Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2025

Third Semester

Electronics and Communication Engineering

EC3354 -Signals and Systems

Regulations - 2021

Duration : 3 Hrs ***Maximum : 100 Marks***

PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)

Q.No.	*Questions*	*BLT*	*CO*	*Marks*
1.	Distinguish between continuous time signal and discrete time signal.	L2	1	2
2.	Find whether the described system y[n]=nx[n] is time invariant or not.	L2	1	2
3.	Write short notes on Dirichlet condition for Fourier series.	L2	2	2
4.	Find the Laplace transform of the signal x(t) =-te^{-2t} u(t).	L2	2	2
5.	Given the input x(t) =u(t) and h(t) = δ(t-1). Find the response y(t).	L1	3	2
6.	What is the relationship between Fourier transform and Laplace transform?	L2	3	2
7.	What is aliasing?	L1	4	2
8.	Consider the analog signal x(t) = 4cos100 t + 15sin300 t - 2cos100 t. Determine the Nyquist rate for this signal.	L3	4	2
9.	Differentiate between the non-recursive and recursive systems.	L2	5	2
10.	Find the convolution of x(n)={1,2,1} and h(n)={1,1}.	L2	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

Q.No.			*Questions*	*BLT*	*CO*	*Marks*
11.	a		Examine whether the following signals are energy signals or power signals (i)$y(n) = \left(\frac{1}{3}\right)^{n} u(n)$ (ii) $x(t) = tu(t)$ (iii) $x(t) = (1 + e^{-5t})$	L3	1	16
			Or			
	b		Examine whether the following systems are static or dynamic, linear or nonlinear, and time invariant or time variant. (i) y(n) = x(n) - x(n-1) (ii)$y(t) = \frac{d}{dt} x(t)$	L3	1	16
12.	a	i	Find out the Fourier transform of x(t)=e^{-at} u(-t).	L3	2	8

		ii	Determine the Fourier series representation of the signal x(t) = 2+cos(4t) + sin(6t).	L3	2	8
			Or			
	b	i	Derive the Laplace transform and ROC of the signal $x(t)=e^{-3t}u(t)+e^{-2t}u(t)$.	L3	2	8
		ii	Find the Laplace transform of, $x(t) = t^2 e^{-2t}u(t)$.	L3	2	8
13.	a		The input-output of a causal LTI system is related by the differential equation $d^2 y(t)/dt^2 + 6dy(t)/dt + 8y(t)= 2x(t)$. (i) Detect the impulse response of h(t) (ii) Find the response y(t) of the system if x(t)=u(t) using Fourier transform	L3	3	16
			Or			
	b		A system is described by the differential equation $\frac{d^2y(t)}{dt^2}+5\frac{dy(t)}{dt}+6y(t)=\frac{dx(t)}{dt}+x(t), \frac{dy(0^-)}{dt}=3, y(0)=1, x(t)=u(t).$ Find the transfer function and output signal y(t).	L3	3	16
14.	a		Determine the Z-transform and ROC of (i) x(n) = u(-n) - u(n-3) (ii) $x(n) = 3^n u(-n-1)$	L3	4	16
			Or			
	b		Prove the sampling theorem and explain how the original signal can be reconstructed from the sampled version with necessary illustrations.	L3	4	16
15.	a		Determine the linear convolution of x(n) = {1,1,1,1} and h(n)= {2,2} using graphical representation.	L2	5	16
			Or			
	b		Determine the transfer function and the impulse response for the causal LTI system described by the difference equation. $y(n)=\frac{1}{4}y(n-1)-\frac{3}{8}y(n-2)=-x(n)+2x(n-1)$	L3	5	16