Experiment – 1

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MATLAB CODE:

```
clc;
clear all;
close all;
t=0:.001:1;
f=input('Enter the value of frequency=:');
a=input('Enter the value of amplitude:');
subplot(3,3,1);
y=a*sin(2*pi*f*t);
plot(t,y,'r');
xlabel('time-->');
ylabel('amplitude');
title('sine wave');
grid on;
subplot(3,3,2);
z=a*cos(2*pi*f*t);
plot(t,z,'b');
xlabel('time-->');
ylabel('amplitude');
title('cosine wave');
grid on;
subplot(3,3,3);
s=a*square(2*pi*f*t);
plot(t,s);
xlabel('time-->');
ylabel('amplitude-->');
title('square wave');
grid on;
subplot(3,3,4);
plot(t,t);
xlabel('time-->');
ylabel('amplitude-->');
title('ramp wave');
grid on;
subplot(3,3,5);
plot(t,a,'r');
xlabel('time-->');
ylabel('amplitude-->');
title('unit step wave');
grid on;
```

Experiment – 02

MATLAB CODE:

```
clc;
clear all;
close all;
a=input('Enter the sequence y(n)=');
b=input('Enter the sequence x(n)=');
N=input('Enter the length (Y)=');
n=0:N-1;
x=[1,zeros(1,N-1)];
Y=filter(b,a,x);
stem(n,Y);
xlabel('time');
ylabel('amplitude');
title('resultant impulse response of difference equation');
```

Experiment - 03

Addition:

Perform addition of x1(n)=[1 2 3 4] x2(n)=[1 1 1 1]

```
Clear all; clc;
x=[1 2 3 4];
subplot(3,1,1);
stem(x);
title('X');
y=[1 1 1 1];
subplot(3,1,2);
stem(y);
title('Y');
z=x+y;
subplot(3,1,3);
stem(z);
title('Z=X+Y');
```

Perform addition of x1(n)=[1 2 3 4] x2(n)=[1 1 1 1 1]

```
n1=-2:1;
x=[1 2 3 4];
subplot(3,1,1);
stem(n1,x);
title('X') ;
axis([-3 3 0 5]);
n2=0:3;
y=[1 1 1 1];
subplot(3,1,2);
stem(n2,y);
title('Y');
axis([-3 3 0 5]);
n3 =min (min(n1) ,min( n2 ) ) : max ( max ( n1 ) , max ( n2 ) ); % finding
the duration of output signal
s1 =zeros(1,length (n3) );
s2 =s1;
s1 (find ( ( n3>=min( n1 ) ) & ( n3 <=max ( n1 ) )==1 ) )=x;
% signal x with the duration of output signal add
s2 (find ( ( n3>=min ( n2 ) ) & ( n3 <=max ( n2 ))==1) )=y;
% signal y with the duration of output signal add
add=s1 +s2; % addition
subplot(3,1,3)
stem(n3,add)
title('Z=X+Y');
axis([-3 3 0 5]);
```

Subtraction :

```
n1=-2:1;
x=[1 2 3 4];
subplot(3,1,1);
stem(n1,x);
title('X') ;
axis([-4 4 -5 5]);
n2=0:3;
y=[1 1 1 1];
subplot(3,1,2);
stem(n2,y);
title('Y');
axis([-4 4 -5 5]);
n3 =min (min(n1) ,min( n2 )) : max ( max ( n1 ) , max ( n2 )); % finding the
duration of output signal
s1 =zeros(1,length (n3) );
s2 =s1;
s1 (find ( ( n3>=min( n1 ) ) & ( n3 <=max ( n1 ) )==1 ) )=x;
% signal x with the duration of output signal 'sub'
s2 (find ( ( n3>=min ( n2 ) ) & ( n3 <=max ( n2 ))==1) )=y;
% signal y with the duration of output signal 'sub'
sub=s1 - s2; % subtraction
subplot(3,1,3)
stem(n3,sub)
title('Z=X-Y');
axis([-4 4 -5 5]);
```

Multiplication :

MATLAB CODE

```
n1=-2:1;
x=[1 2 3 4];
subplot(3,1,1);
stem(n1,x);
title('X') ;
axis([-4 4 -5 5]);
n2=0:3;
y=[1 1 1 1];
subplot(3,1,2);
stem(n2,y);
title('Y');
axis([-4 4 -5 5]);
n3 =min (min(n1) ,min( n2 ) ) : max ( max ( n1 ) , max ( n2 ) ); % finding the
duration of output signal (out)
s1 =zeros(1,length (n3) );
s2 =s1;
s1 (find ( ( n3>=min( n1 ) ) & ( n3 <=max ( n1 ) )==1 ) )=x;
% signal x with the duration of output signal 'mul'
s2 (find ( ( n3>=min ( n2 ) ) & ( n3 <=max ( n2 ))==1) )=y;
% signal y with the duration of output signal 'mul'
mul=s1 .* s2; % multiplication
subplot(3,1,3)
stem(n3,mul)
title('Z=X*Y');
axis([-4 4 -5 5]);
```

