Madan Mohan Malaviya University Of Technology, Gorakhpur

Electronics and Communication Engineering Department

DIGITAL SIGNAL PROCESSING (BEC-303)

ASSIGNMENT-I

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1. List the advantages of digital signal processing over analog signal processing?
2. Discuss and prove the Periodicity, Linearity, circular convolution, circular correlation, circular shift, and frequency shifting properties of DFT.
3. Find the 4-point DFT of the sequence $x(n) = \{1, 2, 3, 1\}$.
4. Compute the six-point DFT $V(k)$ of the signal $v(n) = \{3, 2, 1, 0, 1, 2\}$.
5. Find the inverse DFT of $X(k) = \{1, 2, 3, 4\}$.
6. Use the four-point DFT and IDFT to determine the sequence : $x_3(n) = x_1(n) \textcircled{N} x_2(n)$, where

$$x_1(n) = \{\underset{\uparrow}{1}, 2, 3, 1\}$$
$$x_2(n) = \{\underset{\uparrow}{4}, 3, 2, 2\}$$

7. The first five points of the eight-point DFT of a real-valued sequence are $\{0.25, 0.125 - j0.3018, 0, 0.125 - j0.0518, 0\}$. Determine the remaining three points.
8. Given $x(n) = \{1, 2, 3, 4, 4, 3, 2, 1\}$, find $X(k)$ using DIT FFT algorithm.
9. Given $x(n) = \{1, 2, 3, 4, 4, 3, 2, 1\}$, find $X(k)$ using DIF FFT algorithm.
10. What are the advantages of FFT over DFT. Explain Radix-2 DIT FFT algorithm with related equations and draw the signal flow graph for $N = 8$.
11. Explain the Radix-2 DIF FFT algorithm with related equations and draw the signal flow graph for $N = 8$.