LAB REPORT FOR EXPERIMENT 1.2

Date: August 10, 2021

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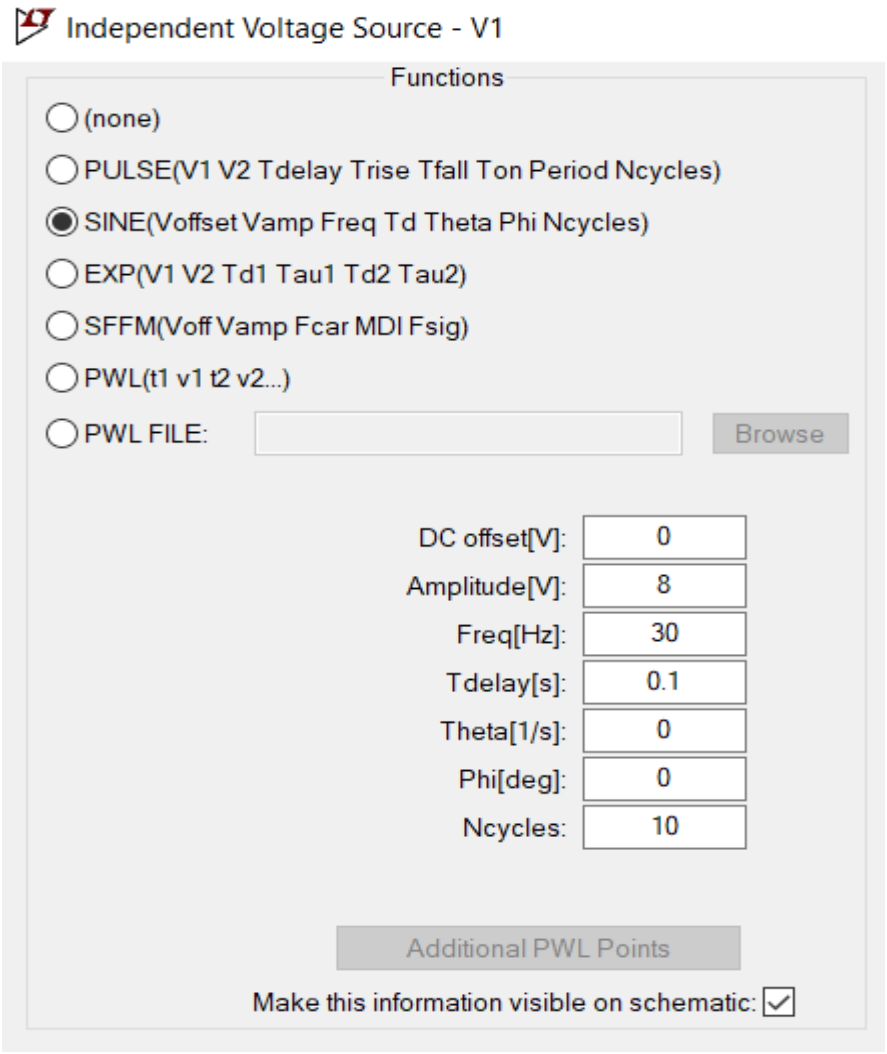
Title of Experiment: Objectives 1.2: I-V Characteristics of Ohm's Law involving AC Input

Brief Description:

