Ryerson University

Department of Electrical, Computer, & Biomedical Engineering
Faculty of Engineering & Architectural Science

ELE 202
Electric Circuit Analysis
LAB COVER PAGE for **Part I** submission.

Lab #:	5	**Lab Title:**	Introduction to Function Generators, Oscilloscopes, & AC Measurements

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***Signature*:**	Sayeed Ahamad

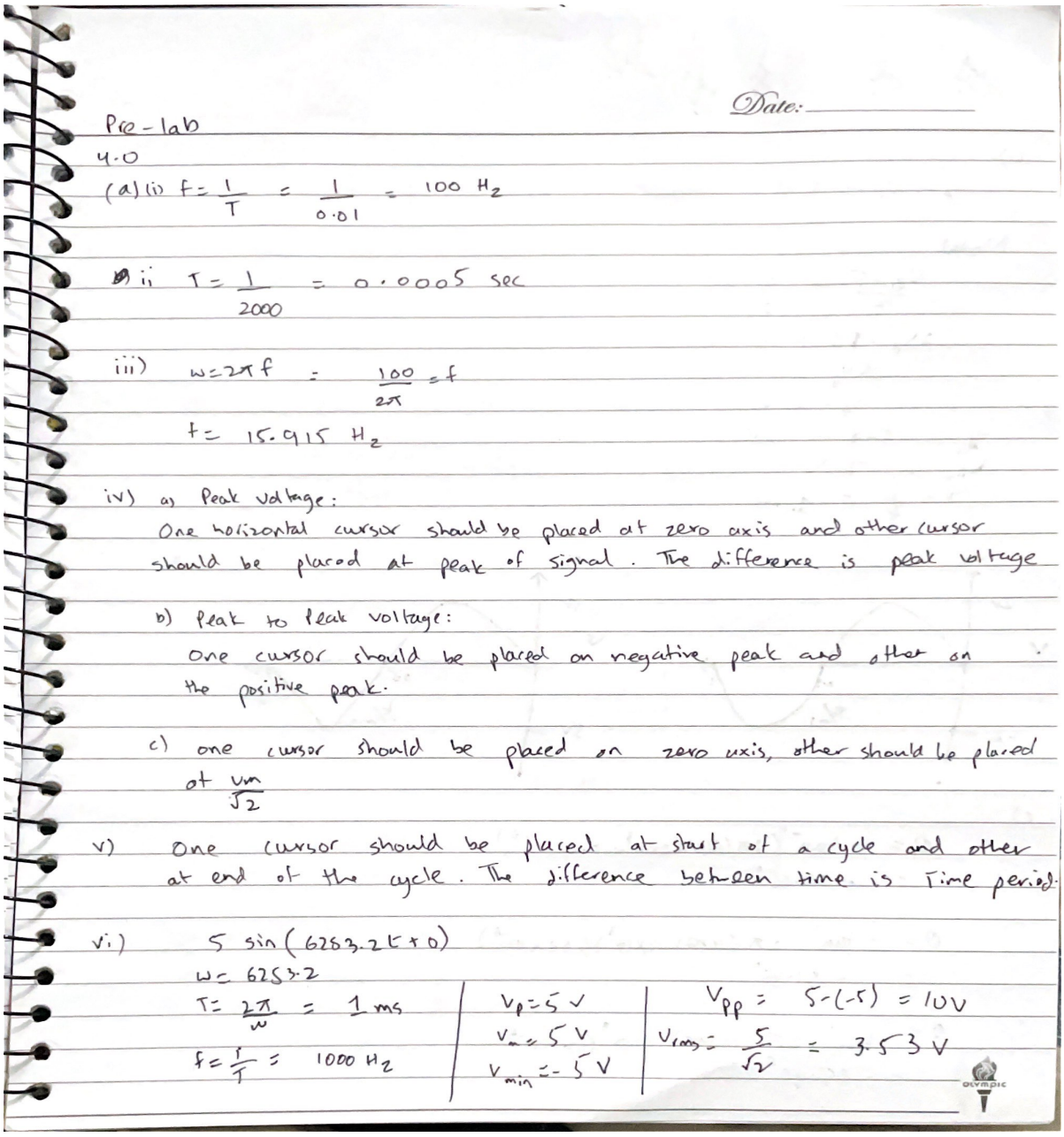
Section #:	11
Submission date and time:	22/3/2023 - 15:00
Due date and time:	22/3/2023 - 15:00

Document submission for Part I:

- A completed and signed "COVER PAGE – **Part I**" has to be included with your submission. The report will not be graded if the signed cover page is not included.
- Your completed handwritten pages of **Section 4.0** should be scanned (via a scanner or phone images), together with the required MultiSIM images. **Note:** *MultiSIM results must be generated using the Department's licensed version of MultiSIM, and the captured screenshots should show your name (at the center-top) and the timestamp (at the bottom-right corner of your screen).*
- Collate and create a ***.pdf*** or ***.docx*** file of the above, and upload it via D2L **any time prior to the start of your scheduled lab**. Upload instructions are provided on D2L.

