

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY-GURUJADA VIZINAGARAM
III B. Tech I Semester Regular Examinations November -2025
SIGNALS AND SYSTEMS
(DEPARTMENT OF EEE)

Time: 3 hours

Max. Marks: 70

The Question paper consists of Part A & Part B.

Part A is compulsory, Answer all questions. Part B Answers any one question from each unit.

1		PART-A	(20Marks)
	a)	How the signals are approximated using orthogonal functions?	[2]
	b)	Explain about time-shifting operation on signals.	[2]
	c)	Define Hilbert Transform? What are its applications?	[2]
	d)	Find the Fourier transform of $x(t) = e^{j2\pi ft}$.	[2]
	e)	What are the requirements to be satisfied by an LTI system to provide distortion less transmission?	[2]
	f)	What is the impulse response of two LTI systems connected in parallel?	[2]
	g)	Define parsevals theorem.	[2]
	h)	What is aliasing?	[2]
	i)	List out all the properties of ROC of Laplace transform.	[2]
	j)	Give the relation between Z-transform and DTFT.	[2]
		PART-B	(50Marks)
		Question from Unit - I	
2	a)	Explain about different types of systems with an example.	[5]
	b)	Check whether the following systems are linear or not. $y(n) = Ax(n)$ and $y(n) = n^2x(2n)$	[5]
		(OR)	
3	a)	Explain about orthogonality in complex functions.	[5]
	b)	Determine whether the following function is periodic or not. If so find the period. $x(t)=3 \sin 200\pi t + 4 \cos 100t$.	[5]
		Question from Unit - II	
4	a)	Find the Fourier Transform of the signal $x(t) = e^{at}u(-t)$	[5]
	b)	Explain about orthogonal signal space and evaluate mean square error.	[5]
		(OR)	
5	a)	State and prove, time differentiation and integration property of Fourier Transform.	[5]
	b)	Write the Dirichlet's conditions to obtain Fourier series representation of any Signal. Find the trigonometric Fourier series for half wave rectified sine wave.	[5]
		Question from Unit - III	
6	a)	Explain the characteristics of an ideal HPF and BPF.	[5]
	b)	Derive the condition for distortion less transmission through the system.	[5]
		(OR)	
7	a)	Obtain the relationship between bandwidth and rise time.	[5]
	b)	Determine the convolution of the following functions graphically. $x_1(t) = e^{-at}u(t)$ and $x_2(t) = u(t)$.	[5]
		Question from Unit - IV	

8	a)	State and Prove the sampling theorem for Band limited signals.	[5]
	b)	Discuss the process of extraction of signal from noise by filtering.	[5]
		(OR)	
9	a)	Compare various sampling techniques.	[5]
	b)	Find the power spectral density of $x(t) = A\sin(2\pi f_0 t)$ and also find the total power.	[5]
		Question from Unit - V	
10	a)	Discuss various properties of ROC's for Laplace transform.	[5]
	b)	Determine the inverse Laplace transform of $\frac{3}{s(s+2)(s+4)}$	[5]
		(OR)	
11	a)	Find the Z transform of $x(n) = a^n u(n+1)$ and its ROC.	[5]
	b)	State and prove initial value and final value properties of z-transform.	[5]
