

Satyug Darshan Institute of Technology, Faridabad

Programme: Btech

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Subject Name : Signal and System

Subject Code: ESC-501

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Unit -1

Short Questions

S. No.	Questions	Bloom Taxonomy
1	Define signal	KL1
2	Differentiate between i) Deterministic and Random signal, ii) power and energy signal	KL1
3	Define basic signals or singular function	KL1
4	Derive the relation between CTS signal $\delta(t)$, $r(t)$ and $u(t)$	KL1
5	Plot the signal for example $2u(t+2)-2u(t-3)$	KL1
6	State the two properties of impulse function	KL1
7	Distinguish between continuous time and discrete time signals.	KL1
8	Define the term periodicity and absolute integrability.	KL1
9	List commonly seen signals in everyday life and in various branches of science and engg.	KL1
10	Define the stochastic properties of signal.	KL1
11	Explain realizability.	KL1
12	Explain recursive and non-recursive system.	KL1
13	Explain invertible system.	KL2
14	Explain the homogeneity and additive property of linearity.	KL2
15	Explain the term invertible system.	KL1

Long Questions

S. No.	Questions	Bloom Taxonomy
1	Determine whether the signal is periodic or not (a) $x(n) = \sin 24\pi n$ (b) $x(t) = e^{j2t} + e^{j4\pi t}$	KL3
2	Define system. Explain the classification of system in brief	KL2
3	Write the state space equation for linear time invariant discrete time system.	KL2
4	Check whether the following systems are linear. $(a) F[x(n)] = a n x(n) + b$ $(b) F[x(n)] = e^{x(n)}$	KL3

5	Check whether the following digital systems BIBO stable or not. (a) $y(n) = ax^2(n)$ (b) $y(n) = ax(n) + b$ (c) $y(n) = e^{-x(n)}$ (d) $y(n) = ax(n+1) + b x(n-1)$ (e) $y(n) = ax(n) \cdot x(n-1)$ (f) $y(n) = \max. \text{ of } [x(n), x(n-1), x(n-2)]$ (g) $y(n) = \text{average of } [x(n+1) + x(n) + x(n-1)]$ (h) $y(n) = ax(n) + bx^2(n-1)$	KL3
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Unit -2

Short Questions

S. No.	Questions	Bloom Taxonomy
1	Define causality	KL1
2	Discuss the role of transition matrix in state space analysis	KL1
3	Define state, state variable, state vector and state space	KL1
4	Write the advantages of state transition matrix	KL2
5	Represent the sequence $x(n)$ in terms of weighted impulse signal where $x(n)=\{1,2,3,4\}$	KL2

Unit -2

Long Questions

S. No.	Questions	Bloom Taxonomy
1	Find the time response of the system described by the equation $\dot{x}(t) = \begin{bmatrix} -1 & 1 \\ 0 & -2 \end{bmatrix} x(t) + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(t)$ $x(0) = \begin{bmatrix} -1 \\ 0 \end{bmatrix}, u(t) = 1, t > 0$	KL3
2	Consider the following matrix $\dot{x} = \begin{bmatrix} 0 & 1 \\ -6 & -5 \end{bmatrix} x(0) = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$ Find the state transition matrix, also determine $x(t)$	KL3
3	(a) Write the properties of transition matrix. (b) If $A = \begin{bmatrix} 0 & 1 \\ -6 & -5 \end{bmatrix}; B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}; C = [0 \ 1]$ Determine $\phi(t)$.	KL3

Unit -3

Short Questions

1	Derive the relation between i) FT and LT ii) DFT and ZT.	KL2
2	Distinguish between Fourier series and Fourier Transform.	KL2

3	State and explain Parseval's theorem	KL2
4	Write the properties of ROC for LT and ZT.	KL1
5	State the importance of ROC.	KL1
6	Write the condition for existence or Dirichlet's condition for Fourier series, Fourier Transform, Laplace Transform and Z-transform.	KL1
7	Why ROC consist of stripes of the s-plane parallel to jw axis	KL1

Unit -3

Long Questions

S. No.	Questions	Bloom Taxonomy
1	Define the term step response, convolution and difference equation. Also explain the concept of causality and stability.	KL2
2	Derive the condition for stability of continuous /discrete linear time invariant system.	KL3
3	Numerical related to:i) state space analysis ii) Convolution(DTS and CTS).	KL3
4	The impulse response of two system is unit step. The two system are in cascade connection. Find the impulse response of overall system.	KL2
5	Find the response of $y(t)$ for the given input signal $x(t)=u(t)$ and $h(t)=\delta(t-1)$	KL3
6	Find the convolution of the following sequences using the graphical method. $x(n)=3\delta(n+1)-2\delta(n-1)+4\delta(n-2)$ and $h(n)=2\delta(n-1)+5\delta(n-2)+3\delta(n-3)$	KL3
7	Write any two application of DFT.	KL2
8	Define Fourier Transform Pair.	KL1
9	Define ROC and need of ROC	KL1

Long Questions

S. No.	Questions	Bloom Taxonomy
1	Write the condition for existence of Fourier series. Explain the trigonometric form of Fourier series representation of a periodic signal with example.	KL2
2	Find the Fourier series representation of impulse signal	KL3
3	List out the properties of Fourier series, Fourier Transform, Laplace Transform and Z-transform.(Statement and Proof).	KL2
4	What is the purpose of Fourier Series and Fourier transform?	KL1
5	Find the inverse Z-transform of the following $X(Z)=1/[1-1.5Z^{-1}+0.5Z^{-2}]$ If (a) $ROC z >1$; (b) $ROC Z <0.5$ and (C) $0.5< Z <1$	KL3
6	Solve the following second-order linear differential equation. Given that input $x(t)=e^{-4t}u(t)$ and $y(0)=2, (dy(0-))/dt=1$ and $(d^2y(t))/[dt]^2 + 5(dy(t))/(dt) + 6y(t) = (dx(t))/dt + x(t)$	KL3
7	Compute the 3-point DFT of the sequence $x(n)=\{1,2,3\}$	KL3
8	Find the Fourier transform of the following signal $x(n)=x(1-n)+x(-1-n)$	KL2

Unit-4

Short Questions

S. No.	Questions	Bloom Taxonomy
1	Define aliasing.How it can be avoided?	KL1
2	Define pre-aliasing filter.	KL1
3	State and explain the sampling theorem and its implications.	KL1

4	List out the application of sampling theorem	KL1
5	Define sampling rate and sampling period.	KL1
6	List out the application of sampling theorem	KL1
Long Questions		
S. No.	Questions	Bloom Taxonomy
1	Explain the methods used to reconstruct of analog signal from sampled signal.	KL2
2	Discuss the application of signal and system in communication system and control system.	KL2
3	Discuss the relation between Continuous time and discrete time system	KL3
4	We want to digitize and store a signal on a CD, and then reconstruct it at a later time. Let the signal $x(t)$ be $x(t) = 2 \cos(500\pi t) - 3 \sin(1000\pi t) + \cos(1500\pi t)$, and let the sampling frequency be $F = 2000$ Hz. a. Determine the continuous time signal $y(t)$ after the reconstruction. b. Notice that $y(t)$ is not exactly equal to $x(t)$. How could you reconstruct the signal $x(t)$ exactly from its samples $x[n]$?	KL3
5	Explain sampling theorem.	KL2
6	Determine the Nyquist rate and Nyquist interval of the signal $x(t) = \cos 200\pi t + \sin 400\pi t$.	KL2



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