Q1.

clc

clear

fs=1000;

t=0:1/fs:1;

fc=10;

x=sin(2\*pi\*fc\*t);

subplot(2,1,1);

plot(t,x);

title('10 Hz sine wave');

xlabel('time');

ylabel('amplitude');

Fx=fft(x,1024);

N=1024;

k=1:N/2;

f=k\*(fs/N);

subplot(2,1,2);

plot(f,abs(Fx(1:512)));

title('Fourier Transform');

xlabel('Frequency');

ylabel('amplitude');

Q2.

clc

clear

fs=1000;

t=0:1/fs:1;

f1=10;

f2=50;

f3=100;

x1=sin(2\*pi\*f1\*t);

x2=sin(2\*pi\*f2\*t);

x3=sin(2\*pi\*f3\*t);

x4=x1+x2+x3;

subplot(2,1,1);

plot(t,x4);

title('Multitone Sine wave (10Hz+50Hz+100Hz)');

xlabel('time');

ylabel('amplitude');

Fx=fft(x4,1024);

N=1024;

k=1:N/2;

f=k\*(fs/N);

subplot(2,1,2);

plot(f,abs(Fx(1:512)));

title('Fourier Transform');

xlabel('Frequency');

ylabel('amplitude');

Q3.

clc

clear

fs=1000; %sampling frequency

t1=0:1/fs:0.250;

t2=0.251:1/fs:0.500;

t3=0.501:1/fs:0.750;

t4=0.751:1/fs:1;

t=[t1 t2 t3 t4];

%various frequencies

f1=10;

f2=50;

f3=100;

%generating the signals

x1=sin(2\*pi\*f1\*t1);

x2=sin(2\*pi\*f1\*t2)+sin(2\*pi\*f2\*t2);

x3=sin(2\*pi\*f1\*t3)+sin(2\*pi\*f2\*t3)+sin(2\*pi\*f3\*t3);

x4=sin(2\*pi\*f1\*t4);

%concatination

x5=[x1 x2 x3 x4];

subplot(2,1,1);

plot(t,x5);

title('non-stationary Sine wave');

xlabel('time');

ylabel('amplitude');

Fx=fft(x5,1024);

N=1024;

k=1:N/2;

f=k\*(fs/N);

subplot(2,1,2);

plot(f,abs(Fx(1:512)));

title('Fourier Transform');

xlabel('Frequency');

ylabel('amplitude');

Q4a.

clc

clear

fs=1000; %sampling frequency

t1=0:1/fs:0.250;

t2=0.251:1/fs:0.500;

t3=0.501:1/fs:0.750;

t4=0.751:1/fs:1;

t=[t1 t2 t3 t4];

%various frequencies

f1=10;

f2=50;

f3=100;

%generating the signals

x1=sin(2\*pi\*f1\*t1);

x2=sin(2\*pi\*f1\*t2)+sin(2\*pi\*f2\*t2);

x3=sin(2\*pi\*f1\*t3)+sin(2\*pi\*f2\*t3)+sin(2\*pi\*f3\*t3);

x4=sin(2\*pi\*f1\*t4);

%concatination

x5=[x1 x2 x3 x4];

subplot(3,1,1);

plot(t,x5);

title('non-stationary Sine wave');

xlabel('time');

ylabel('amplitude');

Fx=fft(x5,1024);

N=1024;

k=1:N/2;

f=k\*(fs/N);

subplot(3,1,2);

plot(f,abs(Fx(1:512)));

title('Fourier Transform');

xlabel('Frequency');

ylabel('amplitude');

Ix=ifft(abs(Fx(1:N)));

ti=0:1/N:(1-(1/N));% time axis

subplot(3,1,3);

plot(ti,real(Ix));

title(' Time-Domain Signal After IFT');

xlabel('time');

ylabel('amplitude');



Q4b.

clc

clear

fs=1000;

t=0:1/fs:1;

f1=10;

f2=50;

f3=100;

x1=sin(2\*pi\*f1\*t);

x2=sin(2\*pi\*f2\*t);

x3=sin(2\*pi\*f3\*t);

x4=x1+x2+x3;

subplot(3,1,1);

plot(t,x4);

title('Multitone Sine wave (10Hz+50Hz+100Hz)');

xlabel('time');

ylabel('amplitude');

Fx=fft(x4,1024);

N=1024;

k=1:N/2;

f=k\*(fs/N);

subplot(3,1,2);

plot(f,abs(Fx(1:512)));

title('Fourier Transform');

xlabel('Frequency');

ylabel('amplitude');

Ix=ifft(abs(Fx(1:N)));

ti=0:1/N:(1-(1/N));% time axis

subplot(3,1,3);

plot(ti,real(Ix));

title(' Time-Domain Signal After IFT');

xlabel('time');

ylabel('amplitude');

Assignment:

Q1.

clc

clear

fs=1000; %sampling frequency

t1=0:1/fs:0.250;

t2=0.251:1/fs:0.500;

t3=0.501:1/fs:0.750;

t4=0.751:1/fs:1;

t=[t1 t2 t3 t4];

%various frequencies

f1=10;

f2=50;

f3=100;

f4=200;

%generating the signals

x1=sin(2\*pi\*f1\*t1);

x2=sin(2\*pi\*f1\*t2)+sin(2\*pi\*f2\*t2);

x3=sin(2\*pi\*f1\*t3)+sin(2\*pi\*f2\*t3)+sin(2\*pi\*f3\*t3);

x4=sin(2\*pi\*f4\*t4);

%concatination

x5=[x1 x2 x3 x4];

subplot(2,1,1);

plot(t,x5);

title('non-stationary Sine wave');

xlabel('time');

ylabel('amplitude');

Fx=fft(x5,1024);

N=1024;

k=1:N/2;

f=k\*(fs/N);

subplot(2,1,2);

plot(f,abs(Fx(1:512)));

title('Fourier Transform');

xlabel('Frequency');

ylabel('amplitude');

q2.

% assignment\_2

clc

clear

fc=400;

fs=1000;

fm=200;

B=0.5;% modulation index

t=0:1/fs:1;

%modulating the message

x1=cos(2\*pi\*fc\*t + B\*sin(2\*pi\*fm\*t));

subplot(2,1,1);

plot(t,x1);

title('Singletone Wave');

xlabel('time');

ylabel('ampltude');

N=1024;

k=0:(N-1);

fx=fft(x1,N);

f=k\*(fs/N);

subplot(2,1,2);

plot(f(1:512),abs(fx(1:512)));

title('FFT');

xlabel('frequency');

ylabel('ampltude');

