PVP 23

Code: 23ES1303

II B.Tech - I Semester – Regular Examinations - DECEMBER 2024

SIGNALS AND SYSTEMS
(ELECTRONICS & COMMUNICATION ENGINEERING)

Duration: 3 hours Max. Marks: 70

Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.
4. All parts of Question paper must be answered in one place.

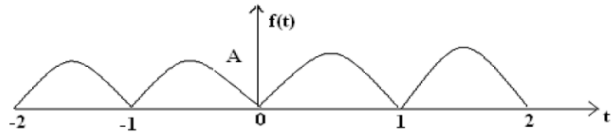
BL – Blooms Level CO – Course Outcome

PART – A

		BL	CO
1. a)	Find the energy of the signal e^{-2t} u (t).	L2	CO1
b)	Identify whether the given system is causal y [n] = 3x[n – 5]+3x[n + 1].	L2	CO1
c)	List the steps to compute convolution integral.	L1	CO2
d)	State the Causality and Stability for LTI Systems.	L2	CO2
e)	State Parseval's relation for continuous time periodic signals.	L2	CO3
f)	Find the Fourier transform of the unit impulse.	L2	CO3
g)	State Convolution Property and Integration in the Time Domain property of Laplace transform.	L2	CO4
h)	Indicate ROC of Laplace transform of the function $x(t) = e^{t}u(t)$	L2	CO4
i)	According to Time shifting property of z-transform, if X(Z) is the z-transform of x[n] then find the z-transform of $x[n-k_0]$?	L2	CO4
j)	Find the Z -transform of the signal and its associated ROC x[n] = {2, -1, 4, 0, 2, 1}	L2	CO4

PART – B

			BL	CO	Max. Marks
UNIT-I					
2	a)	Identify whether the following system is linear, causal, time invariant and dynamic. $y(t) = x^2(t)$	L2	CO1	4 M
	b)	Describe through examples, the classification of signals.	L2	CO1	6 M
OR					
3	a)	Define and sketch an impulse function and also discuss the properties.	L2	CO1	5 M
	b)	Develop and sketch the even and odd components of the signal $x(t) = e^{j4t}$.	L3	CO1	5 M
UNIT-II					
4	a)	What is an LTI system? Derive the properties of discrete time LTI system.	L3	CO2	5 M
	b)	Compute the convolution of the signals $x_1(t) = e^{-2t}\,u(t)$ and $x_2(t) = u(t-1)$.	L3	CO2	5 M
OR					
5	a)	Evaluate the causality and stability of the system with response $h(t) = e^{-t}\,u(t)$.	L4	CO2	4 M
	b)	The LTI system with impulse response $h(t) = e^{-t}\,u(t)$ for an input $x(t) = e^{-2t}\,u(t)$. Find the output y(t).	L4	CO2	6 M
UNIT-III					
6	a)	List and discuss the properties of Fourier series.	L2	CO3	5 M

	b)	Determine the Exponential Fourier series for the rectified Sine wave as shown in figure.  	L3	CO3	5 M
OR					
7	a)	State and prove the following Fourier transform properties: i) Convolution in time domain ii) time shifting	L2	CO3	5 M
	b)	Compute the Fourier transform of each of the following signal $x(t) = [e^{-at}\cos\omega_o t]\, u(t), \quad a > 0$	L3	CO3	5 M
UNIT-IV					
8	a)	Explain the properties of ROC for various classes of signals of Laplace transform.	L4	CO4	6 M
	b)	Determine the Laplace transform of $x(t) = te^{-at}u(t)$ and indicate its ROC.	L3	CO4	4 M
OR					
9	a)	Define bilateral and unilateral Laplace transform and state any five properties of Laplace transform including ROC.	L2	CO4	5 M
	b)	Determine x(t) for the following conditions if X(s) is given by $X(s) = \frac{1}{(s+3)(s+5)}$ i. x(t) is right-sided ii. x(t) is left-sided	L3	CO4	5 M

UNIT-V					
10	a)	Explain the properties of the region of convergence of X(z).	L4	CO4	5 M
	b)	Discuss in detail about the double sided and single sided Z-transform. Correlate Fourier transform and Z transform in their end use.	L4	CO4	5 M
OR					
11	a)	State and prove the following properties of Z-transform. i) Differentiation in the Z-Domain ii) Multiplication by an exponential sequence.	L2	CO4	5 M
	b)	Formulate the Z transform and prepare the pole zero plot with ROC (i) $x[n] = (0.5)^n u[n] - (1/3)^n u[n]$. (ii) $x[n] = \sin(\omega_0 n)u[n]$	L6	CO4	5 M