Zero marks will be assigned for the entire lab if this Part I is not submitted prior to your scheduled lab.

**By signing above, you attest that you have contributed to this submission and confirm that all work you have contributed to this submission is your own work. Any suspicion of copying or plagiarism in this work will result in an investigation of Academic Misconduct and may result in a "0" on the work, an "F" in the course, or possibly more severe penalties, as well as a Disciplinary Notice on your academic record under the Student Code of Academic Conduct, which can be found online at: www.ryerson.ca/senate/current/pol60.pdf.*



Pre-lab

Date: _____

4.0

(a) (i) $f = \frac{1}{T} = \frac{1}{0.01} = 100\ Hz$

ii) $T = \frac{1}{2000} = 0.0005\ sec$

iii) $w = 2\pi f = \frac{100}{2\pi} = f$

$f = 15.915\ Hz$

iv) a) Peak voltage:

One horizontal cursor should be placed at zero axis and other cursor should be placed at peak of signal. The difference is peak voltage

b) Peak to peak voltage:

One cursor should be placed on negative peak and other on the positive peak.

c) one cursor should be placed on zero axis, other should be placed at $\frac{v_m}{\sqrt{2}}$

v) One cursor should be placed at start of a cycle and other at end of the cycle. The difference between time is Time period.

vi) $5 \sin(6283.2t + 0)$

$w = 6283.2$

$T = \frac{2\pi}{w} = 1\ ms$

$f = \frac{1}{T} = 1000\ Hz$

$V_p = 5\ V$

$V_m = 5\ V$

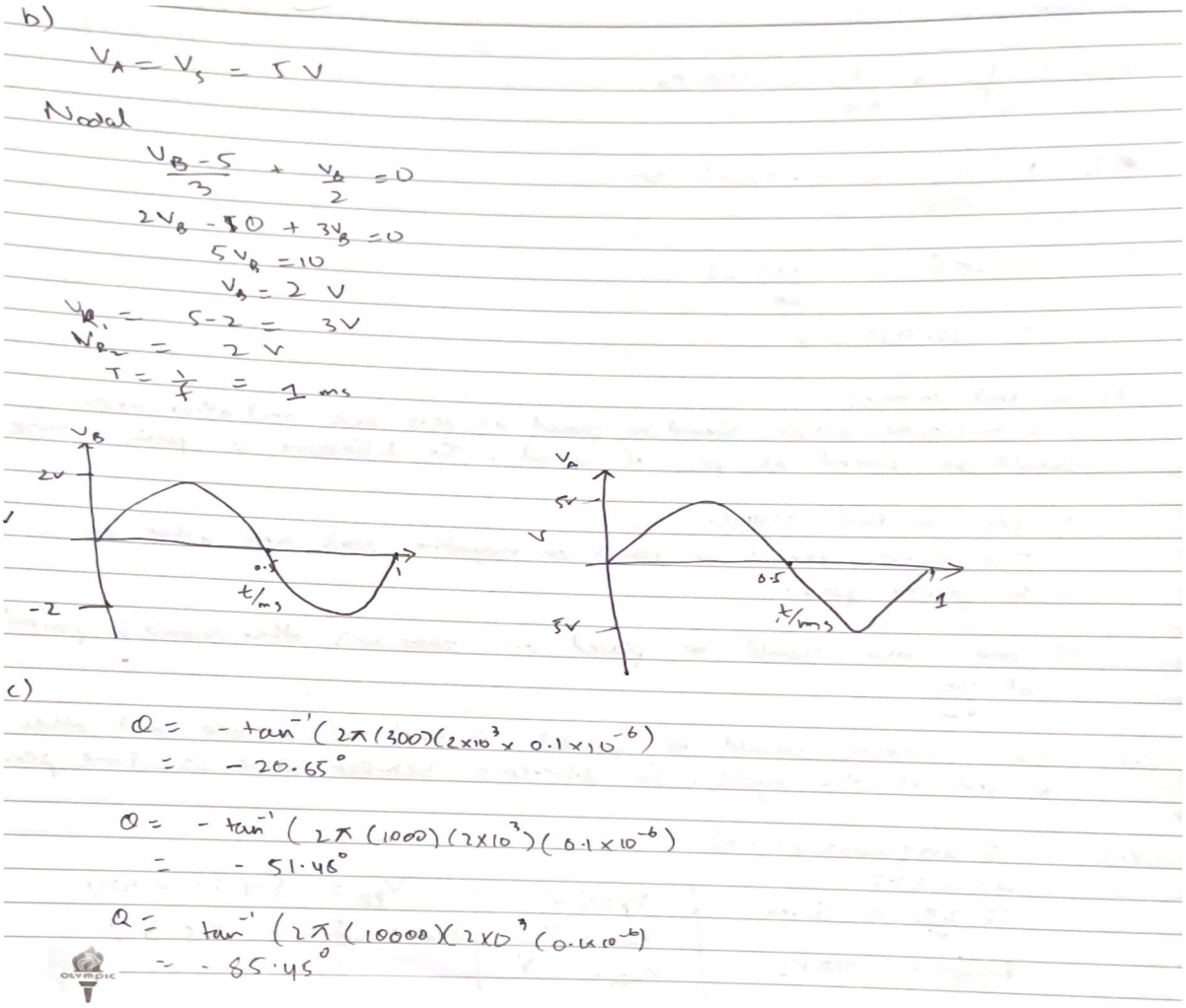
$V_{min} = -5\ V$

$V_{pp} = 5 - (-5) = 10V$

$V_{rms} = \frac{5}{\sqrt{2}} = 3.53\ V$

A)