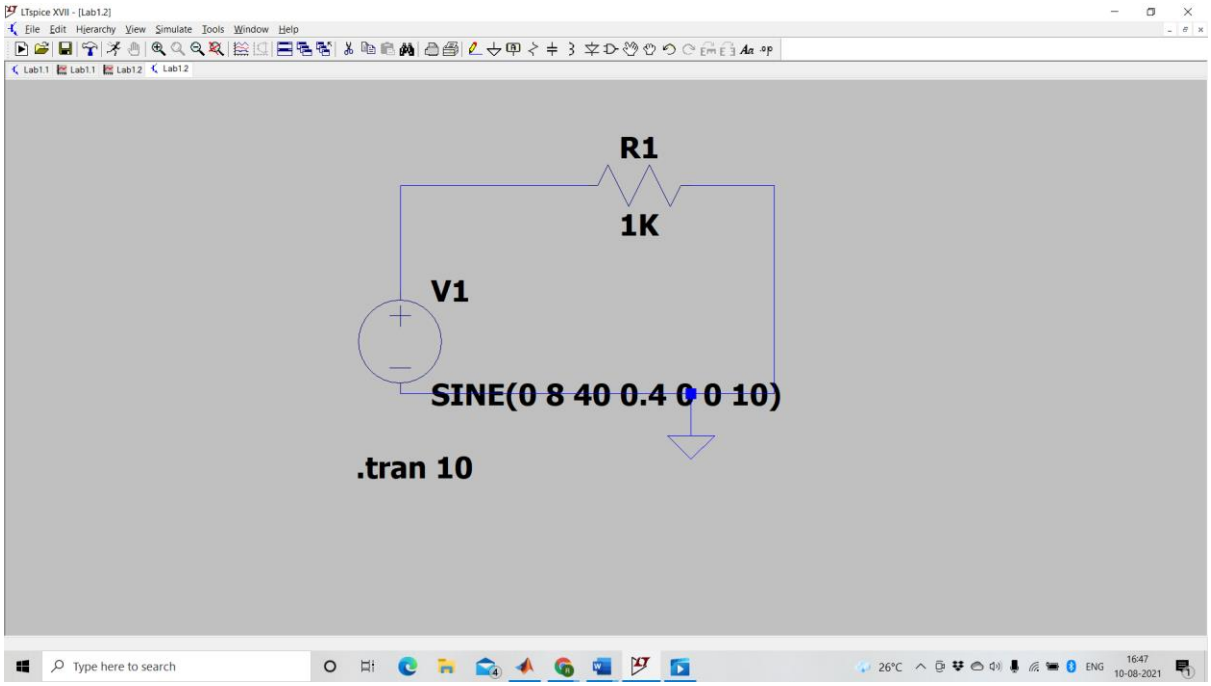
This lab session involved the use of LTspice which is an analog electronic circuit simulator computer software, to perform some basic simulations namely first drawing the circuit that involved a resistor of 1K Ohms with an AC voltage source in series. The AC voltage source had the following parameters:



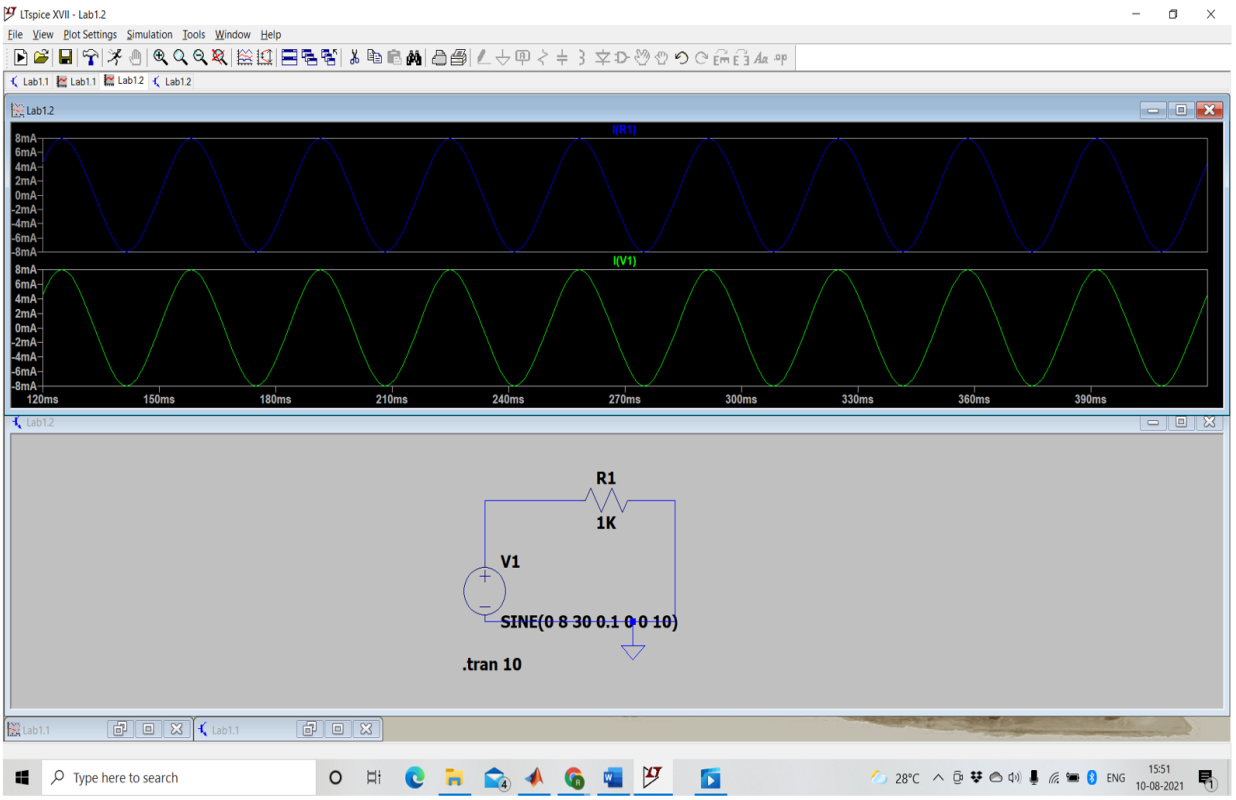
Schematic diagram:

