Date of Performance:

Experiment No: 01

AIM: To generate the discrete time sequences of:

(a) Unit impulse sequence
(b) Unit step sequence
(c) Ramp sequence
(d) Exponential sequence
(e) Sinusoidal sequence
(f) Cosine sequence.

APPARATUS: MATLAB Version 7.8 (R2009a)(Please update version

PROGRAM CODE : (attached your code)

a) PROGRAM for the generation of unit impulse signal

```
clc ;
clear all ;
close all ;
t=-2:1:2 ;
y=[zeros(1,2),ones(1,1),zeros(1,2)] ;
subplot(3,2,1) ;
stem(t,y) ;
ylabel('amplitude ---->') ;
xlabel('(a)n ---->') ;
title(' unit impulse signal ') ;
```

b) PROGRAM for the generation of unit step

Sequence [u(n)-u(n-N)]

```
n=input('enter the N value ') ;
t=0:1:n-1 ;
y=ones(1,n) ;
subplot(3,2,2) ;
stem(t,y) ;
ylabel('amplitude ---->') ;
xlabel('(b)n ---->') ;
title(' unit step sequence ') ;
```

c) PROGRAM for the generation of ramp sequence

```
n=input('enter the length of ramp sequence ') ;
t=0:n-1 ;
subplot(3,2,3) ;
stem(t,t) ;
ylabel('amplitude ---->') ;
xlabel('(c)n ---->') ;
title(' ramp sequence ') ;
```

d)PROGRAM for the generation of exponential sequence

```
n=input('enter the length of exponential
sequence') ;
t=0:n ;
a=input('enter the value of a ') ;
y=exp(a*t) ;
subplot(3,2,4) ;
stem(t,y) ;
ylabel('amplitude ---->') ;
xlabel('(d)n ---->') ;
title(' exponential sequence ') ;
```

e) PROGRAM for the generation of cosine sequence

```
t=0:0.01:pi ;
y=sin(2*pi*t) ;
subplot(3,2,5) ;
plot(t,y) ;
ylabel('amplitude ---->') ;
xlabel('(e)n ---->') ;
title(' sine sequence ') ;
t=0:0.01:pi ;
y=cos(2*pi*t) ;
subplot(3,2,6) ;
plot(t,y) ;
ylabel('amplitude ---->') ;
xlabel('(f)n ---->') ;
title (' cosine sequence ') ;
```

OUTPUT : (SCREEN SHOT OF CODE AND GRAPH)

RESULT:- Thus the generation of discrete-time sequences of unit impulse, unit step, ramp, exponential, sinusoidal and cosine sequence is simulated using MATLAB.

VIVA QUESTIONS :

1. Define unit sample(impulse) sequence.
2. Define unit step sequence.
3. Define discrete-time system.
4. Distinguish the terms ‘discrete’ and ‘digital’ w.r.t DSP.
5. Define sampling theorem.

ANSWERS:

1. The unit impulse sequence is denoted as $\delta(n)$ and is defined as
$\delta(n) = 1$ for $n = 0$
$\delta(n) = 0$ for $n \neq 0$.

2. The unit step sequence is denoted as u(n) and is defined as
$u(n) = 1$ for $n \geq 0$
$u(n) = 0$ for $n < 0$.

3. A discrete-time system is a device or algorithm that operates on a discrete-time input Signal x(n), according to some well-defined rule, to produce another discrete-time signal y(n) called the output signal.

4. Discrete may have the various amplitudes at respective interval but the digital signal should have either zero or one.

5. The sampling theorem states that perfect reconstruction of a signal is possible when the sampling frequency is greater than twice the maximum frequency of the signal being sampled, or equivalently, when the frequency (half the sample rate) exceeds the highest frequency of the signal being sampled. If lower sampling rates are used, the original signal's information may not be completely recoverable from the sampled signal. For example, if a signal has an upper band limit of 100 Hz, a sampling frequency greater than 200 Hz will avoid aliasing and allow theoretically perfect reconstruction.