T (msec.)	f (Hz)	V_P (volts)	V_{max} (volts)	V_{min} (volts)	V_{P-P} (volts)	V_{rms} (volts)
1	**1000**	**5**	**5**	**5**	**10**	**3.53**



b)

f (Hz)	V_A (volts)	V_B (volts)	V_{R1} (volts)	V_{R2} (volts)
1000	5	2	3	2

c)

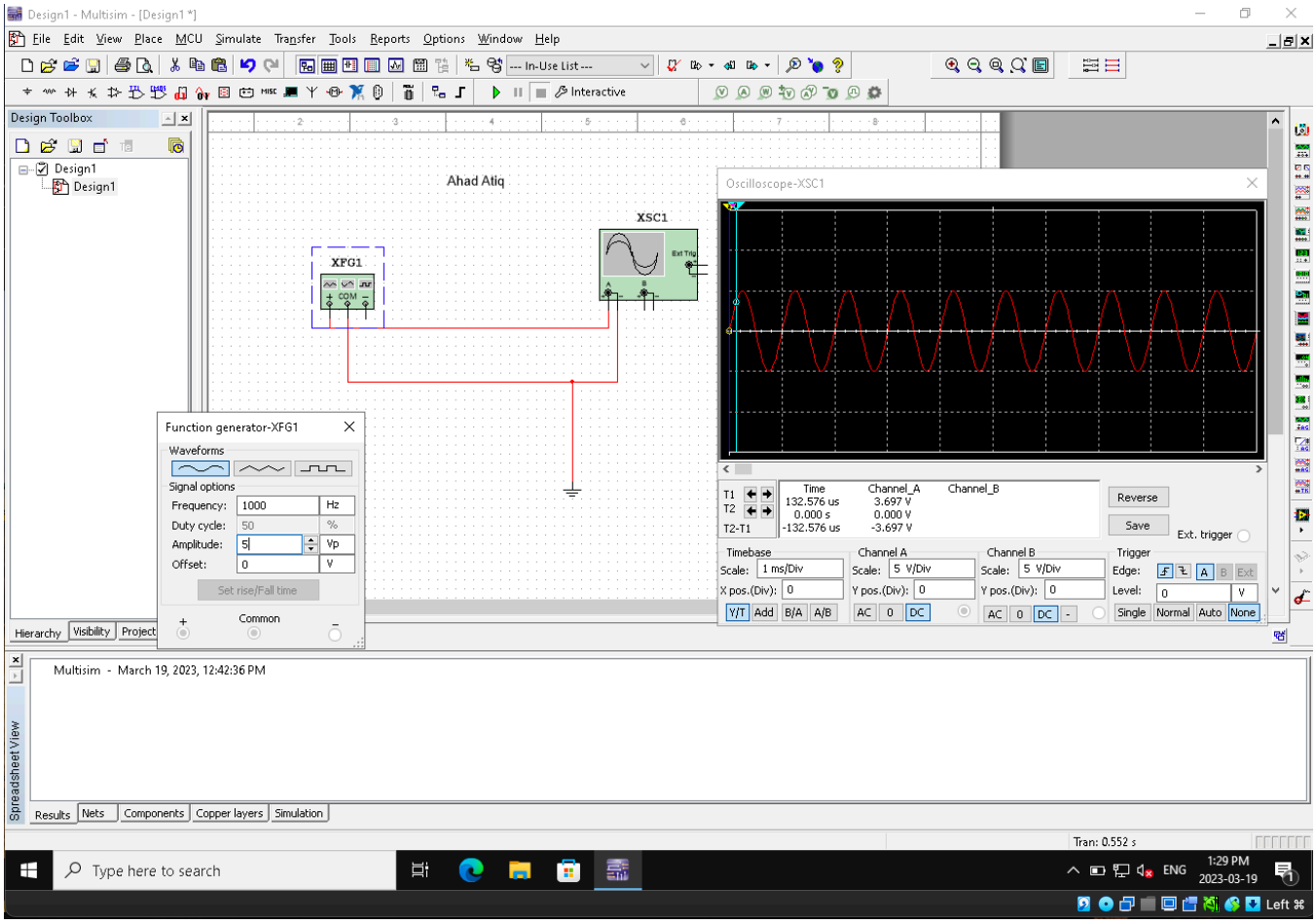
f =>	300 (Hz)	1000 (Hz)	10000 (Hz)
θ^o	20.65	51.48	85.45

