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MIT WORLD PEACE UNIVERSITY

S. Y. B. Tech. (Electrical and Computer Engineering)

Semester: IV **Subject: Electrical Circuit Analysis**

Name: Shreerang Mhatre **Class:**

Roll No: 33 **Batch:** A2

Experiment No: 04

Name of the Experiment: Performing different operations on signals.

Performed on: 6/9/2022

Submitted on: 13/9/2022

Marks	Teacher's Signature with Date
	13-9-22

Aim: To perform operations of addition, multiplication, scaling, shifting and folding on signals.

Prerequisite: Knowledge of signal generation using MATLAB.

Theory:

Using MATLAB, various operations can be performed on discrete signals, they are, addition, multiplication, scaling, shifting, folding, etc.

- **Addition:** For discrete-time signals, the addition is done by adding sample by sample. In general form, it is given as,

  $Z(n) = x1(n) + x2(n)$

  Where,

  x1(n) and x2(n) are two signals to be added and
  z(n) is the resultant output signal.

  In MATLAB, for addition of discrete-time signals, it is necessary that the sequences should be of equal lengths.

- **Multiplication:** By using ' * ' (asterisk) operator we can perform multiplication of signals.

- **Shifting a Signal:** MATLAB can be used to perform shifting of signals. A signal can be delayed as well as advanced. The basic idea is to add the shift value to indices and thereby plotting the signal.

- **Folding a Signal:** The inbuilt function **fliplr()** function can be used to perform reversing or folding a signal.

Procedure:

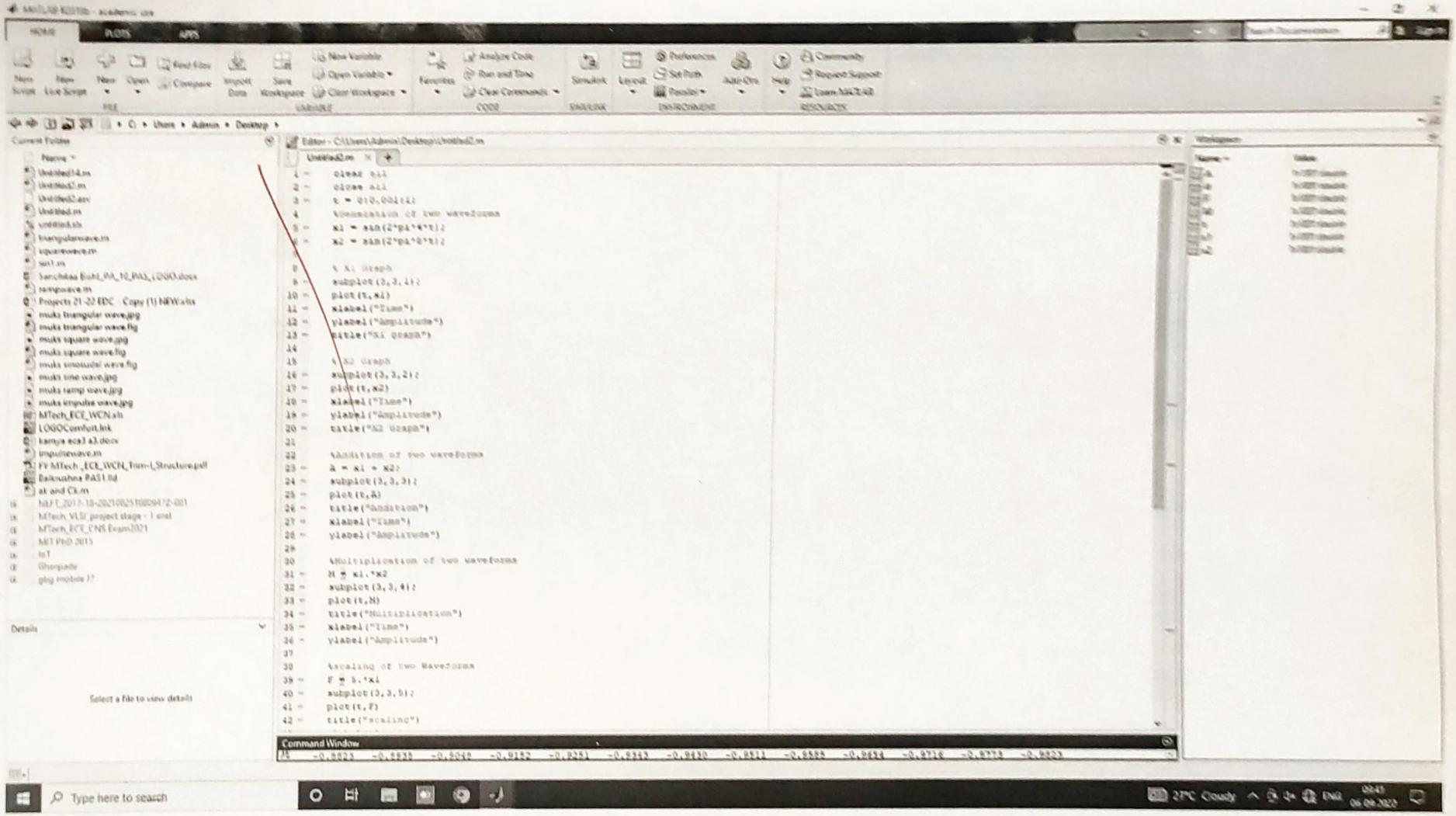
1. Open MATLAB
2. Open new M-file
3. Generate two sine waveforms of two different frequencies
4. Perform all the above operations one by one and display results by using function "subplot"
5. Save in current directory
6. Compile and Run the program
7. For the output see command window\ Figure window

