U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

April 2024 Semester End Main Examinations

Programme: B.E. **Semester: III**
Branch: Electronics and Telecommunication Engineering **Duration: 3 hrs.**
Course Code: 22ET3PCSSA **Max Marks: 100**
Course: Signals and Systems: Analog

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			UNIT - I	CO	PO	Marks
1	a)		Classify the signals and give one example each	CO1	-	**10**
	b)		(i) A signal is given by $x(t) = 2\cos(\pi t)$. Find the fundamental time period (ii) A signal is given by $x(t) = \begin{cases} 1; 0 \le t \le 1 \\ 0; otherwise \end{cases}$. Determine energy or power. (iii) A signal is defined by $x(t) = 1 + t + t^2$. Determine its even and odd components.	CO2	PO1	**10**
			UNIT - II			
2	a)		Prove that $x(t) * h(t) = h(t) * x(t)$ for convolution integral. Where x(t) is the input signal and h(t) is the impulse response of the system.	CO1	-	**08**
	b)		convolute the following signals $x_1(t) = e^{-2t}u(t)$ $x_2(t) = u(t+2)$	CO2	PO1	**12**
			OR			
3	a)		Prove that $x(t) * [h_1(t) + h_2(t)] = x(t) * h_1(t) + x(t) * h_2(t)$ for convolution integral. Where x(t) is the input signal and h(t) are the impulse responses of the systems.	CO1	-	**08**
	b)		convolute the following signals $x_1(t) = \cos \pi t[u(t+1) - u(t-3)]$ $x_2(t) = u(t)$	CO2	PO1	**12**
			UNIT - III			
4	a)		Find the Fourier transform of $x(t) = e^{-2t}u(t)$. Also sketch the magnitude and phase spectrum	CO2	PO1	**10**

		b)	State and prove the following properties for Fourier Transform (i) linearity property (ii) Time shift property	*CO1*	-	**10**
			OR			
	5	a)	State Dirichlet's conditions for a function to be expanded as a Fourier series.	*CO1*	-	**04**
		b)	State and prove Parsevals Theorem for Fourier Series	*CO1*	-	**06**
		c)	Evaluate Fourier Series coefficients and draw the spectrum for $x(t) = \sin 2\pi t + \cos 3\pi t$	*CO2*	*PO1*	**10**
			UNIT - IV			
	6	a)	Draw the DF-I and DF-II structures for the following system $\frac{d^3}{dt^3} y(t) + 2\frac{d}{dt} y(t) + 3y(t) = x(t) + 3\frac{d}{dt} x(t)$	*CO2*	*PO1*	**10**
		b)	Draw the circuit for RC first order low pass filter and find the following. (i) Transfer Function (ii) Impulse response (iii) Frequency response (iv) Pole-Zero plot	*CO2*	*PO1*	**10**
			UNIT - V			
	7	a)	Design a Butterworth filter with maximally flat response in passband and an acceptable attenuation of -2dB at 20 radians/second. The attenuation in the stopband should be more than 10dB beyond 30 radians/second.	*CO3*	*PO3*	**10**
		b)	Describe analog frequency transformations with relevant equations and examples	*CO1*	-	**10**

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