

Department of Computer Science & Engineering
School of Engineering Sciences & technology
Jamia Hamdard
Odd Semester Examination 2022

Time: 3 Hrs.

Marks: 75

Subject Name: Signals and Systems

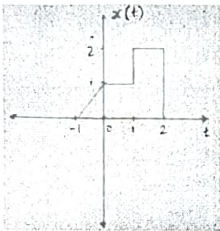
Subject Code: BTCSE 501

Note: Please do proper numbering of Attempted Question. Use of calculator is not allowed.

Section A

Note: All the Questions are Compulsory. Each question carry equal marks

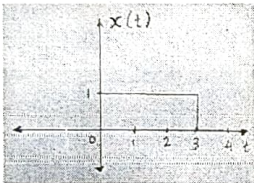
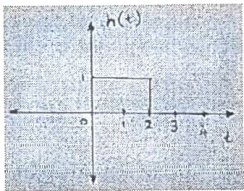
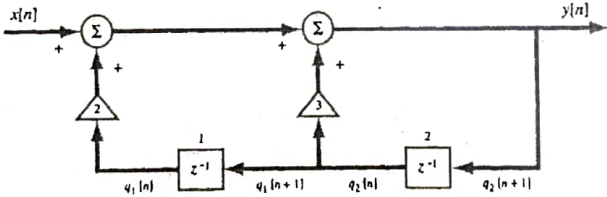
[7 x 5 marks = 35 marks]

Q.No	Question	CO	BL
Q1.	From the given signal below, sketch the following signal transformations a) $x(t+3)$, b) $x(1.5t)$, c) $x(0.5t)$, d) $0.5x(0.5t)$, and e) $x(2t+3)$ 	CO1	L2
Q2.	Discuss the initial value and final value theorem of Laplace Transform with proof. Find the IVT and FVT for the given $F[S]$ $F[S] = \frac{2(S+2)}{s(S+1)(S+3)}$	CO4	L3
Q3.	For any given continuous signal, what is the process of transforming it into a discrete time signal? What is the concept of aliasing and what are its effect during reconstruction of the signal. What will be the Nyquist Sampling interval for a signal $x(t) = \text{Sinc}(700t) + \text{Sinc}(500t)$	CO5	L1 L4
Q4.	Determine whether the given signals are energy or power signals a) $x(t) = e^{-at}u(t), a > 0$ b) $x(t) = A \cos(\omega t + \theta)$	CO2	L4
Q5.	Consider a continuous time system with input-output relationship given by the following equation. Determine whether the system is a) Linear b) Time Invariant $y(t) = \sum_{k=-\infty}^{\infty} x(t) \delta(t - KT_s)$	CO1	L4
Q6.	What is the significance of region of convergence in Z-Transform? Explain with the help of a suitable example.	CO4	L2
Q7.	For a continuous system, whose impulse response, $h(t) = e^{-\beta t}u(t)$ and input $x(t) = e^{-\beta t}u(-t)$, Find the output of the system.	CO3	L5

Section B

Note: Attempt any four questions. Each question carry equal marks

[4 x 10 marks = 40 marks]

Q. No	Question	CO	BL
Q1.	Find the Fourier series representation of the function given below $f(x) = e^{ax} \quad ; -\pi < x < \pi$	CO4	L3
Q2.	Check whether the given systems $y(n) = a^n x(n)$ (i) Time variant or Time invariant (ii) Causal or Non Causal	CO1	L3 L4
Q3.	For the given systems, find the ROC and discuss the stability of the system a) $x[n] = (0.5)^n u[n] + (0.33)^n u[n]$ b) $x[n] = a^{n+1} u[n+1]$ c) $x[n] = na^n u[n]$	CO3	L5 L4
Q4.	Using the given waveforms, determine the convolution of both the waveforms using mathematical and graphical method.   Signal x(t) Signal h(t)	CO2	L3 L5
Q5.	Consider the discrete time LTI Systyem as shown in figure, find the state space representation of the system by choosing the output of units delay element 1 and 2 as state variables $q_1(n)$ and $q_2(n)$ respectively. Find the state space transition matrix of the sysetem. 	CO5	L2 L5
Q6.	(a) Find the Inverse Laplace Transform of the following signal $F(S) = \frac{5S + 13}{s(S^2 + 4S + 13)}$ b) Find the Inverse Z Transform of the given signal $X(Z) = \frac{(1 + Z^{-1})}{1 - Z^{-1} + 0.5 Z^{-2}}, \text{ROZ } Z > 1$	CO4	L5

BL – Bloom's Taxonomy Levels (1- Remembering, 2- Understanding, 3- Applying, 4- Analyzing, 5- Evaluating, 6- Creating)

CO-Course Outcomes