Activity:

Attach screenshots of above activity.

Post Lab Questions:

1. Compare Mesh analysis and Nodal analysis.
2. Define a node.
3. What is a Supermesh?


HOME
PLOTS
APPS
Editor - C:\Users\Admin\Desktop\untitled2.m
Untitled2.m
clear all
close all
t = 0:0.001:1;
%Generation of two waveforms
x1 = sin(2*pi*4*t);
x2 = sin(2*pi*8*t);
% X1 Graph
subplot(3,3,1);
plot(t,x1)
xlabel("Time")
ylabel("Amplitude")
title("X1 Graph")
% X2 Graph
subplot(3,3,2);
plot(t,x2)
xlabel("Time")
ylabel("Amplitude")
title("X2 Graph")
%Addition of two waveforms
A = x1 + x2;
subplot(3,3,3);
plot(t,A)
title("Addition")
xlabel("Time")
ylabel("Amplitude")
%Multiplication of two waveforms
M = x1.*x2
subplot(3,3,4);
plot(t,M)
title("Multiplication")
xlabel("Time")
ylabel("Amplitude")
%scaling of two Waveforms
F = 5.*x1
subplot(3,3,5);
plot(t,F)
title("scaling")
Command Window
Current Folder
Details
Select a file to view details
Workspace
Type here to search
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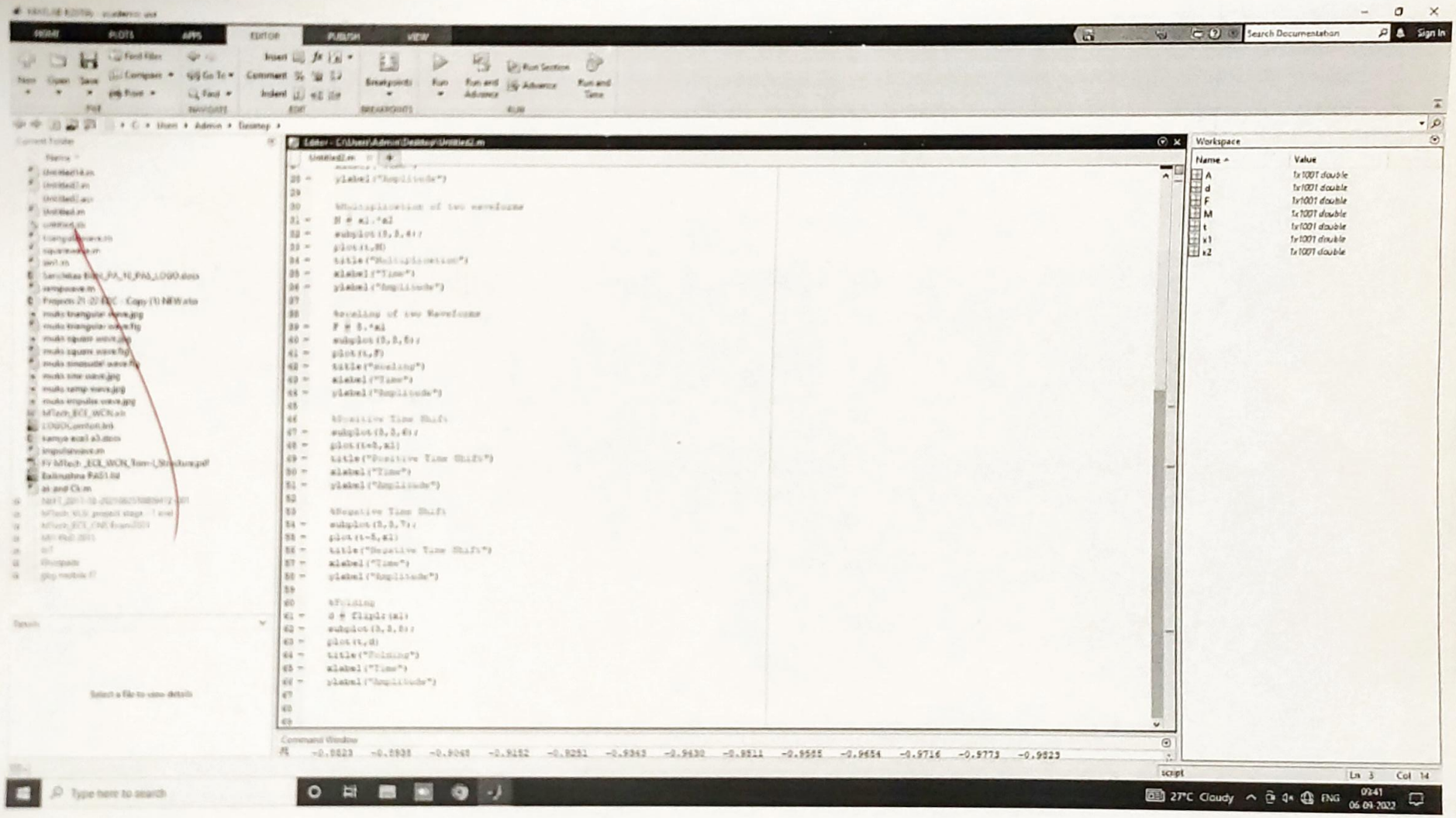
ENG


HOME
PLOTS
APPS
EDITOR
PUBLISH
VIEW
Search Documentation
Sign In
