# Digital Signal Processing Using MATLAB

Digital signal processing (DSP) is the numerical manipulation of signals, usually with the intention to measure, filter, produce or compress continuous analog signals. It is characterized by the use of digital signals to represent these signals as discrete time, discrete frequency, or other discrete domain signals in the form of a sequence of numbers or symbols to permit the digital processing of these signals. Theoretical analyses and derivations are typically performed on discrete-time signal models, created by the abstract process of sampling. Numerical methods require a digital signal, such as those produced by an analog-to-digital converter (ADC). The processed result might be a frequency spectrum or a set of statistics. But often it is another digital signal that is converted back to analog form by a digital-to-analog converter (DAC). Even if that whole sequence is more complex than analog processing and has a discrete value range, the application of computational power to signal processing allows for many advantages over analog processing in many applications, such as error detection and correction in transmission as well as data compression.

**Topics to be Covered:**

**Introduction to MATLAB**

Historical background

Applications

Scope of MATLAB

Importance to engineers

Features

MATLAB windows (editor, work space, command history, • Command window)

Operations with variables

Naming and checking existence

**Data and data flow in MATLAB**

Matrix operations & operators

Reshaping matrices

Arrays

**MATLAB Graphics**

Simple graphics

Graphic types

Plotting functions

**Signal processing using MATLAB (Intermediate),**

*Prerequisites: MATLAB Fundamentals, Basic concept of signals*

**Introduction to Signal Processing**

Types of signals

Concept of frequency

Creating signals in MATLAB

Signal visualization

**Frequency analysis**

Harmonics analysis

Energy and power of a signal

Frequency analysis of external sound

**Real time sound processing**

Recording

Importing and exporting of signal (voice, music file etc.)

Audio player designing

Audio cutter designing

**Designing and implementation of filters**

Introduction to various types of filters

Digital FIR and IIR filter design, analysis and implementation methods

Analog filter design methods, including Butterworth, Chebyshev, Bessel and Elliptic

Filter designing using tool

Filter applications on various signals

Producing sound effects

**Duration:** The duration of this workshop will be two consecutive days, with eight hour session each day in a total of sixteen hours properly divided into theory and hands on sessions.

**Fees:** Rs. 1200/- (inclusive of all Taxes) per participant.