Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, NOV/DEC 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*	*BTL*	*CO*	*Marks*
1.	Find the energy of the signal e^{-2t} u(t).	L3	1	2
2.	What are the major classifications of the signal.	L1	1	2
3.	Write the Laplace transform of e^{at}.	L2	2	2
4.	State the Dirichlet conditions for the existence of Fourier series.	L1	2	2
5.	Give the expression of convolution integral.	L2	3	2
6.	Find the unit step response of a CT LTI system for the given $h(t) = e^{-2t}u(t)$.	L3	3	2
7.	State Sampling theorem.	L1	4	2
8.	Find the DTFT of x(n)= δ(n)+ δ(n-1).	L3	4	2
9.	Find the stability of the system whose impulse response is $h(n)=2^n$ u(n).	L3	5	2
10.	Determine the convolution of the following signals: x[n] = {1, 2, 3}, h[n] = {1,2}.	L3	5	2

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

Q.No			*Questions*	*BLT*	*CO*	*Marks*
11.	a	i	Verify whether the system defined by $y(t)=x(t^2)$ is (a) linear and (b) time-invariant. Justify your answer with appropriate reasoning.	L3	1	8
		ii	A signal x(t)=3+2cos(5t)+4sin(2t) is given. Determine if it is periodic or aperiodic.	L3	1	8
			Or			
	b	i	Determine whether the following signal is an energy signal, a power signal, or neither, justifying your answer: x(t)=u(t)+5 u(t−1)−2 u(t−2) where u(t) is the unit step function.	L3	1	8
		ii	Explain the differences between continuous-time and discrete-time signals with examples.	L2	1	8
12.	a	i	Find out the Fourier transform of $x(t)=e^{-at}$ u(-t).	L3	2	8
		ii	Illustrate the convolution property of Laplace transform with example.	L2	2	8
			Or			

	b	i	Determine the Fourier series representation of the signal x(t) = 2+cos(4t) + sin(6t).	L3	2	8
		ii	State and prove any five properties of the Laplace Transform (linearity, differentiation, time-shifting, convolution, initial/final value theorems).	L2	2	8
13.	a		Examine the convolution y(t) of the given signals. (i) x(t)=cost u(t), h(t)=u(t) x(t)=u(t), h(t)= $R\ L\ e^{-tR/L}$u(t)	L4	3	16
			Or			
	b		The differential equation $d^2y(t)/dt^2$ + 6dy(t)/dt + 8y(t)= 2x(t). relates the input-output of a causal LTI system (i) Determine the impulse response of h(t). (ii) Analyze the response y(t) of the system if x(t)=u(t) using Fourier Transform.	L3	3	16
14.	a		Consider an analog signal x(t) = 4sin100πt. (a) Examine the minimum sampling rate to avoid sampling. (b) If sampling rate Fs =400Hz, what is the discrete time signal after sampling?	L2	4	16
			Or			
	b		Explain the following properties of Z transform (i) Time and frequency convolution property. (ii) Parseval's theorem	L2	4	16
15.	a		Find the impulse response, frequency response, magnitude response and phase response of the second order system: $y(n) - y(n-1) + (3/16)\ y(n-2) = x(n) - 1/2\ x(n-1)$	L3	5	16
			Or			
	b		Determine the linear convolution of x(n) = {1,1,1,1} and h(n)= {2,2} using graphical representation.	L3	5	16