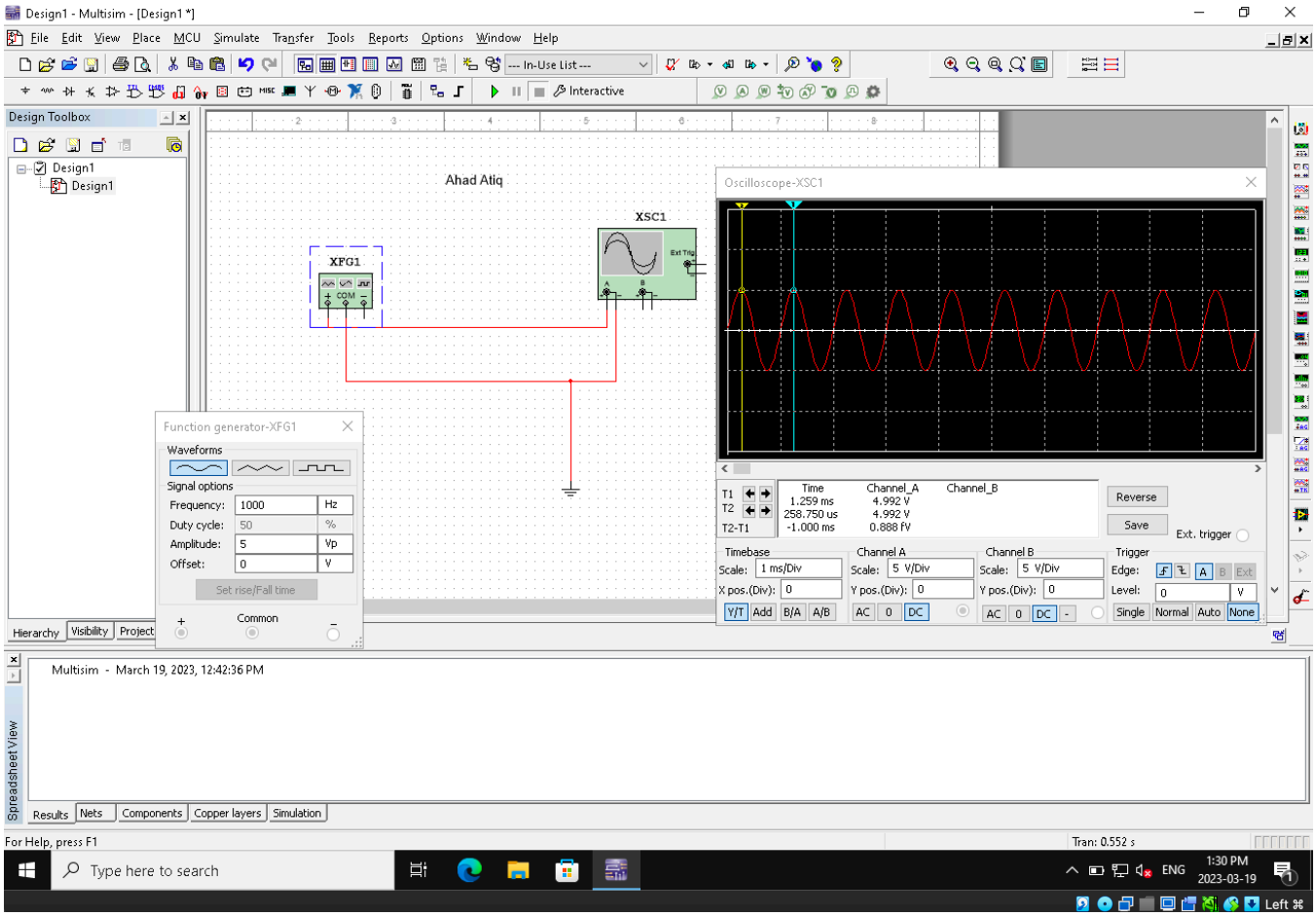
Table 2.1: Theoretical phase-shift values of Figure

d)

T (msec.)	f = 1/T (Hz)	V_P (volts)	V_{max} (volts)	V_{min} (volts)	V_{P-P} (volts)	V_{rms} (volts)
1.0	**1000**	**5.0**	**4.992**	**4.992**	**10.0**	**3.69**

