IET winter 2016
Semester-6
Digital Signal Processing

LAB 7-8

Objectives:

Understand different concepts of Z-transform

Prerequisites:

- Z-transform and its properties, Inverse z-transform, Concept of ROC

Explore Following Commands:

- **syms**
- **ztrans**
- **zplan**
- **iztrans**
- **impz**

Problems

1. Use MATLAB to obtain Symbolic Z-Transform of some basic signals.

   a. X(n)= u(n)
   b. X(n)= nu(n)
   c. X(n) = (1+n) u(n)
   d. X(n) = $\cos(\omega 0 n)$ u(n)
   e. X(n) = $\sin(\omega 0 n)$ u(n)
   f. X(n) = $a^n \cos(\omega 0 n)$ u(n)
   g. X(n) = $a^n \sin(\omega 0 n)$ u(n)
   h. X(n) = $n\, a^n$ u(n) ;
   i. X(n) = $-na^n$ u($-n-1$) ;
   j. X(n) = $n\,(-1)^n$ u(n)
   k. X(n) = $(n)^2$ u(n)

2. Use MATLAB to Plot poles and zeros of the Z-transform obtained for following signals.

    a. $X(n) = \left(\frac{1}{2}\right)^n u(n) + \left(-\frac{1}{3}\right)^n u(n)$

    b. $X(n) = \left(-\frac{1}{3}\right)^n u(n) - \left(\frac{1}{2}\right)^n u(-n-1)$

    c. $X(n) = \left(\frac{1}{2}\right)^n u(-n)$

    d. $X(n) = \{-1,0,-1,0,-1,0,-1,0,-1\ldots\ldots\}$

3. Use MATLAB to obtain Symbolic Inverse Z-Transform of some basic signals.

    a. $X(z) = \left(\frac{1+3\,z^{-1}}{1-3\,z^{-1}+2\,z^{-2}}\right)$

    b. $X(z) = \left(\frac{1+2\,z^{-1}}{1+z^{-2}}\right)$

    c. $X(z) = \left(\frac{1+2z^{-1}+z^{-2}}{1+4\,z^{-1}+4z^{-2}}\right)$

4. I) Use MATLAB to obtain impulse response & step response of the systems specified below

   II) Use MATLAB to obtain pole-zero plot of the systems specified in (a), (b), (c)

    a. $Y(n) = 0.75\ y(n-1) - 0.125\ y(n-2) + x(n)$
    b. $Y(n) = y(n-1) + x(n)$
    c. $Y(n) = 0.7\ y(n-1) - 0.1\ y(n-2) + 2\ x(n) - x(n-2)$