Hall Ticket Number:

Code No. : 17341 S N/O

VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD

Accredited by NAAC with A++ Grade

B.E. (E.E.E.) VII-Semester Supplementary Examinations, May/June-2023

Digital Signal Processing

Time: **3 hours** Max. Marks: **60**

*Note: Answer all questions from **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Sketch the signal u[n]+u[-n-1].	2	3	2	1,2,3,5,12
2.	Differentiate digital and discrete signal.	2	1	1	1,2,3,5,12
3.	Compare circular convolution with linear convolution.	2	2	3	1,2,3,5,12
4.	List the properties of twiddle factor.	2	2	2	1,2,3,5,12
5.	Differentiate Chebyshev type – I filter with type – II filter.	2	2	4	1,2,3,5,12
6.	Sketch the graph between digital and analog angular frequencies in bilinear transformation.	2	2	4	1,2,3,5,12
7.	Define group delay.	2	1	4	1,2,3,5,12
8.	List the different possible types of impulse responses that can be obtained for linear phase Finite Impulse Response filters.	2	1	4	1,2,3,5,12
9.	Differentiate Dual access RAM and single access RAM.	2	2	5	1,2,3,5,12
10.	Among voltage regulation and current regulation in DSP based control of buck – boost converter, which regulation is given priority and why?	2	3	5	1,2,3,5,12
	Part-B (5×8 = 40 Marks)				
11. a)	Test the properties causality, shift invariance and linearity for the system described by the difference equation $y[n] = x^2[n] + x[n^2]$.	3	2	2	1,2,3,5,12
b)	A system is given by the difference equation y[n]-3y[n-1]-4y[n-2]=x[n]+5x[n-1]. Obtain response of system for the input $x[n]=2^n u[n]$ with initial conditions y[-1]=1 and y[-2]=2.	5	2	2	1,2,3,5,12
12. a)	Compute convolution of the sequences x[n] = {5, 0, 4, 0, 3, 0, 2, 0} and h[n] = {1, 0, 1} using overlap-add method.	5	3	3	1,2,3,5,12
b)	Obtain linear convolution of the sequences x[n] = {2, -1, -2} and h[n] = {-1, 2} using Discrete Fourier Transform.	3	3	3	1,2,3,5,12
13. a)	Using Bilinear transformation, design a Butterworth digital high pass filter with the following specifications: Passband edge: $\omega_p = 0.5\pi$ rad, stopband edge: $\omega_s = 0.2\pi$ rad, passband attenuation: $A_p = -2$dB, stopband attenuation: $A_s = -15$dB. Assume T=1 sec.	5	3	4	1,2,3,5,12
b)	Obtain the parallel form realization of IIR filter with system function $H[z] = \frac{(2+z^{-1})(5+0.2z^{-1})}{(1-z^{-1}+0.5z^{-2})(1+z^{-1}-0.3z^{-2})}$	3	3	4	1,2,3,5,12

Contd... 2

14. a)	Using Bartlett window of order N=7, design a Finite Impulse Response filter with desired frequency response $$H_d(e^{j\omega}) = \begin{cases} e^{-j3\omega}, & \frac{-\pi}{4} \le \omega \le \frac{\pi}{4} \\ 0, & \frac{\pi}{4} \le \lvert\omega\rvert \le \pi \end{cases}$$	5	3	4	1,2,3,5,12
b)	Obtain the frequency response of a linear phase Finite Impulse Response filter with symmetric and odd length impulse response.	3	2	2	1,2,3,5,12
15. a)	Draw the block diagram showing the peripherals in TMSLF2407 DSP controller and explain them.	5	1	5	1,2,3,5,12
b)	Using a neat block diagram, explain multiplexing functionality in TMSLF2407 DSP controller.	3	1	5	1,2,3,5,12
16. a)	Explain about Zero Input Response (ZIR) and Zero State Response (ZSR).	3	1	2	1,2,3,5,12
b)	Determine Fast Fourier Transform of the sequence x[n] = {1, 0, 2, 0, 3, 0, 4, 0} using Decimation in Frequency algorithm.	5	3	2	1,2,3,5,12
17.	Answer any ***two*** of the following:				
a)	Compare Infinite Impulse Response and Finite Impulse Response filters.	4	2	4	1,2,3,5,12
b)	Explain the procedure to design a Finite Impulse Response using window technique.	4	1	4	1,2,3,5,12
c)	Using a neat block diagram, explain about voltage regulation of buck – boost converter using TMSLF2407 DSP controller.	4	2	5	1,2,3,5,12

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

i)	Blooms Taxonomy Level – 1	26.25%
ii)	Blooms Taxonomy Level – 2	36.25%
iii)	Blooms Taxonomy Level – 3 & 4	37.50%

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