University Institute of Engineering & Technology

(Recognised Under Section 2(f) and 12B of UGC)

Kurukshetra University, Kurukshetra

Roll No. - 25210[redacted]

THEORY EXAMINATION – DEC 2022	
B.TECH - ECE	SEMESTER – III

TIME – 3 Hrs.

M.M. - 75

PAPER – EC-209

SUBJECT - Signals and Systems

Note: All questions in Part-A and Part-B are compulsory. Attempt any four questions from Part-C selecting at least one from each unit.

PART-A (15 Marks)

Q. No. – 1 Answer the following questions carrying one mark each. 15x1=15

(i)	Define signum function?
(ii)	The time derivative of u(t) is _____
(iii)	Explain BIBO stability.
(iv)	Explain time scaling property of unit impulse function.
(v)	Derive the expression for odd part of a signal.
(vi)	Define cross correlation.
(vii)	The condition $h(t) \neq 0$ for $t<0$ must be satisfied by the system that is a) Memoryless b) Causal c) BIBO stable d) None of the above
(viii)	The Convolution operator is i) Commutative ii) Associative iii) Both iv) None of these.
(ix)	State frequency shifting property for continuous time Fourier transform.
(x)	Write the convolution for two signals x(t) and y(t) over the interval [0,T].
(xi)	The laplace transform of u(t) is_____
(xii)	Write the expression for polar form representation of Fourier series.
(xiii)	The exponential CTFS of x(t) is _____
(xiv)	Define ROC.
(xv)	Define nyquist interval.

$\int_3^{\infty} e^{-st}\,dt$

$+t^3\int_3^{\infty} e^{-st}\,dt - \int \frac{d}{dt}t^3 \int_3^{\infty} e^{-st}\,.dt$

PART-B (20 Marks)

Answer the following questions, one from each unit & all question carrying equal marks. 5x4=20

	UNIT-I	
2	Explain singular functions and also express their relationship with each other.	5
	UNIT-II	
3	Explain mean, variance and standard deviation for a random variable.	5
	UNIT-III	
4	Determine the exponential fourier series for x(t)= A sin(t) for the interval [0, π]	5
	UNIT-IV	
5	Find the Laplace transform for x(t)= exp(-4*t) u(t)- exp(-2*t) u(-t) and also draw it's ROC.	5

PART-C (40 Marks)

Students are required to attempt four question, by selecting atleast one question from each unit & all question carrying equal marks. 10x4=40

	UNIT-I	
6 (a)	Explain periodic and non periodic signals and also mention the condition of periodicity for of signals.	05
6 (b)	Check whether the signal x(t)= u(t) is periodic or not.	05
7(a)	The following system have input x[t] and output y[t]. y(t)= x(-t)+ cos(t) Determine whether the system is a) Stable b) Causal c) Linear d) time invariance	10
	UNIT-II	
8	Explain impulse response and unit step response for a system with input x(t) and output y(t).	10
9	Describe Probability density function of a random X with its properties. If probability dens function of random variable is $p(x) = x^2$ for $1 \le x \le 4$. Find the mean,variance and standard deviation.	10
	UNIT-III	
10	Explain sampling theorem and also derive the expression for sampled signal in frequency domain.	10
11	Write the dirichlet conditions for Fourier series. Derive the expression for trigonometric fo series coefficients.	10
	UNIT-IV	
12	State and prove the properties for continuous time fourier transform.	10
13	Find the laplace transform for $x(t)= t^3u(t-3)$ and also determine its ROC.	10