**clc;close all;clear all;**

**disp('Krushna Garkal TETA10');**

**disp('Exp.1 :Implementation of DFT,IDFT,verifying properties and spectrum analysis');**

**disp('\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_');**

**%Implementation of DFT**

**N=input('Enter the size of DFT:');**

**x=input('Enter the samples:');**

**L=length (x);**

**if N>L**

**x=[x zeros(1,(N-L))];**

**elseif N<L**

**x=[x(1:N)]**

**end**

**%N=4;**

**%x=[1 2 3 4];**

**n=[0: 1 : N-1];**

**k=[0: 1 : N-1];**

**w=exp(-j\*2\*pi/N);**

**nk=n'\*k**

**W=w.^nk**

**disp ('DFT samples');**

**X=x\*W**

**subplot(211);**

**stem (n,x);**

**title('Discrete Samples ');**

**xlabel('x(n)');**

**ylabel('n---->');**

**subplot(212);**

**stem (k,X);**

**title('DFT output ');**

**xlabel('k--->');**

**ylabel('x(k)');**

**%Implimentation of IDFT**

**disp('Krushna Garkal TETA10');**

**disp('Exp.1 :Implementation of IDFT');**

**disp('\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_');**

**N=input('Enter the size of DFT:');**

**X=input('Enter the output samples:');**

**n=[0: 1 : N-1];**

**k=[0: 1 : N-1];**

**w=exp(j\*2\*pi/N);**

**nk=n'\*k**

**W=w.^nk**

**disp ('IDFT samples');**

**x=(1/N)\*(X\*W)**

**subplot(211);**

**stem (n,X);**

**title('Discrete Samples ');**

**xlabel('x(n)');**

**ylabel('n---->');**

**subplot(212);**

**stem (k,x);**

**title('IDFT output ');**

**xlabel('k--->');**

**ylabel('x(k)');**

**%Properties of DFT and IDFT**

**x1=input ('Enter the first input sequence : ');**

**N1=length(x1);**

**x2=input ('Enter the second input sequence : ');**

**N2=length(x2);**

**N=max(N1,N2)**

**n=[0:1:N-1]**

**k=[0:1:N-1]**

**if N1>N2**

**k1=N1-N2**

**x2=[x2,zeros(1,k1)];**

**elseif (N2>N1)**

**k2 =(N2-N1)**

**x1=[x1,zeros(1,k2)];**

**end**

**%RHS**

**%Find DFT of x1**

**X1=fft(x1);**

**%find DFT of x2**

**X2=fft(x2)**

**disp ('addition of two Dft sequences : ');**

**f1=X1+X2**

**%LHS**

**for i=1:N**

**for j=1:N**

**if (i==j)**

**x(i)=x1(i)+ x2(j)**

**end**

**end**

**end**

**%DFT of addition of two sequences**

**f2=fft(x);**

**if (f1==f2)**

**disp('Linearity property is verified')**

**else**

**disp('Linearity property is not verified !!! ')**

**end**

**%Symmtry property**

**x=input ('Enter the input sequence : ');**

**y=fft(x)**

**z=abs(y)**

**if z(2)==z(8)**

**disp ('Since x(1)=x\*(7),x(2)=x\*(6) ')**

**disp('Symmetry property is verified')**

**else**

**disp('Symmetry property is not verified!!!')**

**end**

**%% Implementation of formula for DFT**

**disp('Spectrum Analysis of DFT')**

**x=[1 1 1 1];**

**subplot(3,3,1)**

**stem(x)**

**grid on**

**for i=2:1:9;**

**N=2^i ;**

**n=[0:1:(N-1)];**

**k=[0:1:(N-1)];**

**l=length(x);**

**if(N>l)**

**x=[x zeros(1,(N-l))];**

**elseif(N<l)**

**x=x(1:N);**

**end**

**w=exp((-1j\*2\*pi\*n'\*k)/N);**

**X=w\*x';**

**subplot(3,3,i)**

**stem(X)**

**grid on**

**end**