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Code No. : 16412

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
B.E. (E.C.E. : CBCS) VI-Semester Main Examinations, January-2021
Digital Signal Processing

Time: 2 hours

Max. Marks: 60

Note: Answer any NINE questions in Part-A and any THREE from Part-B

Part-A (9 × 2 = 18 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	What is the impact of zero padding in frequency domain	2	2	1	2
2.	State Circular Convolution property of DFT	2	1	1	1
3.	Compare FIR filter over IIR filter	2	2	2	2
4.	Specify one disadvantage of rectangular window against Blackman window.	2	2	2	2
5.	Give the no. of multiplications in direct form I realization of IIR digital filters.	2	2	2	1
6.	Mention any two errors due to Finite word length representation of coefficients.	2	2	3	1
7.	Given the input spectrum, plot the output spectrum $Y(\omega)$. <div style="text-align: center;"> </div>	2	3	4	3
8.	If sampling frequency from $F_s = 8\text{kHz}$ has to be changed to $F_s = 12\text{kHz}$, draw the choice of Up/down sampler block diagram	2	3	4	3
9.	Give one example of floating point and fixed point TI DSP processor.	2	2	5	1
10.	Mention the key important feature of DSP Processor.	2	2	5	1
11.	State the two properties that are exploited in FFT due to which the computation is fast.	2	2	1	2
12.	Find the quantization error due to rounding off and truncation of the fixed point number: 0.875	2	3	3	3

Part-B (3 × 14 = 42 Marks)					
13. a)	Find the 4-point DFT of the following sequence using Radix-2 DIT-FFT algorithm. $x(n) = \begin{cases} 1 & \text{for } 0 \leq n \leq 2 \\ 0 & \text{else where} \end{cases}$	10	3	1	4
b)	Compare DFT and FFT in terms of Computation requirements. What is in-place algorithm?	4	2	1	2
14.	Design an FIR digital Bandpass filter approximating the ideal frequency response as mentioned below using rectangular Window. Consider N=5.	14	5	2	4
	$H_d(\omega) = \begin{cases} 0 & \text{for } \omega \leq \pi/6 \\ 1 & \text{for } \pi/6 \leq \omega \leq \pi/3 \\ 0 & \text{for } \pi/3 \leq \omega \leq \pi \end{cases}$				
15.	Design a digital IIR filter using Bilinear Transformation Technique with the following specifications of Analog Low Pass Butterworth filter: Passband edge frequency in Hz: 1000 Stopband edge frequency in Hz: 3000 Ripple in Passband:10dB Ripple in Stopband:40dB Sampling frequency:7000Hz	14	5	2	4
16. a)	Derive the decimation process with relevant equations and input and output spectrum.	8	3	4	4
b)	State the applications of Multirate signal processing and explain any one in detail.	6	2	4	2
17. a)	Sketch the functional schematic of TMS320C67XX processor.	8	2	5	2
b)	Mention any three addressing modes with an example instruction to each.	6	3	5	2
18. a)	Discuss the radix-2 DIF-FFT algorithm for a sequence x(n) of period N, and plot the flow graph for N=4.	8	3	1	3
b)	explain in detail the steps in Parks-McClellan algorithm	6	2	2	2
19.	Answer any <i>two</i> of the following:				
a)	Determine the poles of Chebyshev type I filter, with order n=3	7	3	2	4
b)	Elaborate on the process of interpolation with relevant equations and spectrums.	7	3	4	3
c)	Describe any four advantages of DSP processor against Microprocessor.	7	2	5	3

M: Marks; L: Bloom's Taxonomy Level; CO: Course Outcome; PO: Programme Outcome

S. No.	Criteria for questions	Percentage
1	Fundamental knowledge (Level-1 & 2)	40
2	Knowledge on application and analysis (Level-3 & 4)	37
3	*Critical thinking and ability to design (Level-5 & 6) (*wherever applicable)	23