**Q1. Generate a function file for**

1. **Unit sequence**

function [ s,n ] = unitseq( k,n1,n2 )

n=n1:n2;

s=[(n-k)>=0];

end

1. **Impulse sequence**

function [ del,n] = impseq( k,n1,n2 )

n=n1:n2;

del=[(n-k)==0];

end

1. **Signal addtion**

function [ y,n ] = sigadd( x1,n1,x2,n2 )

n=min(min(n1),min(n2)):max(max(n1),max(n2));

y1=zeros(1,length(n))

y2=y1;

y1(find((n>=min(n1))&(n<=max(n1))))=x1;

y2(find((n>=min(n2))&(n<=max(n2))))=x2;

y=y1+y2;

end

1. **Signal multiplication**

function [ y,n ] = sigmul( x1,n1,x2,n2 )

n=min(min(n1),min(n2)):max(max(n1),max(n2));

y1=zeros(1,length(n));

y2=y1;

y1(find((n>=min(n1))&(n<=max(n1))))=x1;

y2(find((n>=min(n2))&(n<=max(n2))))=x2;

y=y1.\*y2;

end

1. **Signal shift**

function [ y,m ] = sigshift( x,n,k )

y=x;

m=n+k;

end

1. **Signal fold**

function [ y,m ] = sigfold( x,n )

y=fliplr(x);

m=-fliplr(n);

end

1. **Even odd**

function [ xe,ne,xo,no ] = evenodd( x,n )

[y,m]=sigfold(x,n);

[xe,ne]=sigadd(x,n,y,m);

xe=0.5\*xe;

[xo,no]=sigadd(x,n,-y,m);

xo=0.5\*xo;

end

**Q2. Generate periodic sequence using stem function**

clc;

clearall;

closeall;

x1=[-2 -1 0 1 2]

p=5;

xper=x1'\*ones(1,p);

xper=xper(:);

xper=xper';

stem(xper);

xlabel('Time')

ylabel('Amplitude')

title('Question 2 a')

clc;

clearall;

closeall;

n=0:30;

[x1,n1]=unitseq(0,0,30)

[x2,n2]=unitseq(20,0,30)

y1=x1-x2;

y2=exp(0.1\*n)

y=y1.\*y2;

p=3;

xper=y'\*ones(1,p);

xper=xper(:);

xper=xper';

stem(xper);

xlabel('Time')

ylabel('Amplitude')

title('Question 2 b')

clc;

clearall;

closeall;

n=0:30;

[x1,n1]=unitseq(0,0,30)

[x2,n2]=unitseq(20,0,30)

y1=x1-x2;

y2=sin(0.1\*n\*pi)

y=y1.\*y2;

p=4;

xper=y'\*ones(1,p);

xper=xper(:);

xper=xper';

stem(xper);

xlabel('Time')

ylabel('Amplitude')

title('Question 2 c')

**Q3. Generate and plot the following signals**

clc;

clearall;

closeall;

x=[2 4 -3 1 -5 4 7]

n=0:6;

[x1,n1]=sigshift(x,n,3)

[x2,n2]=sigshift(x,n,-4)

y1=2\*x1+3\*x2-x;

stem(n,y1);

xlabel('Time')

ylabel('Amplitude')

title('Question 3 a')

clc;

clearall;

closeall;

x=[2 4 -3 1 -5 4 7]

n=0:6;

[x1,n1]=sigshift(x,n,-4)

[x2,n2]=sigshift(x,n,-5)

y1=4\*x1+5\*x2+2\*x;

stem(n,y1);

xlabel('Time')

ylabel('Amplitude')

title('Question 3 b')

clc;

clearall;

closeall;

x=[2 4 -3 1 -5 4 7]

n=0:6;

[x1,n1]=sigshift(x,n,-3);

[x2,n2]=sigshift(x,n,2);

[y1,m1]=sigmul(x1,n1,x2,n2);

[x3,n3]=sigfold(x,n);

[x4,n4]=sigshift(x3,n3,1);

[x5,n5]=sigshift(x,n,-1);

[y2,m2]=sigmul(x4,n4,x5,n5);

[y3,m3]=sigadd(y1,m1,y2,m2);

stem(m3,y3);

xlabel('Time')

ylabel('Amplitude')

title('Question 3 c')

clc;

clearall;

closeall;

x=[2 4 -3 1 -5 4 7]

n=0:6;

m=-10:10;

[x1,n1]=sigshift(x,n,-2);

x2=cos(0.1\*m\*pi)

[x3,n3]=sigmul(x1,n1,x2,m);

x4=2\*exp(0.5\*m);

[x5,n5]=sigmul(x,n,x4,m)

[y,m1]=sigadd(x3,n3,x5,n5);

stem(m1,y);

xlabel('Time')

ylabel('Amplitude')

title('Question 3 d')

