U.S.N.										

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

Autonomous Institute Affiliated to VTU

October 2024 Supplementary Examinations

Programme: B.E. **Semester: VI**
Branch: Electrical and Electronics Engineering **Duration: 3 hrs.**
Course Code: 22EE6PCSIP **Max Marks: 100**
Course: Signal Processing

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.

			CO	PO	Marks
		UNIT - I			
1	a)	Analyze and Evaluate the average power or energy of the following signals after determining whether they are Energy or Power signals. $i).\ x(n) = u(n), ii).\ x(n) = e^{j[(\frac{\pi}{3})n+\frac{\pi}{2}]}$	*CO1*	*PO1*	**04**
	b)	Analyze and sketch the following the DT signal operation of: x(n):{1 -1 **2** 0 1 1 4}; **2**=origin **i).**x(-n-2); **ii).**x(-2n-2); **iii)**. x(-n+3)	*CO2*	*PO2*	**06**
	c)	Design an LTI system, If x(n) = {[1 **1** 0 2] (**1**=origin} and y(n)={[2 4 **6** 12 16 L M N](**6**=origin)}. Analyses and develop the DT convolution sum of the signal, evaluate L M &N and also verify by tabular Convolution method.	*CO2*	*PO2*	**10**
		OR			
2	a)	What are independent signal operation with examples	*CO1*	*PO1*	**04**
	b)	What are types properties of systems explain with examples	*CO1*	*PO1*	**06**
	c)	If x(n)={1 **2** 0 3};2=origin and output: y(n)={1 4 **5** 10 22 P Q R}; 5=Origin, Analyses and evaluate the impulse function of h(n) and also values of PQR.	*CO2*	*PO2*	**10**
		UNIT - II			
3	a)	Evaluate & Analyses the z-transform using appropriate property: $\boldsymbol{x(n) = \frac{1}{3}(n^2 - n)\left(\frac{1}{2}\right)^{n-1} u(n-1)}$	*CO2*	*PO2*	**06**
	b)	Analyze and perform the following on the sequence x(n)={1 2 3 1}& h(n) ={1 1 1 } (i): Linear convolution; (ii): Circular convolution; (iii): Linear convolution using circular convolution.	*CO2*	*PO2*	**07**
	c)	Analyze and Evaluate the linear filtering using DFT &IDFT by overlap save method for h(n) and x(n) given below: h(n)={1 1 1 }& x(n)={3 -1 0 1 3 2 0 1 2 1 }	*CO2*	*PO2*	**07**

			UNIT - III			
	4	a)	Develop an 8 point DIT-FFT algorithm, draw the signal flow graph. Evaluate the DFT of the following sequence: x(n)={1 1 1 1 0 0 0 0},using the signal flow graph show all the intermediate results on the signal flow graph.	*CO2*	*PO2*	**12**
		b)	Realize the following system function by IIR structure: i). Direct-Form-II & ii). Cascaded Form: $H(z) = \frac{Y(z)}{X(z)} = \frac{8z^3 - 4z^2 - 11z - 2}{(z - 0.25)(z^2 - z + 0.5)}$	*CO2*	*PO2*	**08**
			OR			
	5	a)	Develop an 8 point DIF-FFT algorithm, draw the signal flow graph. Evaluate the DIF of the following sequence x(n)={2 1 2 1 }using the signal flow graph show all the intermediate results on the signal flow graph.	*CO2*	*PO2*	**12**
		b)	Realize the following system function by linear phase FIR structure: $i).H(z) = 1 + \frac{1}{2}z^{-1} + \frac{1}{3}z^{-2} + \frac{1}{7}z^{-3} + \frac{1}{3}z^{-4} + \frac{1}{2}z^{-5} + z^{-6}$ $ii).H(z) = 1 + \frac{1}{3}z^{-1} + \frac{1}{4}z^{-2} + \frac{1}{4}z^{-3} + \frac{1}{3}z^{-4} + z^{-5}$	*CO2*	*PO2*	**08**
			UNIT - IV			
	6	a)	Design butter-worth filter for the following specifications: $0.8 \le \lvert H_a(s)\rvert \le 1$ for $0 \le F \le 1000$ Hz; & $\lvert H_a(s)\rvert \le 0.2$ for $F \ge 5000$ Hz	*CO3*	*PO3*	**10**
		b)	Design the Chebyshev filter with specification: A_p=2.5dB; Ω_p=20 rad/sec; A_s =30dB;Ω_s=50 rad/sec.	*CO3*	*PO3*	**10**
			UNIT - V			
	7	a)	Design a FIR digital filter with the following desired specification using a Hanning window with N=7 $H(\Omega)_d = \begin{cases} e^{-3jw} & \frac{-\pi}{4} \le \lvert w\rvert \le \frac{\pi}{4} \\ 0 & \frac{\pi}{4} \le \lvert w\rvert \le \pi \end{cases}$	*CO3*	*PO3*	**10**
		b)	Design a FIR digital filter with the following desired specification using a frequency sampling method with N=7: $H(w)_d = \begin{cases} e^{-j3w} & 0 \le \lvert w\rvert \le \frac{\pi}{2} \\ 0 & \frac{\pi}{4} \le \lvert w\rvert \le \pi \end{cases}$	*CO3*	*PO3*	**10**

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