American International University-Bangladesh (AIUB)

Department of Computer Science

Lab Report-02

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SECTION   : **G**

COURSE NAME   : DATA COMMUNICATION

SEMESTER   : 2020-21, FALL

<u>Title:</u> Study of signal frequency, spectrum, bandwidth, bit rate, quantization using MATLAB.

<u>Performance Task:</u>

My ID = **17-34465-2**

Here,

> A= 1, B= 7, C= 3, D= 4, E= 4, F= 6, G= 5, H= 2.

$x_1(t) = A_1 \cos(2\pi(C*100) t)$
Here , according to my ID the value of C =3.

=> $x_1(t) = A_1 \cos(2\pi (3*100) t)$

$x_2(t) = A_2 \cos(2\pi (F*100)t)$

Here , according to my ID the value of F =6.

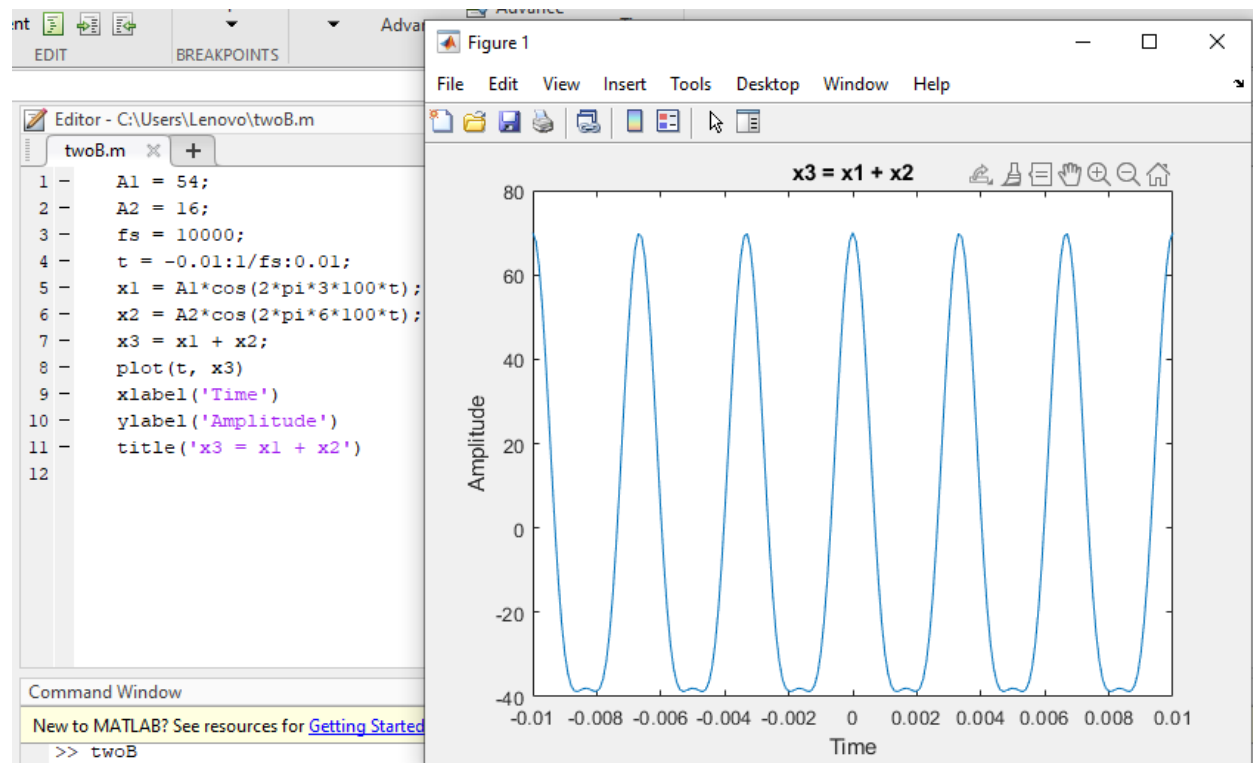=> $x_2(t) = A_2 \cos (2\pi (6*100) t)$

$x3(t) = x1(t) + x2(t)$

(a) Select the value of the amplitudes as follows: let *A1* = GD and *A2* = AF.
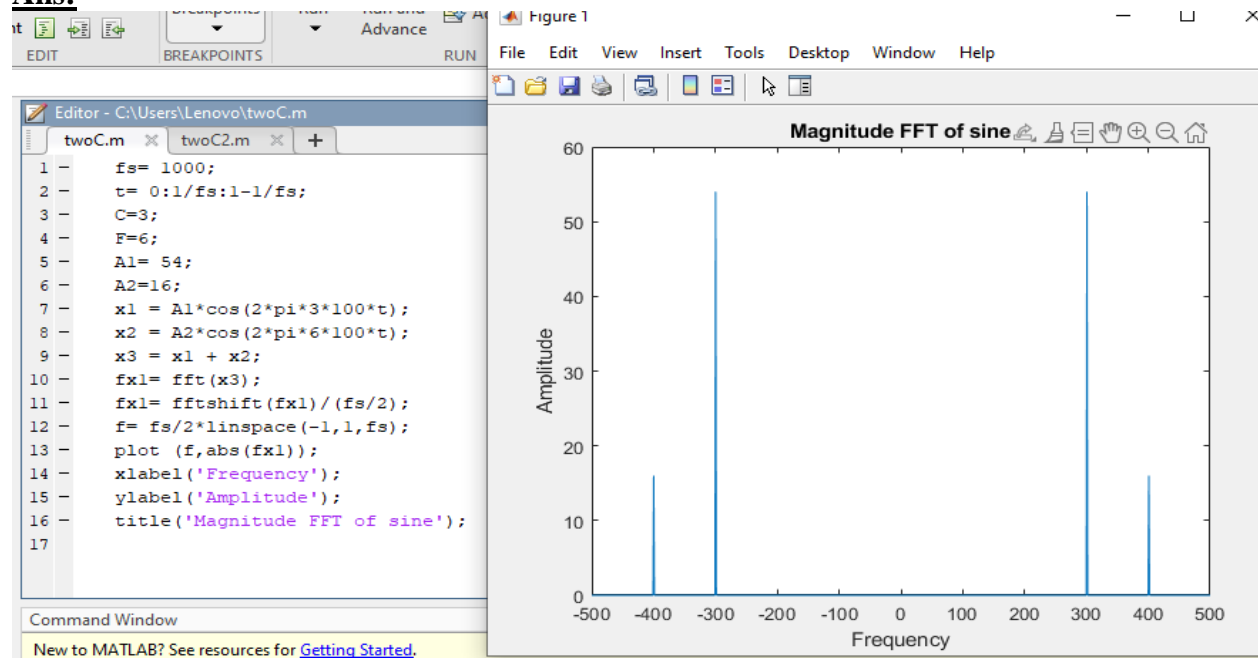