**Q4. Generate the following sequence**

**a.**clc;

clearall;

closeall;

n=0:10;

[x1,n1]=unitseq(-20,0,10)

[x2,n2]=unitseq(10,0,10)

y1=x1-x2;

y2=exp(0.1\*n);

y=y1.\*y2;

stem(n,y)

xlabel('Time')

ylabel('Amplitude')

title('Question 3 c')

b. clc;

clearall;

closeall;

n=-200:200;

x1=cos(0.49\*n\*pi);

x2=cos(0.51\*n\*pi);

x3=x1+x2;

y=5\*x3;

stem(n,y)

xlabel('Time')

ylabel('Amplitude')

title('Question 4 b')

1. clc;

clearall;

closeall;

n=0:100;

x1=sin((0.1\*n\*pi)+(pi/3));

x2=exp(-0.05\*n);

y=x1.\*x2;

stem(n,y)

xlabel('Time')

ylabel('Amplitude')

title('Question 4 g')

**Q5. Using the evenodd function find even and odd components and plot them.**

**a.**clc;

clearall;

closeall;

x=[0 1 2 3 4 5 6 7 8 9];

n=0:9;

[xe,ne,xo,no]=evenodd(x,n);

subplot(3,1,1)

stem(n,x)

xlabel('Time')

ylabel('Amplitude')

title('QUESTION 5 A')

subplot(3,1,2)

stem(ne,xe)

xlabel('Time')

ylabel('Amplitude')

title('Even part')

subplot(3,1,3)

stem(no,xo)

xlabel('Time')

ylabel('Amplitude')

title('odd part')

**b.** clc;

clearall;

closeall;

n=0:10;

[x,n]=unitseq(0,0,10);

[x1,n1]=unitseq(-5,0,10);

[x2,n2]=unitseq(10,0,10);

x3=x1-x2;

x4=exp(0.1\*n);

y=x3.\*x4;

[xe,ne,xo,no]=evenodd(y,0:10);

subplot(3,1,1)

stem(n,x)

xlabel('Time')

ylabel('Amplitude')

title('Question 5 b')

subplot(3,1,2)

stem(ne,xe)

xlabel('Time')

ylabel('Amplitude')

title('Even part')

subplot(3,1,3)

stem(no,xo)

xlabel('Time')

ylabel('Amplitude')

title('Odd part')

**c.** clc;

clearall;

closeall;

n=-20:20;

x1=cos((0.2\*n\*pi)+(pi/4));

[xe,ne,xo,no]=evenodd(x1,n)

subplot(3,1,1)

stem(n,x1)

xlabel('Time')

ylabel('Amplitude')

title('Question 5 c')

subplot(3,1,2)

stem(ne,xe)

xlabel('Time')

ylabel('Amplitude')

title('Even part')

subplot(3,1,3)

stem(no,xo)

xlabel('Time')

ylabel('Amplitude')

title('odd part')

**d.** clc;

clearall;

closeall;

n=-20:20;

x1=sin((0.1\*n\*pi)+(pi/3));

x2=exp(-0.05\*n);

x=x1.\*x2;

[xe,ne,xo,no]=evenodd(x,n)

subplot(3,1,1)

stem(n,x)

xlabel('Time')

ylabel('Amplitude')

title('Question 5 d')

subplot(3,1,2)

stem(ne,xe)

xlabel('Time')

ylabel('Amplitude')

title('Even part')

subplot(3,1,3)

stem(no,xo)

xlabel('Time')

ylabel('Amplitude')

title('Odd part')

**Q6. Generate and plot the following sequences**

1. clc;

clearall;

closeall;

n=-5:5;

x=2\*impseq(-2,-5,5)-impseq(4,-5,5);

stem(n,x);

title('Question 6 A')

xlabel('Time')

ylabel('Amplitude')

1. clc;

clearall;

closeall;

n=0:20;

x1=n.\*(unitseq(0,0,20)-unitseq(10,0,20));

x2=10\*exp(-0.3\*(n-10)).\*(unitseq(10,0,20)-unitseq(20,0,20));

x=x1+x2;

stem(n,x);

xlabel('Time')

ylabel('Amplitude')

title('Question 6 b')

c.clc;

clearall;

closeall;

n=0:50;

x=cos(0.04\*pi\*n)+0.2\*randn(size(n));

stem(n,x);

xlabel('Time')

ylabel('Amplitude')

title('Question 6 c')

d.clc;

clearall;

closeall;

x1=[5 4 3 2 1]

n=-9:10;

xper=x1'\*ones(1,4);

xper=xper(:);

xper=xper';

stem(xper);

xlabel('Time')

ylabel('Amplitude')

title('Question 6 d')



