

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY-GURUJADA VIZINAGARAM
III B. Tech I Semester Supplementary Examinations November -2025
DIGITAL SIGNAL PROCESSING
(ECE)

Time: 3 hours

Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

UNIT-I			
1.	a)	Explain the classification of signals and systems with suitable examples.	[7M]
	b)	Derive the convolution sum representation of discrete-time LTI systems.	[7M]
		(OR)	
2.	a)	Explain the properties of the Discrete-Time Fourier Transform (DTFT).	[7M]
	b)	Determine the response of an LTI system to a given input using convolution.	[7M]
UNIT-II			
3.	a)	State and prove the properties of the Discrete Fourier Transform (DFT).	[7M]
	b)	Compute the 4-point DFT of the sequence $x(n) = \{1, 2, 3, 4\}$.	[7M]
		(OR)	
4.	a)	Compute the 4-point DFT using the FFT algorithm.	[7M]
	b)	Explain the importance of the Fast Fourier Transform (FFT) and derive the Radix-2 DIT-FFT algorithm.	[7M]
UNIT-III			
5.	a)	Compare FIR and IIR filters in terms of design, stability, and applications.	[7M]
	b)	Explain the design procedure of an FIR filter using the windowing method.	[7M]
		(OR)	
6.	a)	Discuss the concept of frequency sampling method for FIR filter design.	[7M]
	b)	Design a low-pass FIR filter using the Hamming window method with $N=5$ and a cutoff frequency of 0.4π .	[7M]
UNIT-IV			
7.	a)	Derive the bilinear transformation method for IIR filter design.	[7M]
	b)	Design a Butterworth low-pass filter for a given specification.	[7M]
		(OR)	
8.	a)	Obtain the transfer function of a Chebyshev filter and analyze its characteristics.	[7M]
	b)	Explain the concept of impulse invariance transformation in IIR filter design.	[7M]
UNIT-V			
9.	a)	Explain the architecture and features of a DSP processor.	[7M]
	b)	Discuss the applications of DSP in speech and image processing.	[7M]
		(OR)	
10.	a)	Describe the pipelining and parallel processing concepts in DSP.	[7M]
	b)	Explain how DSP is used in biomedical signal processing.	[7M]