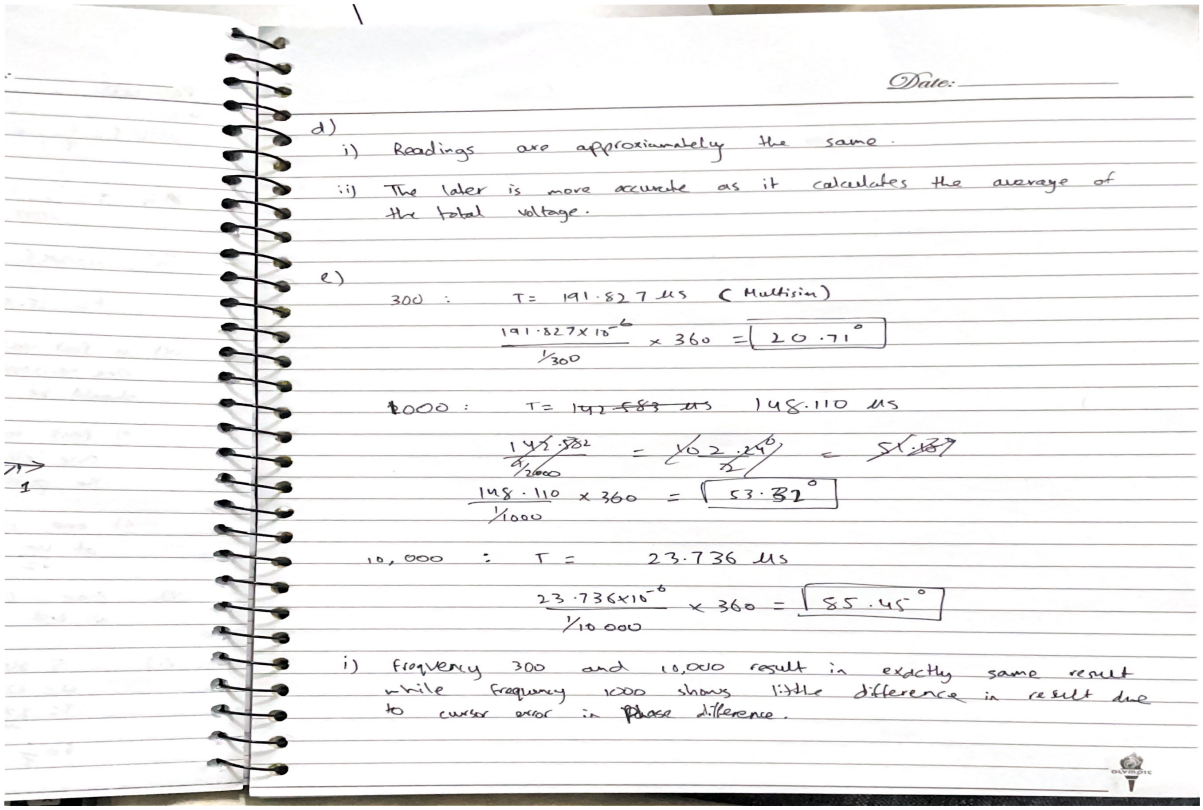
Table 3.0: MultiSIM measured values of the sinewave properties





e)

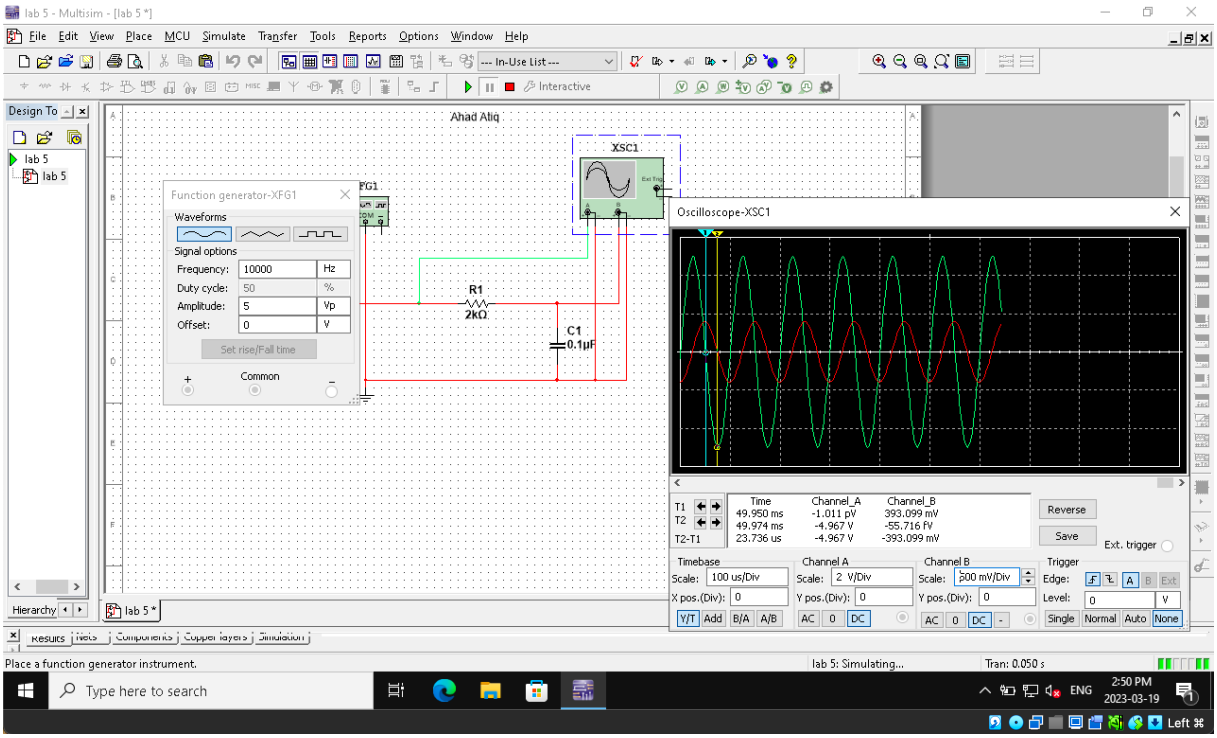
f (Hz)	V_A (volts)	V_B (volts)	$V_{R1} = V_A - V_B$ (volts)	$V_{R2} = V_B$ (volts)
1000	5	2	3.1	1.98

