JAMIA HAMDARD
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New Delhi – 110062
Supplementary Examination Odd Semester Examination 2023

Paper Name: Signals and Systems
Time: 3 Hours

Paper Code: BTCSE501/BTCSE501 (Lateral Entry)
Maximum Marks: 75

CO1. Knowledge about Basic Signal and System Modeling Concept and Definitions.
CO2. Knowledge about system Properties and their mathematical analysis.
CO3. Knowledge about Fourier series and Frequency domain analysis of signals.
CO4. Knowledge about Transformation analysis of signals in continuous domain and in discrete domain.
CO5. Knowledge about the application and use of Mathematical Transforms and State-Variables in order to solve Electrical Engineering Problems.

Follow proper numbering for answering the questions.

Section-A

All questions are compulsory in this Section

QN		Marks	CO	BL
1.	Define following properties with examples (i) Causal and Non-Causal (ii) Linearity and Non-Linearity	5	1	L3
2.	Explain Energy signals and Power Signals with example $x(n) = ACos(w_o n)\, U(n)$	5	3	L2
3.	Consider an LTI system whose response to the input $x(n) = a^n U(n)$ and Output response $y(n) = U(n)$ Determine the system's impulse response.	5	2	L2
4.	For an LTI System $H(s) = \frac{s+2}{s^2+7s+12}$, find its inverse Laplace transform?	5	4	L4
5.	Find the Fourier transform of the given signal $x(n) = -a^n u(n-1)$	5	3	L1
6.	Find the DTFT of the sequence $x(n) = (\frac{1}{3})^n u(n+2)$ and determine magnitude and phase spectrum.	5	4	L4
7.	Find the Z Transform of the given signal along with the ROC $x(n) = n\, Sin\left(\frac{\pi}{2} n\right) u(n)$	5	5	L3

	Attempt any **FOUR** Questions from this Section			
1.	Let $f(x)$ *be a function of Period* 2π *such that* $f(x) = \begin{cases} 1, & -\pi < x < 0 \\ 0, & 0 < x < \pi \end{cases}$ (a) Sketch a graph of f(x) in interval $-2\pi < x < 2\pi$ (b) Show that the Fourier series equation of f(x) in the interval $\pi < x < \pi$	10	1	L5
2.	Find the convolution output y[n] of the given system, where $x[n] = a^n u(n)$ and $h[n] = \delta(n) - a\delta(n-1)$	10	2	L3
3.	Use the defining equation for the FT to evaluate the frequency-domain representations for the following signals: i) X(t)= e^{-2t}u(t-3) ii) X(t)= e^{-4t} Sketch the magnitude and phase spectra.	10	4	L6
4.	Determine the Laplace Transform of $x(t) = e^{-at}[u(t) - u(t-10)]$	10	3	L6
5.	Determine the Inverse Z. Transform of the following equation by Partial fraction expansion method X(Z)= $\frac{Z+2}{2Z^2-7Z+3}$	10	3	L5
6.	Write Short Notes on any two: (i) Duality Property in Fourier Transform (ii) Parseval's theorem (iii) Drichlet's Condition (iv) State Space Matrix	10	2,3,5	L4

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

CO- Course Outcomes