* 1. PROBLEM STATEMENT

To generate unit impulse, step and ramp signals and perform different maipulations in them.

MATLAB CODE:

% Generation of unit step

clc

clear all

close all

n=-5:5;

x=(n>=0);

stem(n,x,'filled','linewidth',2),

xlabel('n'),ylabel('Amplitude'),

title('u[n]')

**Figure 1.1 MATLAB code for generation of unit step signal**



**Fig 1.2 Unit step signal**

% Generation of unit step flipped

clc

clear all

close all

n=-5:5;

x=(n>=0); % Unit step funtion

y=fliplr(x); % Flipped unit step function y=x(end:-1:1)

subplot(2,1,1),stem(n,x,'filled','linewidth',2),

xlabel('n'),ylabel('Amplitude'),

title('u[n]')

subplot(2,1,2),stem(n,y,'filled','linewidth',2),

xlabel('n'),ylabel('Amplitude'),

title('u[-n]')

**Fig 1.3 MATLAB code for flipped unit step signal**



**Fig 1.4 Flipped unit step signal**

% Generation of shifted unit step

clc

clear all

close all

n=-5:5;

x=(n>=0);

x1=(n>=1);

x2=(n>=-1);

subplot(3,1,2),stem(n,x1,'filled','linewidth',2),

xlabel('n>=1'),ylabel('Amplitude'),

title('u[n-1]')

subplot(3,1,1),stem(n,x,'filled','linewidth',2),

xlabel('n'),ylabel('Amplitude'),

title('u[n]')

subplot(3,1,3),stem(n,x2,'filled','linewidth',2),

xlabel('n'),ylabel('Amplitude'),

title('u[n+1]')

**Fig 1.5 MATLAB code for shifting unit step signal**



**Fig 1.6 Comparision of unit step signal with shifted unit step signals**

% Difference of step functions

clc

clear all

close all

n=-10:10;

x=(n>=-5);

x1=(n>=5);

x2=x-x1;

subplot(3,1,1),stem(n,x,'filled','linewidth',2),

xlabel('n>=1'),ylabel('Amplitude'),

title('u[n+5]')

subplot(3,1,2),stem(n,x1,'filled','linewidth',2),

xlabel('n'),ylabel('Amplitude'),

title('u[n-5]')

subplot(3,1,3),stem(n,x2,'filled','linewidth',2),

xlabel('n'),ylabel('Amplitude'),

title('u[n+5]-u[n-5]')

**Fig 1.7 MATLAB code for difference between unit step signals**



**Fig 1.8 Difference between unit step signals**

%Generation of unit ramp signal

clc

close all

clear all

%Generation of unit ramp signal

n=-10:10

x=n.\*(n>=0)

y=stem(n,x,'filled')

xlabel('n'),ylabel('Amplitude')

title('Unit Ramp signal')

**Fig 1.9 MATLAB code for generation of ramp signal**



**Fig 1.10 Ramp signal**

% Generation of Ramp signal

clc

clear all

close all

n=-10:10;

x=(n+1).\*(n+1>=0); % r(n+1)

y=n.\*(n>=0); % r(n)

z=x-y; % r(n+1)- r(n)

subplot(3,1,1),stem(n,x,'filled','linewidth',2),

xlabel('n'),ylabel('Amplitude'),

title('r[n+1]')

subplot(3,1,2),stem(n,y,'filled','linewidth',2),

xlabel('n'),ylabel('Amplitude'),

title('r[n]')

subplot(3,1,3),stem(n,z,'filled','linewidth',2),

xlabel('n'),ylabel('Amplitude'),

title('r[n+1]-r[n]')

**Fig 1.9 MATLAB code for difference between ramp signal**



**Fig 1.10 Difference between Ramp signals**

**Fig 1.9 MATLAB code for Linear convolution**

% Convolution of x[n] with delta[n]

clc

clear all

close all

% Step 1: Sine wave generation with A= 1 an 5Hz frequency

t=linspace(0,1,100); % 100 samples

x=square(2\*pi\*5\*t); % sine wave define

% Step 2:Generation of delta[n]

h=[1,zeros(1,99)];

% Step 3 : Convolution

y=filter(h,1,x);

subplot(3,1,1),plot(t,x),title('x(n)'),axis([0 1 -2 2]),xlabel('n'),ylabel('Amplitude'),

subplot(3,1,3),plot(t,y),title('y(n)= \delta(n) \* x(n)'),

axis([0 1 -2 2]),xlabel('n'),ylabel('Amplitude'),

subplot(3,1,2),stem(h,'filled'),

title('\delta(n)'),xlabel('n'),ylabel('Amplitude')



**Fig 1.9 Linear convolution**

**1.2 PROBLEM DESCRIPTION**

To plot and compute the power of the following signals.

**MATLAB CODE:**

% Genertion of unit sample signal

clc

clear all

close all

n=-3:3;

% Defining the given signals

a=-2\*(n==-1)+3\*(n==0)+2\*(n==1);

b=(n==-1)+(n==1);

c=2\*(n==-1)+3\*(n==0)-2\*(n==1);

d=(n==-1)+3\*(n==0)+1\*(n==1);

% Computing the power of signals

p1=sum(abs(a).^2);

p2=sum(abs(b).^2);

p3=sum(abs(c).^2);

p4=sum(abs(d).^2);

subplot(2,2,1),stem(n,a,'filled','linewidth',2),xlabel('n'),ylabel('Amplitude'),axis([-3 3 -3 4]),

title(['x\_1(n) with energy ',num2str(p1),' J']);

subplot(2,2,2),stem(n,b,'filled','linewidth',2),xlabel('n'),ylabel('Amplitude'),axis([-3 3 -3 4]),

title(['x\_2(n) with energy ',num2str(p2),' J']);

subplot(2,2,3),stem(n,c,'filled','linewidth',2),xlabel('n'),ylabel('Amplitude'),axis([-3 3 -3 4]),

title(['x\_3(n) with energy ',num2str(p3),' J']);

subplot(2,2,4),stem(n,d,'filled','linewidth',2),xlabel('n'),ylabel('Amplitude'),axis([-3 3 -3 4]),

title(['x\_4(n) with energy ',num2str(p4),' J']);

**Fig 1.1 MATLAB code to plot and compute the power of signals**



**Fig 1.2 Comparision of different x(n) sequences**

**CONCLUSIONS**

Any of the arbitrary signal can be represented by means of scaled and shifted version of δ(n)

Two or more different signals can have the same power.