Ans:

(a) $A_1 = GD = 54$; $A_2 = AF = 16$

(b) Make a plot of x3 over a range of t that will exhibit approximately 2 cycles. Make sure the plot starts at a negative time so that it will include t = 0, and make sure that you have at least 20 samples per period of the wave.

Ans:

(c) Plot x3 in frequency domain and calculate its bandwidth.

Ans:

```
fs= 1000;
t= 0:1/fs:1-1/fs;
C=3;
F=6;
Al= 54;
A2=16;
x1 = Al*cos(2*pi*3*100*t);
x2 = A2*cos(2*pi*6*100*t);
x3 = x1 + x2;
fx1= fft(x3);
fx1= fftshift(fx1)/(fs/2);
f= fs/2*linspace(-1,1,fs);
plot (f,abs(fx1));
xlabel('Frequency');
ylabel('Amplitude');
title('Magnitude FFT of sine');
```


Bandwidth Calculation:

```
fs= 1000;
t= 0:1/fs:1-1/fs;
C=3;
F=6;
Al= 54;
A2=16;
x1 = Al*cos(2*pi*3*100*t);
x2 = A2*cos(2*pi*6*100*t);
x3 = x1 + x2;
bandwidth=obw(x3,fs)
```

```
>> twoC2

bandwidth =

   100.9326
```