**Task 1**

clear all

f\_1=2;

f\_2=6;

f\_3=10;

f\_4=14;

fs= 5\*max([f\_1,f\_2, f\_3, f\_4,39]);

ts=1/fs;

t= 0:ts:10;

m\_t= sin(2\*pi\*f\_1\*t)+(1/3)\*sin(2\*pi\*f\_2\*t)+(1/5)\*sin(2\*pi\*f\_3\*t)+(1/7)\*sin(2\*pi\*f\_4\*t);

M\_f=fft(m\_t);

x\_t=m\_t.\*cos (50\*pi\*t);

X\_f=fft(x\_t);

freq\_axis\_m= linspace(-fs/2, fs/2, length(M\_f));

freq\_axis\_x= linspace(-fs/2, fs/2, length(X\_f));

figure(1)

title ('task 1')

subplot(2,1,1), plot (t, m\_t)

grid on

title ('task 1a')

subplot(2,1,2), plot (t,x\_t)

title ('task 1a')

figure(2)

title ('task 1b')

subplot(2,1,1),plot(freq\_axis\_m, fftshift(abs(M\_f)))

title ('task 1b')

grid on

subplot(2,1,2),plot(freq\_axis\_x, fftshift(abs(X\_f)))

grid on

title ('task 1b')





**Task2 a:**

clear all

B1=100;

B2=200;

B3=400;

fs= 5\*max([B1,B2,B3]);

ts=1/fs;

t= -2:ts:2;

m1\_t= 200\*sinc(200\*t);

m2\_t= 400\*sinc(400\*t);

m3\_t= 800\*sinc(800\*t);

m\_t= m1\_t.\*m2\_t.\*m3\_t;

M\_f=fft(m\_t);

freq\_axis= linspace(-fs/2, fs/2, length(M\_f));

figure(1)

plot (t, m\_t)

title ('2a:mt')

grid on

figure(2)

plot(freq\_axis, fftshift(abs(M\_f)))

title ('2b:Mf')

grid on





**Task: 2b**

clear all

B1=100;

B2=200;

B3=400;

fs= 5\*max([B1,B2,B3]);

ts=1/fs;

t= -2:ts:2;

m1\_t= 200\*sinc(200\*t);

m2\_t= 400\*sinc(400\*t);

m3\_t= 800\*sinc(800\*t);

m\_t= m1\_t.\*m2\_t.\*m3\_t;

g\_t=400\*sinc(400\*t);

x\_t=conv(m\_t,g\_t);

M\_f=fft(m\_t);

X\_f=fft(x\_t);

freq\_axis\_m= linspace(-fs/2, fs/2, length(M\_f));

freq\_axis\_x= linspace(-fs/2, fs/2, length(X\_f));

figure(2)

subplot(2,1,1),plot(freq\_axis\_m, fftshift(abs(M\_f)))

grid on

title('2b: Mf')

subplot(2,1,2),plot(freq\_axis\_x, fftshift(abs(X\_f)))

title('2b: Xf')

grid on

