Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE – SEMESTER- VII EXAMINATION-SUMMER 2023

Subject Code: 3171708   **Date: 27/06/2023**
Subject Name: Digital Signal Processing (IC)
Time: 10:30 AM TO 01:00 PM   **Total Marks: 70**
Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	List the different types of filters based on frequency response.	03
	(b)	Discuss the overlap-add method for long data sequence.	04
	(c)	Discuss the concept of frequency transformation in analog domain.	07
Q.2	**(a)**	What is the relation between Z-transform and DFT?	03
	(b)	Find the IDFT of X(k) = {1, 0, 1, 0}.	04
	(c)	Perform circular convolution of x(n)={2,1,2,1} and y(n)={1,2,3,4}.	07
		OR	
	(c)	Realize an FIR system	07
		y(n)+2y(n-1)-3y(n-2)= 4x(n) + 5x(n-1) + 6x(n-2) using the transposed form structure.	
Q.3	**(a)**	What is the relation between DTFT and DFT?	03
	(b)	State and prove the time reversal property of DFT.	04
	(c)	What is an FIR filter? Compare an FIR filter with an IIR filter.	07
		OR	
Q.3	**(a)**	Discuss how FFT improves the speed of computation.	03
	(b)	State and prove the circular time shift property of the DFT.	04
	(c)	Explain FIR filter design using windowing method.	07
Q.4	**(a)**	Give any two applications of DFT?	03
	(b)	Explain radix-2 DIF FFT.	04
	(c)	Discuss the different methods of realization of FIR systems.	07
		OR	
Q.4	**(a)**	Explain the ideal characteristic of Lowpass filter.	03
	(b)	Draw and explain the basic butterfly diagram or flow graph of radix-2 DIT FFT?	04
	(c)	Write the difference equations for FIR and IIR system and hence derive the transfer functions of FIR and IIR systems.	07
Q.5	**(a)**	Discuss the bilinear transformation method for IIR filter design.	07
	(b)	Find the 4-point DFT of the sequence x(n) = {2, 1, 4, 3} by (a) DIT FFT algorithm (b) DIF FFT algorithm.	07
		OR	
Q.5	**(a)**	Discuss the impulse invariant method for IIR filter design.	07
	(b)	Given a sequence x(n) = {1, 2, 3, 4, 4, 3, 2, 1}, determine X(k) using DIT FFT algorithm.	07

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