Register Number:……..

KUMARAGURU college of technology
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B.E/B.TECH DEGREE EXAMINATIONS: NOV /DEC 2024

(Regulation 2018)

Fourth Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

U18ECI4201**:** Digital Signal Processing

COURSE OUTCOMES

CO1: Apply DFT algorithm for signal analysis

CO2: Design, implement and analyze IIR filter for the given specification

CO3: Design, implement and analyze FIR filter for the given specification

CO4: Compare different structures for filter implementations

CO5: Analyze the effect of finite word length

CO6: Compare DSP Processor Architectures

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

1.	Find the 4-point DFT of the sequence x(n)={1,1}.	CO1	[K_3]
2.	Sketch the basic butterfly diagram for Radix 2 DIF-FFT.	CO1	[K_2]
3.	Compare bilinear transformation and Impulse invariant method of IIR filter design.	CO2	[K_2]
4.	Generalize the comment on the passband and stopband characteristics of butterworth filter.	CO2	[K_2]
5.	The most straight forward approach to FIR filter design is to truncate the impulse response of an ideal IIR filter. Why this is usually an undesirable approach?	CO3	[K_3]
6.	Realize the direct form causal FIR filter structure for length M= 5.	CO3	[K_2]
7.	Recall the stages of pipelining.	CO6	[K_2]
8.	Differentiate between Von-Neumann and Harvard architecture.	CO6	[K_2]
9.	Express $(-7/8)_{10}$ using sign magnitude representation.	CO5	[K_3]
10.	What is the need for scaling.	CO5	[K_3]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11.	a)	Obtain 8 point DFT of the input sequence x(n)={1,1,1,1,1,1,1,1} using decimation in frequency Fast Fourier Transform algorithm.	8	CO1	[K_3]
	b)	Use 4-point inverse FFT for the DFT result {6,-2+2j,-2,-2-2j} and Evaluate the input sequence.	8	CO1	[K_3]
12.	a)	Design a butterworth filter using Bilinear transformation for the following specifications. $0.8 \leq \|H(e^{jw})\| \leq 1, 0 \leq w \leq 0.2\pi$ $\|H(e^{jw}) \leq 0.2, 0.6\ \pi \leq w \leq \pi$	8	CO2	[K_4]
	b)	Sketch the linear phase realization for the system transfer function $H(z)=1/4+2/3z^{-1}+3/4z^{-2}+3/4z^{-3}+2/3z^{-4}+1/4z^{-5}$	8	CO4	[K_4]
13.	a)	Obtain and sketch the frequency response of rectangular window & outline its characteristics.	8	CO3	[K_3]
	b)	Using a rectangular window technique design a LPF with pass band gain of unity, cut off frequency of 1000Hz and working sampling frequency of 5 KHz. The length of impulse reponse is 7.	8	CO3	[K_4]
14.	a)	Convert the analog filter with system function $H_a(s)=[s+0.1]/[(s+0.1)^2+9]$ into a digital IIR filter by means of Bilinear transformation method.	8	CO2	[K_4]
	b)	Draw the direct form I and direct form II structures for the given difference equation y(n)= 1/4y(n-1)-1/8y(n-2) + x(n) + 1/2x(n-2).	8	CO4	[K_3]
15.	a)	Summarize the types of Quantization error.	6	CO5	[K_2]
	b)	A digital system is characterized by, y(n)=0.95y(n-1)+x(n). Determine the dead band and the system when x(n)=7/8, n=0 otherwise assume 4 bit sign magnitude representation.	10	CO5	[K_2]
16.	a)	Summarize the addressing modes of digital signal processor with suitable example.	8	CO6	[K_2]
	b)	Sketch the architecture of DSPTMS320C67XX and explain each unit related to DSP algorithm.	8	CO6	[K_2]

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