**Generation of Discrete-Time Sequences**

**Aim:**

1. To generate and view the following discrete time sequences using MATLAB

* Sinusoidal wave
* Cosine wave
* Sinc function
* Rectangular pulse
* Triangular
* Unit step signal
* Unit impulse signal
* Exponential signal
* Ramp signal

1. To generate and view the random sequences with normal distribution and uniform distribution using MATLAB

**Program:**

clc;

clear all;

close all;

f=1000;

fs=20000;

A=2;

%Sine signal

subplot(3,3,1);

t=0:1/fs:2/f;

x1=A\*sin(2\*pi\*f\*t);

stem(t,x1,'k');

title("Sine Signal");

xlabel("n");

ylabel("x(n)");

axis tight;

%Cosine signal

subplot(3,3,2);

x2=A\*cos(2\*pi\*f\*t);

stem(t,x2,'k');

title("Cosine Signal");

xlabel("n");

ylabel("x(n)");

axis tight;

%Ramp signal

subplot(3,3,3);

t1=-10:10;

x3=[zeros(1,10),0:10];

stem(t1,x3,'k');

title("Ramp Signal");

xlabel("n");

ylabel("x(n)");

axis tight;

%Exponential signal

subplot(3,3,4);

t2=-5:0.5:5;

x4=exp(t2);

stem(t2,x4,'k');

title("Exponential Signal");

xlabel("n");

ylabel("x(n)");

axis tight;

%Sinc signal

subplot(3,3,5);

t3=-20:0.5:20;

%for i=t30,

for i=1:length(t3)

if t3(i)==0

x5(i)=A;

else

x5(i)=A\*sin(t3(i))/t3(i);

end

end

stem(t3,x5,'k');

title("Sinc Signal");

xlabel("n");

ylabel("x(n)");

axis tight;

%Rectangular signal

subplot(3,3,6);

t4=-15:15;

x6=[zeros(1,10),A\*ones(1,11),zeros(1,10)];

stem(t4,x6,'k');

title("Rectangular Signal");

xlabel("n");

ylabel("x(n)");

axis tight;

%Triangular signal

subplot(3,3,7);

for i=1:length(t4)

if t4(i)<-10

x7(i)=0;

elseif t4(i)<=0

x7(i)=t4(i)+10;

elseif t4(i)<=10

x7(i)=10-t4(i);

else

x7(i)=0;

end

end

stem(t4,x7,'k');

title("Triangular Signal");

xlabel("n");

ylabel("x(n)");

axis tight;

%Unit step signal

subplot(3,3,8);

x8=[zeros(1,15),ones(1,16)];

stem(t4,x8,'k');

title("Unit Step Signal");

xlabel("n");

ylabel("x(n)");

axis tight;

%Unit Impulse signal

subplot(3,3,9);

x9=[zeros(1,15),1,zeros(1,15)];

stem(t4,x9,'k');

title("Unit Impulse Signal");

xlabel("n");

ylabel("x(n)");

axis tight;

**Simulated Results:**

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**Program:**

clc; clear all; close all;

a=5;

b=2;

subplot(2,2,1);

c=a+b\*randn(1,1000);

histogram(c,”FaceColor”,’k’);

title("Normal Distribution");

xlabel("Interval of values");

ylabel("Frequency");

axis tight;

subplot(2,2,2);

stem(c,’k’);

title("Normal Distribution");

xlabel("Interval of values");

ylabel("Frequency");

axis tight;

subplot(2,2,3);

c=randi(20,[1,1000]);

histogram(c,”FaceColor”,’k’);

title("Uniform Distribution");

xlabel("Interval of values");

ylabel("Frequency");

axis tight;

subplot(2,2,4);

stem(c,’k');

title("Uniform Distribution");

xlabel("Interval of values");

ylabel("Frequency");

axis tight;

**Simulated Results:**

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**Result:**

Thus, the generation and plotting of various Discrete-Time sequences and histogram plotting of Normal and Uniform distributed random sequences were successfully executed using MATLAB.