Editor - C:\Users\Admin\Desktop\Untitled2.m
Untitled2.m
ylabel("Amplitude")
%Multiplication of two waveforms
M = x1.*x2
subplot(3,3,4);
plot(t,M)
title("Multiplication")
xlabel("Time")
ylabel("Amplitude")
%scaling of two Waveforms
F = 5.*x1
subplot(3,3,5);
plot(t,F)
title("scaling")
xlabel("Time")
ylabel("Amplitude")
%Positive Time Shift
subplot(3,3,6);
plot(t+5,x1)
title("Positive Time Shift")
xlabel("Time")
ylabel("Amplitude")
%Negative Time Shift
subplot(3,3,7);
plot(t-5,x1)
title("Negative Time Shift")
xlabel("Time")
ylabel("Amplitude")
%Folding
d = fliplr(x1);
subplot(3,3,8);
plot(t,d)
title("Folding")
xlabel("Time")
ylabel("Amplitude")
Command Window
-0.8823 -0.8928 -0.9045 -0.9152 -0.9251 -0.9343 -0.9430 -0.9511 -0.9585 -0.9654 -0.9716 -0.9773 -0.9823
Workspace
Name
Value
A 1x1001 double
d 1x1001 double
F 1x1001 double
M 1x1001 double
t 1x1001 double
x1 1x1001 double
x2 1x1001 double
script
Ln 3 Col 14
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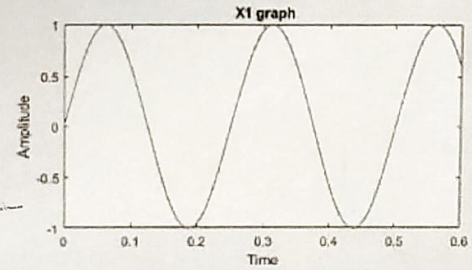
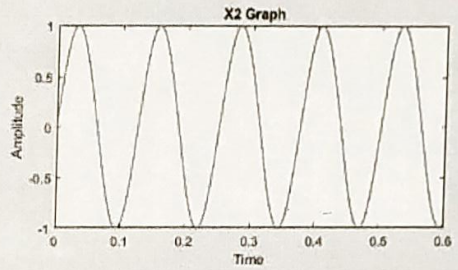
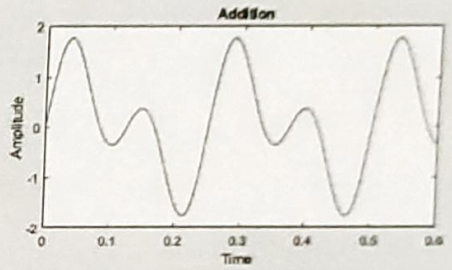
09:41
06-09-2022

