SIGNALS & SYSTEMS (19APCO402)

(Electronics & Communication Engineering)

Time: 3 Hours **Max Marks: 70**

PART-A (10*2= 20 M)

		Answer the following	UNIT	Marks
1	a)	Any function f (t) can be expressed as a sum of its components along mutually orthogonal functions. Write the condition on the function.	I	2
	b)	What is the analogy between vectors and signals?	I	2
	c)	What is the condition to be satisfied for the existence of Laplace transform?	II	2
	d)	Define Z transform. What are the two types of Z transform?	II	2
	e)	Find inverse DTFT of $x[n] = \delta(n+4)$	III	2
	f)	What is the relation between Fourier transform & DFT?	III	2
	g)	What is the relation between Bandwidth and Rise time?	IV	2
	h)	Define Energy Spectral Density (ESD) and give the relation between ESD and auto correlation?	IV	2
	i)	What is BIBO stability?	V	2
	j)	Explain region of convergence (ROC) for Laplace transforms.	V	2

PART-B (5*10= 50 M)

Answer One Full Question from each unit; All questions carry EQUAL marks.

	UNIT-I	
2	Explain the concept of convolution and Correlation with the help of example. Also explain the types of convolutions and correction as well as their properties.	**10 M**
	(OR)	
3	The discrete time systems are represented by the following difference equations in which x(n) is the input and y(n) is output. $y(n) = 3y^2(n-1) - nx(n) + 4x(n-1) - 2x(n+1)$ and $y(n) = x(n+1) - 3x(n) + x(n-1)$; Check whether above systems are Linear, Shift invariant, casual? Justify your answer.	**10 M**
	UNIT-II	
4	Find the Fourier transform of the following functions. i) A single symmetrical triangular pulse. ii) A single symmetrical gate pulse	**10 M**
	(OR)	
5	State and prove sampling theorem for band limited signals using graphical approach	**10 M**
	UNIT-III	
6.	Explain the properties of DTFT for different types of signals and systems	**10 M**
	(OR)	

7.	Consider a discrete-time LTI system with impulse response $h[n] = \left[\left(\frac{1}{2}\right)^n \cos\left(\frac{\pi n}{2}\right)\right] u[n]$. Use Fourier transforms to determine the response to each of the following inputs: (i) $x[n] = (\frac{1}{2})^n u[n]$ (ii) $x[n] = \cos(\pi n/2)$	10 M
	UNIT-IV	
8	Explain the concept of Paley-Wiener criterion for physical realizability using relevant expressions	5 M
		5 M

(OR)

9.	Explain the filter characteristics of ideal LPF, HPF and BPF using their magnitude and phase responses.	10 M
	UNIT-V	
10	State and prove all the properties of Z-transform (Linearity, Time Scaling, Time Shifting, Convolution, Time Differentiation)	10 M

(OR)

11.	Find the Z transform of $x(n) = 3\left(\frac{1}{2}\right)^n u[n] - 2\left(\frac{1}{4}\right)^n u[-n-1]$	10 M