PVP 20

Code: 20EC3601

III B.Tech - II Semester – Regular Examinations – JUNE 2023

DIGITAL SIGNAL PROCESSING
(ELECTRONICS & COMMUNCIATION ENGINEERING)

Duration: 3 hours Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

BL – Blooms Level CO – Course Outcome

			BL	CO	Max. Marks
		UNIT-I			
1		Determine the stability of the system $\mathbf{y(n) - \frac{5}{2}y(n-1) + y(n-2) = x(n) - x(n-1)}$ and also sketch the Pole-zero plot.	L4	CO1, CO2	14 M
		OR			
2		Determine the frequency response $H(e^{j\omega})$ for the system and plot magnitude and phase response. $$\boldsymbol{y(n) + \frac{1}{4}y(n-1) = x(n) - x(n-1)}$$	L4	CO1, CO2	14 M
		UNIT-II			
3		Find the 8- point DFT of the sequence $\boldsymbol{x(n) = \{1, 2, 3, 4, 4, 3, 2, 1\}}$ using radix 2 DIF- FFT algorithm.	L3	CO1, CO5	14 M
		OR			

4	Find the circular convolution of the sequences $\boldsymbol{x_1(n) = \{1, -1, 2, 3\}}$; $\boldsymbol{x_2(n) = \{0, 1, 2, 3\}}$ using DFT.	L3	CO1, CO5	14 M
	UNIT-III			
5	Design a Butterworth digital IIR low pass filter using impulse invariant transformation by taking T= 1 second, to satisfy the following specifications. $\boldsymbol{0.707 \leq \left\|H(e^{j\omega})\right\| \leq 1.0}$; $\boldsymbol{0 \leq \omega \leq 0.3\pi}$ $\boldsymbol{\left\|H(e^{j\omega})\right\| \leq 0.2}$; $\boldsymbol{0.75\pi \leq \omega \leq \pi}$	L5	CO1, CO2, CO4	14 M
	OR			
6	Design a Butterworth digital IIR low pass filter using bilinear transformation by taking T= 1 second, to satisfy the following specifications. $\boldsymbol{0.8 \leq \left\|H(e^{j\omega})\right\| \leq 1.0}$; $\boldsymbol{0 \leq \omega \leq 0.2\pi}$ $\boldsymbol{\left\|H(e^{j\omega})\right\| \leq 0.2}$; $\boldsymbol{0.32\pi \leq \omega \leq \pi}$	L5	CO1, CO2, CO4	14 M
	UNIT-IV			
7	Design an ideal high pass filter with a frequency response $$\boldsymbol{H_d(e^{j\omega}) = e^{-j\alpha\omega} \; for \; \frac{\pi}{4} \leq |\omega| \leq \pi}$$ $$\boldsymbol{= 0 \text{ for } |\omega| \leq \left|\frac{\pi}{4}\right|}$$ Find the values of h (n) for **N=11**, using Hamming window technique.	L5	CO1, CO4	14 M
	OR			

8	Obtain the Direct form I, Direct form II, Cascade form and Parallel form for the following system $\mathbf{y(n) = \frac{1}{4}y(n-1) + \frac{1}{8}y(n-2) + x(n) + x(n-1)}$	L5	CO1, CO4	14 M
	UNIT-V			
9	Explain decimation and interpolation by an integer factor with necessary equations and block diagram.	L3	CO1, CO5	14 M
	OR			
10	List out the applications of Multirate signal processing and also the role of multistage implementation of sampling rate conversion.	L3	CO1, CO5	14 M