Reg. No. : | | | | | | | | | | |

Question Paper Code: 95B04

B.E./B.Tech. DEGREE EXAMINATION, NOV 2022

Fifth Semester

Biomedical Engineering

19UBM504- Principles of Digital Signal Processing

(Regulations 2019)

Duration: Three hours Maximum: 100 Marks

Answer All Questions

PART A - (10x 2 = 20 Marks)

1.	Find the IDFT of $X(k) = \{1,0,1,0\}$.	CO2- App
2.	Compute the N-point DFT of the signal $x(n) = \cos(n\pi/4)$ for $0 \leq n \leq 3$.	CO2- App
3.	Given that, $H(s)=1 / (s+1)$. By impulse invariant method, obtain the digital filter transfer function.	CO2- App
4.	Determine the order of the butter worth analog filter for the given specification $\alpha p = 5$, $\alpha s = 20$, $\Omega p = 1000$ rad/sec and $\Omega s = 500$ rad/sec	CO2- App
5.	The frequency response of a digital filter is, $H(e^{j\omega}) = (0.7+0.6\cos\omega - 0.9\cos 2\omega)e^{-j7.5\omega}$. Determine the phase delay and group delay.	CO2- App
6.	Write the magnitude and phase function of FIR filter when impulse response is symmetric and N is odd.	CO2- App
7.	Convert $(+0.125)_{10}$ to 2's complement format of binary and verify the result by converting the binary to decimal.	CO2- App
8.	Convert $(-0.125)_{10}$ to one's complement format of binary and verify the result by converting the binary to decimal.	CO2- App
9.	Define pipelining	CO1- U
10.	Write a short note on MAC unit in DSPs.	CO1- U

PART – B (5 x 16= 80 Marks)

11.	(a)	Compute DFT for the following sequence $x(n)=(-1)^n$ for N=8	CO2- App	(16)
		Or		
	(b)	Compute IDFT for the following sequence $x(n)=(-1)^n$ for N=8	CO2- App	(16)
12.	(a)	Use the Bilinear transformation to convert the analog filter with system function H(S) = s+0.1/(s+0.1)2+9 into a digital IIR filters. Select T=0.1 and compare the location of the zeros in H(Z) with the locations of the zeros obtained by applying the impulse invariant method in the conversion.	CO4- E	(16)
		Or		
	(b)	The normalized transfer function of an analog filter is given by , $H(S)=1/s^2+1.414s+1$ convert the analog filter into a digital IIR filters with cutoff frequency 0.4π, using Bilinear transformation and compare the location of the zeros in H(Z) with the locations of the zeros obtained by applying the impulse invariant method in the conversion.	CO4- E	(16)
13.	(a)	Design a linear phase FIR BPF to pass frequency in the range 0.35π to 0.48π rad/sample using a rectangular window, by taking 5 samples of window sequence. Analyze the above with a Hamming window and comment about the result.	CO3-Ana	(16)
		Or		
	(b)	Design a band pass filter using frequency sampling method for the specifications, Sampling frequency F= 8000Hz Cutoff frequency fc_1 =1000 Hz fc_2=3000 Hz Determine the filter coefficients for N=7. If N=5 what will be the filter coefficients?	CO3-Ana	(16)
14.	(a)	For second-order IIR filter, $H(z) = 1 /(1-0.5z^{-1})(1-0.45z^{-1})$. Study the effect of shift in pole location with 3 bit coefficient representation in direct and cascade form.	CO2- App	(16)
		Or		

(b) In the IIR system given below the products are rounded to 4-bits (including sign bit). $H(z) = 1 / (1-0.35z^{-1}) (1-0.62z^{-1})$. Find the output round off noise power in a)direct form realization b)cascade realization — CO2- App — (16)

15. (a) Draw the simplified architecture of the TMS320C6xx processor and explain in detail. — CO1- U — (16)

Or

(b) List the addressing modes of the TMS320C6xx processor with relevant examples. — CO1- U — (16)