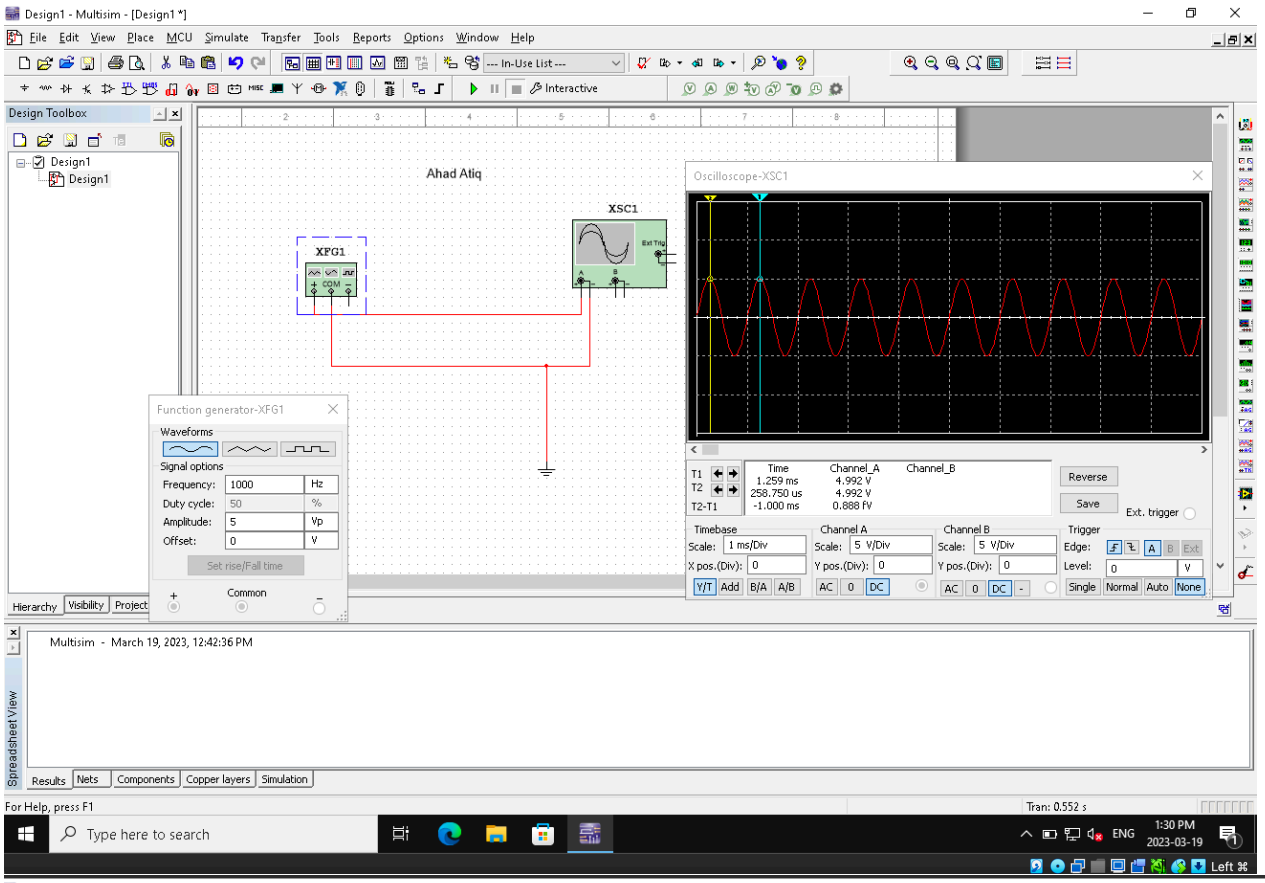


