

THE KAVERY ENGINEERING COLLEGE
(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, NOV /DEC 2024

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.	Sketch the signal $x[n] = u[n] - u[n - 5]$.	RE	1	2
2.	Define symmetric and anti-symmetric signals.	RE	1	2
3.	The function $x(t)$ is defined as, $x(t) = u(t) - u(t-2)$. Calculate $X(s)$.	AP	2	2
4.	Define Parseval's relation for CT periodic signals	RE	2	2
5.	Find the unit step response of a CT LTI system for the given $h(t) = e^{-2t}u(t)$.	UN	3	2
6.	List the properties for convolution integral.	BTL1	3	2
7.	State Sampling theorem.	RE	4	2
8.	Infer about the convolution property of Z-transform.	AP	4	2
9.	Is the discrete time system described by the difference equation $y(n) = x(-n)$ is causal?	UN	5	2
10.	Determine the system function of the discrete time system described by the difference equation, $y(n) = 0.5y(n-1) + x(n)$.	AP	5	2

PART - B (ANSWER ALL QUESTIONS) (Marks 5*13 = 65)

Q.No	Questions	BLT	CO	Marks
11.	a Identify 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) $y(t) = \frac{d}{dt} x(t)$ Or b Classify the following signals as energy, power signals or neither and find the corresponding value. (i) $x(t) = e^{-2t} u(t)$ (ii) $x(n) = - (0.5)^n u(n)$ (iii) $x(t) = e^{j(3t + \pi/4)}$	AN	1	13

12.	a i	Estimate the Fourier Transform of $x(t) = 1 - e^{- t } \cos \omega t$.	UN	2	7
	ii	Derive the Fourier Transform of Rectangular pulse and sketch the signal.	UN	2	6
Or					
	b i	Find the Fourier transform of $x(t) = e^{-at} u(-t)$ (6)	UN	2	6
	ii	Determine the Fourier series representation of the signal $x(t) = 2 + \cos(4t) + \sin(6t)$	UN	2	7
13.	a	The input-output of a causal LTI system is related by the differential equation $\frac{d^2 y(t)}{dt^2} + \frac{6dy(t)}{dt} + 8y(t) = 2x(t)$. (i) Determine the impulse response of $h(t)$.	AN	3	13
	Or				
	b	Examine the impulse response and step response of the system $H(s) = \frac{s+4}{s^2+5s+6}$	AN	3	13
14.	a	Deduce the DTFT of the rectangular pulse sequence shown below and also plot the spectrum.	AN	4	13
	Or				
	b	Solve for the Z-transform of $x(n) = (2/3)^n u(n) + (-1/2)^n u(n)$.	AN	4	13
15.	a	Determine the impulse response of the discrete time system described by the difference equation $y(n-2) - 3y(n-1) + 2y(n) = x(n-1)$.	AP	5	13
	Or				
	b	Consider a DT LTI system whose system function $H(Z)$ is given by $H(Z) = \frac{Z}{Z-0.5}$: $ z > 0.5$. Find the step response of the system.	AP	5	13

PART - C (Marks 1*15 = 15)

Q.No	Questions		BLT	CO	Marks
16.	a	Check and classify whether the following systems are static/dynamic, linear/non-linear, time-invariant or time-variant, and causal or noncausal. (i) $y(n) = 2x(n) + 1x(n-1)$ (ii) $y(n) = x^2(n) + 1x^2(n-1)$	UN	2	15
	Or				
	b	Determine the Fourier transform of $x(t) = e^{-2 t } u(t)$ and plot the Fourier spectrum.	UN	2	15