6M
	b	Find the inverse Laplace transform of $X(s) = \frac{1}{s(s+1)(s+2)(s+3)}$	6M

*** END ***