PVP 20

Code: 20EC3601

III B.Tech - II Semester – Regular / Supplementary Examinations
APRIL 2024

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	a)	Compute the Linear convolution of the given sequences x[n] = {1, 2, 4} h[n] = {1, 1, 1, 2}	L3	CO2	7 M
	b)	Determine the response of the relaxed system characterized by the impulse response $h[n] = (0.5)^n u[n]$ and input $x[n] = (2)^n u[n]$.	L3	CO1 CO2	7 M
OR					
2		Check whether the given LTI systems are causal and stable a) $h[n] = (0.5)^n u(n)$ b) $h[n] = \delta(n) + \delta(n-1)$ c) $h[n] = (2)^n u(-n)$	L3	CO2	14 M

UNIT-II					
3	a)	State and Prove convolution and conjugate symmetry properties of DFT.	L3	CO1	7 M
	b)	Find the DFT of x(n) = {1, 2, 2, 1} and sketch the magnitude and phase spectra.	L3	CO1	7 M
OR					
4	a)	Develop 8-point radix-2 Decimation-in-Frequency FFT flow graph for N = 8.	L3	CO5	7 M
	b)	Obtain the 8 point DIT FFT of given sequence x(n) = {8, 8, 8, 0, 1, 4, 2, 3}	L3	CO5	7 M
UNIT-III					
5		Design a Butterworth filter using Bilinear Transformation method for the following specifications: $0.8 \leq \left\|H\left(e^{j\omega}\right)\right\| \leq 1 \quad 0 \leq \omega \leq 0.2\pi$ $\left\|H\left(e^{j\omega}\right)\right\| \leq 0.2 \quad 0.6\pi \leq \omega \leq \pi$	L5	CO2 CO4	14 M
OR					
6	a)	Illustrate the Impulse Invariant transformation method of obtaining digital filter from analog filter.	L3	CO2	7 M
	b)	Apply bilinear transformation to $(s) = \frac{2}{(s+1)(s+2)}$ with T=1sec and compute H(z).	L3	CO2 CO4	7 M
UNIT-IV					
7	a)	Compare IIR and FIR digital filters.	L3	CO2	4 M
	b)	Design a Low Pass FIR filter of length 9	L5	CO2	10 M

		with a cutoff frequency of 2 rad/sec using Hamming window.		CO4	
OR					
8	a)	Find the direct form - I and direct form – II realizations of a discrete time system represented by $$H(Z) = \frac{2Z^3 - 4Z^2 + 11Z - 8}{(Z-8)(Z^2 - Z + 3)}$$	L3	CO3	7 M
	b)	Explain the characteristics of rectangular window with typical sketches.	L2	CO2	7 M
UNIT-V					
9	a)	Discuss the procedure to implement digital filter bank using multirate signal processing.	L3	CO1 CO5	10 M
	b)	State the applications of multirate signal processing.	L2	CO5	4 M
OR					
10	a)	Derive the expression for the spectrum of a down sampled signal.	L3	CO1 CO5	7 M
	b)	Explain the concept of interpolation by a factor I with the help of necessary equations.	L3	CO1 CO5	7 M