



B.Tech III Semester Regular Examinations, February 2024

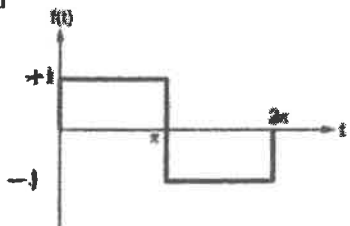
SIGNALS AND SYSTEMS
((ELECTRONICS & COMMUNICATION ENGINEERING))

Maximum Marks: 60

Date: 26.02.2024 Duration: 3 hours

- Note:**
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A		CO	Bloom Tx
All the following questions carry equal marks (10x1M=10 Marks)			
a)	Define continuous time complex exponential signal.	CO1	L1
b)	Determine whether the following systems are causal or not $y(n) = \sin x(n)$	CO1	L3
c)	State the Dirichlet's conditions.	CO2	L2
d)	Give the sufficient condition for the existence of Fourier transform.	CO2	L2
e)	Determine initial value and final value of the following signal $X(S) = \frac{1}{S(S+2)}$	CO3	L3
f)	What are the effects of aliasing?	CO3	L1
g)	Mention the difference between cross-correlation and autocorrelation function.	CO4	L2
h)	State Parseval's energy theorem.	CO4	L1
i)	What do you understand by the term signal bandwidth?	CO5	L2
j)	Write a note on Properties of state transition matrix.	CO5	L1
Part-B			
Answer All the following questions. (5X10M=50Marks)		CO	Bloom Tx level
2	Examine which of the signals are causal or non-causal. [10] (i) $x(t) = e^{2t} u(t-1)$ (ii) $x(t) = 3 \text{ sinc } 2t$ (iii) $x(n) = u(n+4) - u(n-2)$ (iv) $x(n) = u(n)$ (v) $x(n) = u(n^2)$	CO1	L4

	OR		
3	Figure shows a square wave. Represent this signal by <i>sint</i>. Plot an error in this representation. [10] 	CO1	L5
4	Derive the expressions for the trigonometric Fourier series coefficients. [10]	CO2	L5
	OR		
5	State and prove any two properties of Continuous time Fourier transform. [10]	CO2	L3
6	Consider a stable LTI System characterized by the differential equation $dy(t)/dt + 2y(t) = x(t)$. Apply Laplace transform and find its impulse response also comment on its ROC. [10]	CO3	L3
	OR		
7	a. What is aliasing? What can be done to reduce aliasing? [5] b. Find the Nyquist rate and Nyquist interval for the continuous-time signal given below: [5] $x(t) = \frac{1}{2\pi} \cos(4000\pi t) \cos(1000\pi t)$	CO3	L4
8	a. List the steps involved in performing convolution operation using graphical method. [5] b. Verify Parseval's theorem for the energy signal $x(t) = e^{-4t} u(t)$. [5]	CO4	L4
	OR		
9	a. Show that $R(r)$ and ESD form Fourier transform pair. [5] b. Distinguish between ESD and PSD. [5]	CO4	L4
10	Explain the Filter characteristics of linear systems with neat diagram. [10]	CO5	L3
	OR		
11	Derive the transfer function from state model. [10]	CO5	L3