

Experiment No: 16

Experiment Name: Inverse Z-Transform

Description of the Problem:

The objective of this experiment is to find the **inverse Z-transform** of a given Z-domain function using MATLAB.

The inverse Z-transform converts a signal from the **Z-domain (frequency domain)** back to the **time domain**, allowing us to obtain the discrete-time sequence $x[n]$.

MATLAB's symbolic math toolbox provides the function **iztrans()** to directly compute the inverse Z-transform.

Basic Formula:

If

$$X(z) \xleftrightarrow{Z} x[n]$$

Then,

$$x[n] = Z^{-1}\{X(z)\}$$

This experiment demonstrates how to compute this using symbolic expressions.

Source Code Sample:

```
clc;
clear all;
close all;

% Define symbolic variables
syms z n

% Ask user to enter the Z-transform function
X = input('Enter the Z-transform X(z) (use z as the variable): ');
```

```
% Compute inverse Z-transform
x = iztrans(X, z, n);

% Display the result
disp('Inverse Z-Transform x[n] = ');
disp(x);
```

Sample Input:

Enter the Z-transform X(z): $1/(1 - 0.5z^{-1})$

Sample Output:

Inverse Z-Transform x[n] =
 $(1/2)^n * u[n]$

Screenshot:

```
1      clc;
2      clear all;
3      close all;
4
5      % Define symbolic variables
6      syms z n
7
8      % Ask user to enter the Z-transform function
9      X = input('Enter the Z-transform X(z) (use z as the variable): ');
10
11     % Compute inverse Z-transform
12     x = iztrans(X, z, n);
13
14     % Display the result
15     disp('Inverse Z-Transform x[n] = ');
16     disp(x);
17
```

Command Window

```
Enter the Z-transform X(z) (use z as the variable): 1/(1 - 0.5*z^-1)
Inverse Z-Transform x[n] =
(1/2)^n
```