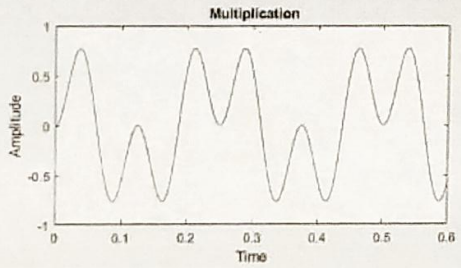
Figure 1

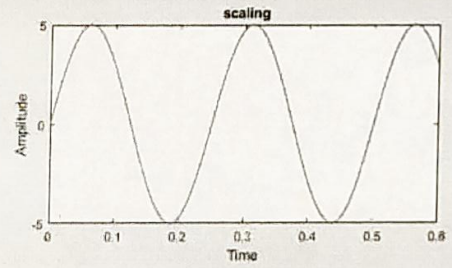
File Edit View Insert Tools Desktop Window Help

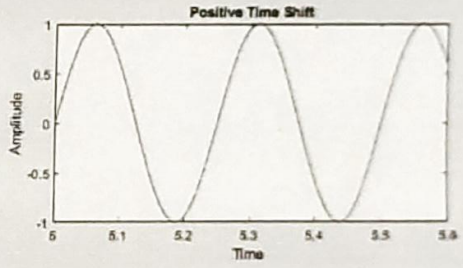


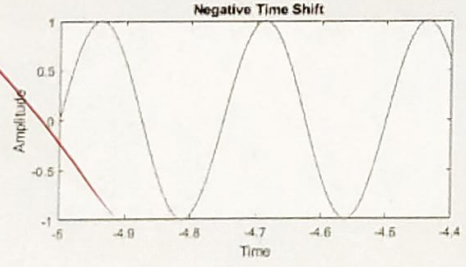


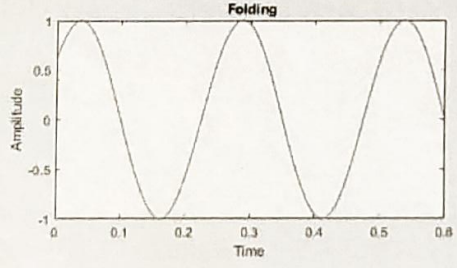












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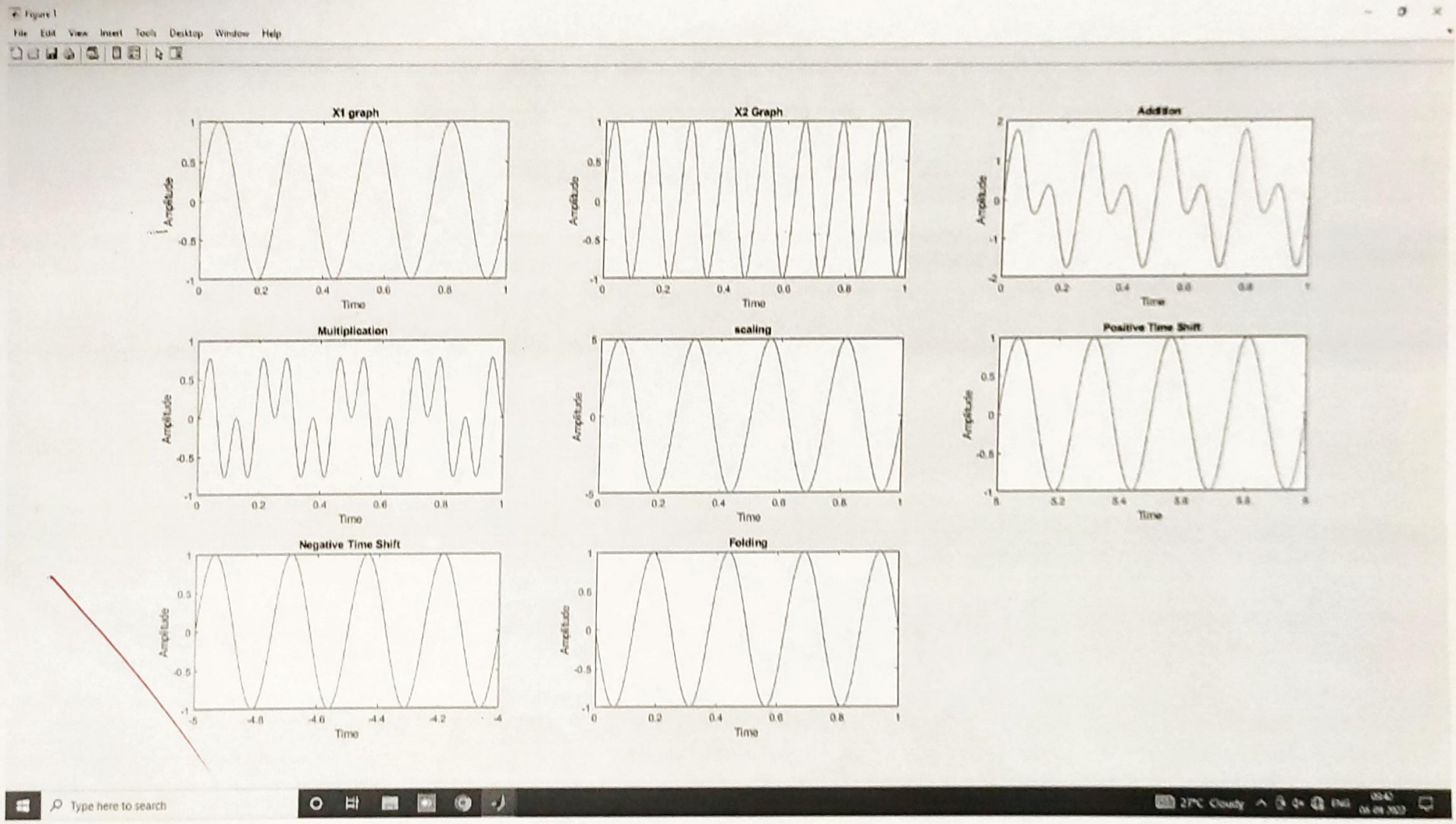
Figure 1
File Edit View Insert Tools Desktop Window Help
X1 graph
X2 Graph
Addition
Multiplication
scaling
Positive Time Shift
Negative Time Shift
Folding
Amplitude
Time
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* Post Lab Questions -

Q 1) Compare Mesh analysis and Nodal analysis.

→ The difference between mesh and nodal analysis is that nodal analysis is an application of Kirchhoff's current law, which is used for calculating the voltages at each node in an application. while mesh analysis is an application of Kirchhoff's voltage law which is used for calculating the current.

Q 2) Define a node

→ Any region on a circuit between two circuit elements.

Q 3) what is a supermesh?

→ A supermesh occurs when a current source is contained between two essential meshes. The circuit is first treated as if the current source is not there. This leads to one equation that incorporates two mesh currents.

13/4/22

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