Shifting a Signal :

MATLAB CODE:

```
n1=input('Enter the amount to be delayed');
n2=input('Enter the amount to be advanced');
n=-2:2;
x=[-2 3 0 1 5];
subplot(3,1,1);
stem(n,x);
title('Signal x(n)');
m=n+n1;
y=x;
subplot(3,1,2);
stem(m,y);
title('Delayed signal x(n-n1)');
t=n-n2;
z=x;
subplot(3,1,3);
stem(t,z);
title('Advanced signal x(n+n2)')
```

Reversing a Signal:

MATLAB CODE:

```
n=-1:2;
x=[3 -1 0 -4];
subplot(2,1,1)
stem(n,x);
axis([-3 3 -5 5]);
title('Signal x(n)');
c=fliplr(x);
y=fliplr(-n);
subplot(2,1,2);
stem(y,c);
axis([-3 3 -5 5]);
title('Reversed Signal x(-n)') ;
```

Experiment – 4

MATLAB CODES:

```
clc ;
close all;
syms n;
a=2;
x=a^n;
X=ztrans(x); %finding z transform
disp('z tranform of a^n a>1');
disp(X);
syms n;
a=0.5;
x=a^n;
X1=ztrans(x);
disp('z tranform of a^n 0<a<1');
disp(X1);
syms n;
a=2;
x=1+n;
X2=ztrans(x);
disp('z tranform of 1+n');
disp(X2);
A=iztrans(X);
disp('inverse z tranform of a^n a>1');
disp(A);
B=iztrans(X1);
disp('inverse z tranform of a^n 0<a<1');
disp(B);
C=iztrans(X2);
disp('inverse z tranform of 1+n');
disp(C);
subplot(1,3,1);
zplane([1 0],[1 -2]);
subplot(1,3,2);
zplane([1 0],[1 -1/2]);
subplot(1,3,3);
zplane([1 0 0],[1 -2 1]);
```

Experiment – 5

PROGRAM :

```
clc; clear all; close all;
num=input('enter the numerator polynomial vector \n'); %[1 0 0]
den=input('enter the denominator polynomial vector \n');%[1 1 0.16]
H=filt(num,den)
z=zero(H);
disp('the zeros are at ');
disp(z);
[r p k]=residuez(num,den);
disp('the poles are at ');
disp(p);
zplane(num,den);
title('Pole-Zero map in the Z-plane');
if max(abs(p))>=1
disp('all the poles do not lie with in the unit circle');
disp('hence the system is not stable');
else
disp('all the poles lie with in the unit circle');
disp('hence the system is stable');
end;
```

Experiment – 6

MATLAB CODE:

```
clc;
clear all;
close all;
x=input('Enter the coefficents of x(n)=');
N=length(x);
a=0:N-1;
subplot(2,1,1);
stem(a,x);
xlabel('time-->');
ylabel('amplitude-->');
title('Input sequence x(n)');
y=fft(x,N);
subplot(2,1,2);
stem(a,y)
xlabel('time-->');
ylabel('amplitude-->');
title('Resultant Discrete Fourier Transform');
```

Experiment – 7

MATLAB CODE:

```
clc;
clear all;
close all;
x=input('Enter the coefficents of x(n)=');
N=length(x);
a=0:N-1;
subplot(2,1,1);
stem(a,x);
xlabel('time-->');
ylabel('amplitude-->');
title('Input sequence x(n)');
y=ifft(x,N);
subplot(2,1,2);
stem(a,y)
xlabel('time-->');
ylabel('amplitude-->');
title('Resultant Inverse Discrete Fourier Transform');
```

Experiment - 8

MATLAB CODE:

```
clc;
clear all;
close all;
wp=input('Enter the passband frequency=');
ws=input('Enter the stop band frequency=');
rp=input('Enter the passband ripple=');
rs=input('Enter the stopband ripple=');
[n,wn]=buttord(wp/pi,ws/pi,rp,rs);
[b,a]=butter(n,wn,'low');
freqz(b,a)
```

Experiment - 9

MATLAB CODE:

```
clc;
clear all;
close all;
wp=input('Enter the passband frequency=');
ws=input('Enter the stop band frequency=');
rp=input('Enter the passband ripple=');
rs=input('Enter the stopband ripple=');
[n,wn]=buttord(wp/pi,ws/pi,rp,rs);
[b,a]=butter(n,wn,'high');
freqz(b,a)
```

Experiment – 10

MATLAB CODE:

```
clc;
clear all;
close all;
wp=input('Enter the passband frequency=');
ws=input('Enter the stop band frequency=');
rp=input('Enter the passband ripple=');
rs=input('Enter the stopband ripple=');
[n,wn]=buttord(wp/pi,ws/pi,rp,rs);
[b,a]=butter(n,wn);
freqz(b,a)
```