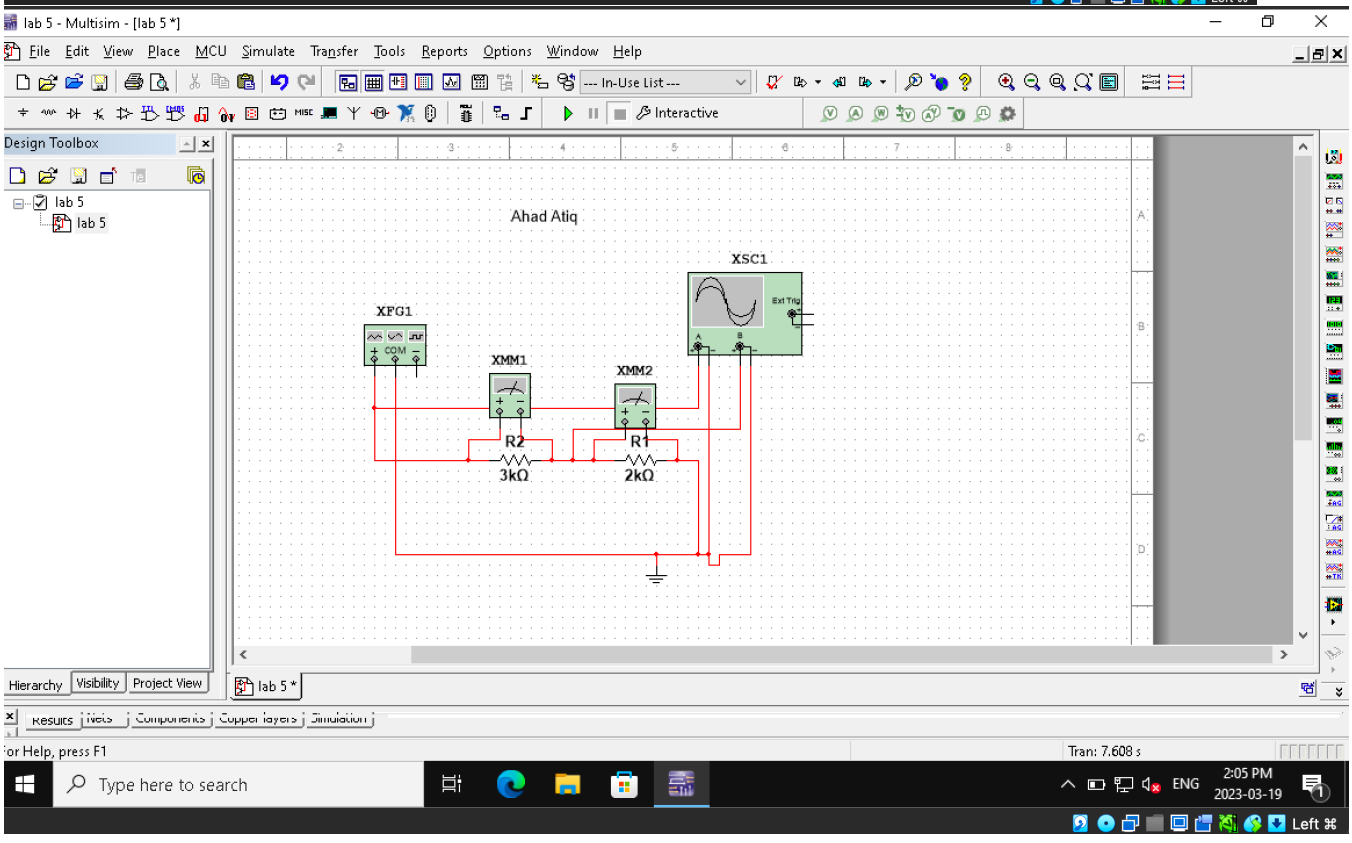
f)

