Code No: 123AW **R15**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 2017
SIGNALS AND SYSTEMS
(Common to ECE, EIE, ETM)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A

(25 Marks)

1.a)	Determine whether a unit step signal u (t) is energy or power signal.	[2]
b)	Define principle of orthogonality.	[3]
c)	Define sampling Theorem.	[2]
d)	Compare Fourier series and Fourier transform.	[3]
e)	Explain with suitable example what is meant by an LTI system.	[2]
f)	Define system Bandwidth and signal Bandwidth.	[3]
g)	List the properties of Cross-correlation.	[2]
h)	Define Noise and state its properties with respect to correlation.	[3]
i)	List out the properties of Laplace transform.	[2]
j)	What is meant by region of convergence in Z Transform?	[3]

PART-B

(50 Marks)

2.a) Derive the expression for trigonometric Fourier series coefficients.
b) State the dirichilet's conditions for existence of Fourier series. [6+4]

OR

3.a) Test the orthogonality of the signals sin wt cos2 wt over the interval (t_0 to t_0+T).
b) Find the exponential Fourier series of the signal x(t) = 5cos 5t+10 sin 15t. [5+5]

4.a) Find the Fourier transform of x(t) =e^{-at} u (t).
b) State and prove the convolution property of Fourier transform. [5+5]

OR

5.a) State and prove parsavels energy theorem.
b) If x (t) has Fourier transform pair X (w). Deduce the Fourier Transform of X (at-t_0). [5+5]

6.a) Define Transfer function and state its relation with Impulse function.
b) Find the impulse response of a continuous time LTI system with
H(s) = S-1/(S+1)(S+2) such that i) Re[S] >2 ii) -1 Re[S]<2 [3+7]

OR

7.a) Derive the relation between Bandwidth and Rise time.

b) Determine whether the system governed by the equation y(n)= 5x(n) is linear or not Assume that x(n) represents the input to the system and y(n) represents its output. [5+5]

8.a) Determine the convolution of the signals X(n)={2,-1,3,2} and h(n)={1,-1,1,1}

b) What is the necessary and sufficient condition on impulse response for stability? [6+4]

OR

9.a) What is the overall impulse response h(n) when two system with impulse response $h_1(n)$ and $h_2(n)$ are connected in parallel and in series?

b) State and prove properties of convolution. [5+5]

10.a) The unilateral Laplace transform of $f(t)$ is $\frac{1}{s^2+s+1}$. What is the unilateral Laplace Transform of $tf(t)$.

b) Find the inverse Laplace transform of the functions

i) $Y(s) = 105/(5+2)^2(5+8)$

ii) $Y(s) = 105/(5+2)^3(5+8)$ [5+5]

OR

11. Find the Laplace transform of following functions:

a) Exponential function

b) Unit Step function

c) Damped sine function. [3+3+4]

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