Model Question Paper-1/2 with effect from 2022-23 (CBCS Scheme)

USN | | | | | | | | | | |

Fourth Semester B.E. Degree Examination
Subject Title: Signal Processing

TIME: 03 Hours **Max. Marks: 100**

Note: 01. 02. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

		Module -1	*Bloom's Taxonomy Level	CO's	Marks
Q.01	a	With the help of neat block diagram explain the basic elements of digital signal processing system	L2	CO1	10
	b	Explain the classification of signals with examples	L2	CO1	10
		OR			
Q.02	a	Explain the concept of frequency in continuous time discrete time signals	L2	CO1	10
	b	Explain with neat diagram analog to digital Conversion process. Also discuss the importance of sampling of analog signal	L2	CO1	10
		Module-2			
Q. 03	a	Explain the block diagram representation of discrete time system and determine the response of the system for the following input signal $x(n) = \begin{cases} \|n\| & -3 \le n \le 3 \\ 0 & otherwise \end{cases}$ i)$y(n) = \frac{1}{3}[x(n+1) + x(n) + x(n-1)]$ ii) $y(n) = max[x(n+1).x(n).x(n-1)]$	L2	CO2	10
	b	Explain the resolution of the discrete time signal in to impulses. Determine the response of the system to the input signal $x(n) = \{1,2,3,1\}$ for the impulse response of the system $h(n) = \{1,2,1,-1\}$	L3	CO2	10
		OR			
Q.04	a	Explain the classification of discrete time systems with example and determine if the systems described by the following input-output equations are linear or nonlinear. i) $y(n) = nx(n)$ ii) $y(n) = Ax(n) + B$	L3	CO2	10
	b	Explain theProperties of Convolution Sum and Interconnection of LTI systems with example	L3	CO2	10
		Module-3			
Q. 05	a	What is z transform explain its properties with example	L3	CO3	10
	b	Determine the z-transform of the signals (a) $x(n) = (\cos \omega_o n)u(n)$ (b) $x(n) = (\sin \omega_o n)u(n)$	L3	CO3	10
		OR			
Q. 06	a	Explain inverse z transform by partial fraction expansion with example	L2	CO3	10

	b	Determine the inverse z-transform of $X(Z) = \frac{1}{1-1.5z^{-1}+0.5z^{-2}}$ for i) ROC: $\|z\| > 1$ ii)ROC: $\|z\| < 0.5$	L2	CO3	10
Module-4					
Q. 07	a	What is FIR filters and explain the Characteristics of Practical Frequency-SelectiveFilters	L3	CO4	10
	b	Determine the coefficients of a linear-phase FIR filter of length M=15 which has asymmetric unit sample response and a frequency response that satisfies the conditions $H_r(n) = \begin{cases} 1 & k = 0,1,2,3 \\ 0.4 & k = 4 \\ 0 & k = 5,6,7 \end{cases}$	L3	CO4	10
OR					
Q. 08	a	Explain Design of FIR differentiators with necessary equations	L3	CO4	10
	b	Design a bandpass filter of length $M = 32$ with passband edge frequencies $f_{p1} = 0.2$and $f_{p2} = 0.35$ and stopbandedge frequenciesof$f_{s1} = 0.1$ and $f_{s2} = 0.425$.	L3	CO4	10
Module-5					
Q. 09	a	Explain steps involved in designing IIR filter using bilinear transformation	L3	CO4	10
	b	Convert the analog filter with system function $H(S) = \frac{s + 0.1}{(S + 0.1)^2 + 16}$ into a digital IIR filter by means of the bilinear transformation. The digital filter isto have a resonant frequency of $\omega_r = \pi/2$	L3	CO4	10
OR					
Q. 10	a	Explain the characteristics commonly used Analog filters with necessary equations	L3	CO4	10
	b	Determine the order and the poles of a type I lowpassChebyshev filter that has a1-dB ripple in the passband, a cutoff frequency $\Omega_p = 1000\pi$, a stopband frequency of 2000π, and an attenuation of 40 dB or more for $\Omega \geq \Omega s$.	L3	CO4	10

*Bloom's Taxonomy Level: Indicate as L1, L2, L3, L4, etc. It is also desirable to indicate the COs and POs to be attained by every bit of questions.