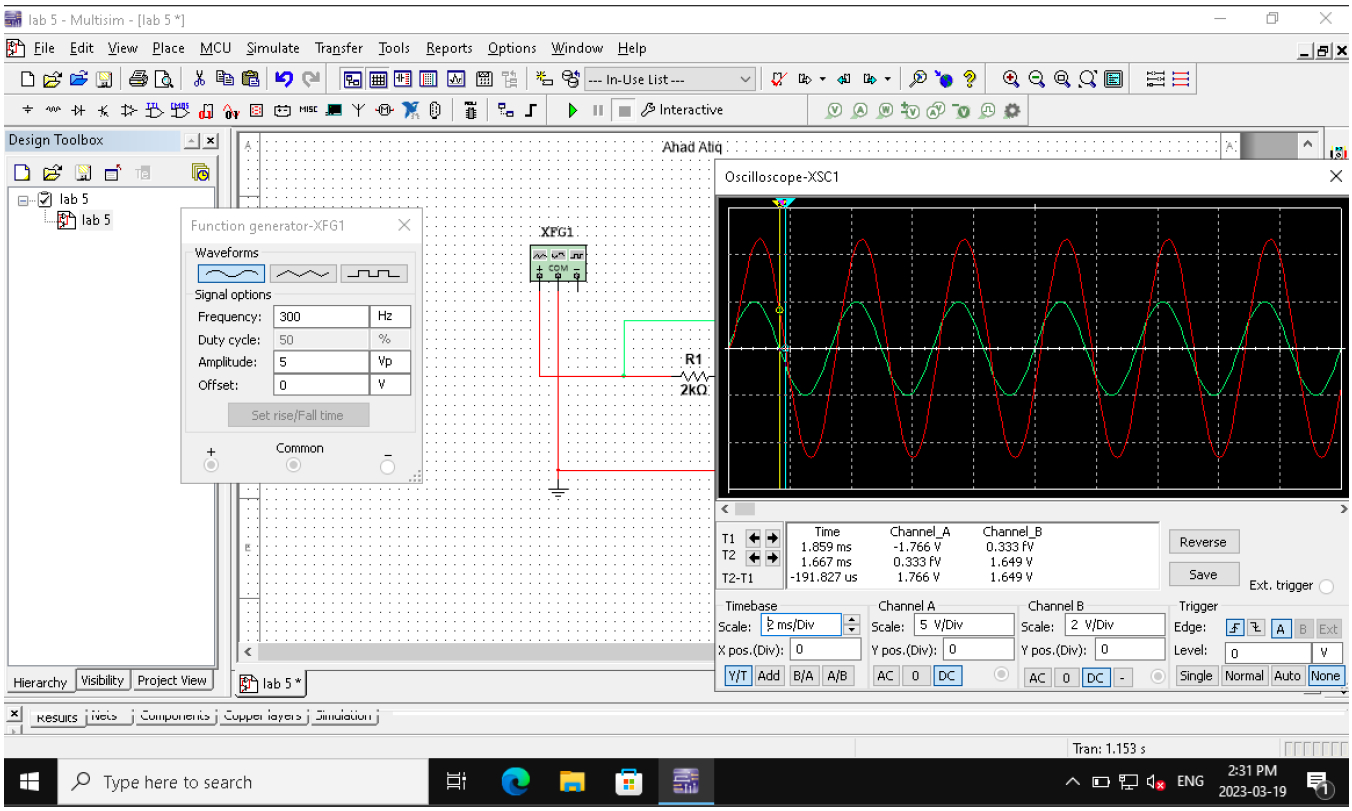
f	T	ΔT	Θo
	calculated from freq., f	measured on MultiSIM	determined from ΔT
300 (Hz)	0.003	20.71	20.65
1000 (Hz)	0.001	53.32	51.48
10000 (Hz)	0.0001	85.45	85.45

Table 3.2: MultiSIM measured phase-shift values of Figure 3.0 circuit


lab 5 - Multisim - [lab 5 *]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
Interactive
Design To
lab 5
lab 5
Ahad Atiq
XSC1
Function generator-XFG1
Waveforms
Signal options
Frequency: 10000 Hz
Duty cycle: 50 %
Amplitude: 5 Vp
Offset: 0 V
Set rise/Fall time
Common
R1
2kΩ
C1
0.1µF
Oscilloscope-XSC1
Time Channel_A Channel_B
49.950 ms -1.011 pV 393.099 mV
49.974 ms -4.967 V -55.716 fV
23.736 us -4.967 V -393.099 mV
T2-T1
Reverse
Save
Ext. trigger
Timebase
Scale: 100 us/Div
X pos.(Div): 0
Channel A
Scale: 2 V/Div
Y pos.(Div): 0
Channel B
Scale: 500 mV/Div
Y pos.(Div): 0
Trigger
Edge:
Level: 0 V
Single Normal Auto None
lab 5 *
Results Nets Components Copper layers Simulation
Place a function generator instrument.
lab 5: Simulating...
Tran: 0.050 s
Type here to search
ENG
2:50 PM
2023-03-19


Design1 - Multisim - [Design1 *]
Ahad Atiq
XSC1
XFG1
Oscilloscope-XSC1
Function generator-XFG1
Waveforms
Signal options
Frequency: 1000 Hz
Duty cycle: 50 %
Amplitude: 5 Vp
Offset: 0 V
Set rise/Fall time
Common
Multisim - March 19, 2023, 12:42:36 PM
Type here to search
1:30 PM
2023-03-19


lab 5 - Multisim - [lab 5 *]
Ahad Atiq
XSC1
XFG1
XMM1
XMM2
R2
3kΩ
R1
2kΩ
Type here to search
2:05 PM
2023-03-19


lab 5 - Multisim - [lab 5 *]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
Interactive
Design Toolbox
lab 5
lab 5
Function generator-XFG1
Waveforms
Signal options
Frequency: 300 Hz
Duty cycle: 50 %
Amplitude: 5 Vp
Offset: 0 V
Set rise/Fall time
Common
XFG1
R1
2kΩ
Ahad Aliq
Oscilloscope-XSC1
Time Channel_A Channel_B
T1 1.859 ms -1.766 V 0.333 fV
T2 1.667 ms 0.333 fV 1.649 V
T2-T1 -191.827 us 1.766 V 1.649 V
Reverse
Save
Ext. trigger
Timebase
Scale: 2 ms/Div
X pos.(Div): 0
Y/T Add B/A A/B
Channel A
Scale: 5 V/Div
Y pos.(Div): 0
AC 0 DC
Channel B
Scale: 2 V/Div
Y pos.(Div): 0
AC 0 DC
Trigger
Edge:
Level: 0 V
Single Normal Auto None
Hierarchy Visibility Project View
lab 5 *
Results Nets Components Copper layers Simulation
Tran: 1.153 s
Type here to search
ENG
2:31 PM
2023-03-19