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

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year I Semester Regular & Supplementary Examinations Nov/Dec 2018

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** Test whether the signal is periodic or not. If so find the fundamental period 7M

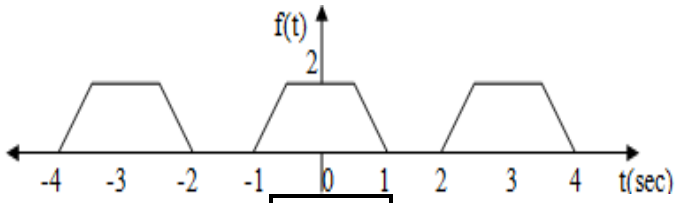
i) $x(t) = e^{j10t}$ ii) $x(t) = \cos\left(\frac{\pi}{3}\right)t + \sin(\frac{\pi}{5})t$

iii) $x(t) = \cos(t + \frac{\pi}{4})$

b Define a system .How are systems classified? Define each one of them. 5M

OR

2 Find the exponential Fourier series by direct evaluation of coefficients. 12M



UNIT-II

3 **a** State and prove the multiplication in time domain property of Fourier transforms 5M

b Obtain the fourier transform of 7M

(i) Sgn(t)

(ii) $\Delta(t) = \begin{cases} 1 - \frac{2|t|}{\tau} \text{ for } |t| < \tau \\ 0 \quad \text{elsewhere} \end{cases}$

OR

4 **a** Obtain the Fourier transform of the following functions: 7M

i) Impulse train ii) DC Signal iii) Cos $\omega_0 t$ iv) Gaussian Pulse

b State and prove the Duality property of Fourier transforms 5M

UNIT-III

5 **a** Given a signal x(t)= $3\cos(50\pi t) + 10\sin(300\pi t) - \cos(100\pi t)$.Find the Nyquist rate for this signal. 6M

b Define LTI system. Determine whether the following system is LTI system or not 6M

y(t)=2x(t-1)

OR

6 **a** State and prove sampling theorem for low pass signals. 6M

b A signal $x(t) = 2\cos 400\pi t + 6\cos \pi t$ is ideally sampled at $f_s = 500$ Hz. If the sampled signal is passed through an ideal low-pass filter with a cut-off frequency of 400 Hz, what frequency components will appear in the filter output. 6M

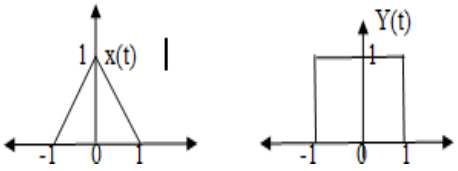
UNIT-IV

7 **a** Determine auto and cross correlation, Energy Spectral Density of the signal 5M

x(t)=A sin(wt+Ø)

b Find auto correlation, power, RMS value and sketch the Power Spectral Density for the signal x(t)=(A+ sin100t)cos200t. 7M

OR

8	**a**	Prove that for a signal, auto correlation and Power Spectral Density form a Fourier transform pair	5M
	b	Find the cross correlation between unit triangular and unit gate pulse as follows: 	7M

UNIT-V

9	**a**	State and prove the initial value and final value theorem of Laplace Transform and explain its significance in analyzing a system.	6M
	b	Determine the inverse Laplace transform of $X(S) = \frac{2(S+2)}{S^2+7S+12}$ Re(s) > -3.	6M

OR

10	**a**	A finite sequence x[n] is defined as x[n] = {5,3,-2,0,4,-3} Find X[Z] and its ROC.	6M
	b	Determine Z- Transform of a signal $x(n) = (\frac{2}{3})^n u(n) + (-\frac{1}{2})^n u(n)$ and plot ROC and Pole zero locations of X(Z).	6M

*** END ***