The following screenshot depicts the circuit setup.

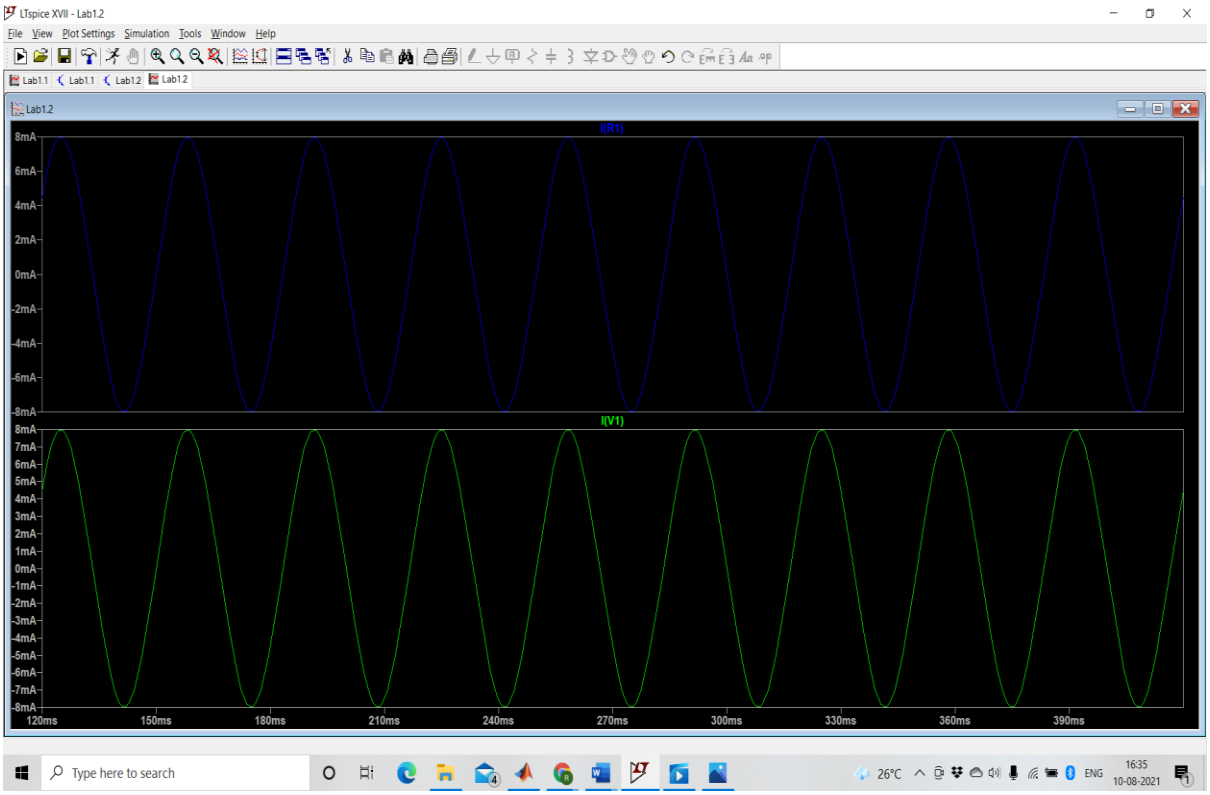
While running the simulations, I tried the AC input with two sets of values as outlined in the results and in the brief procedure above.



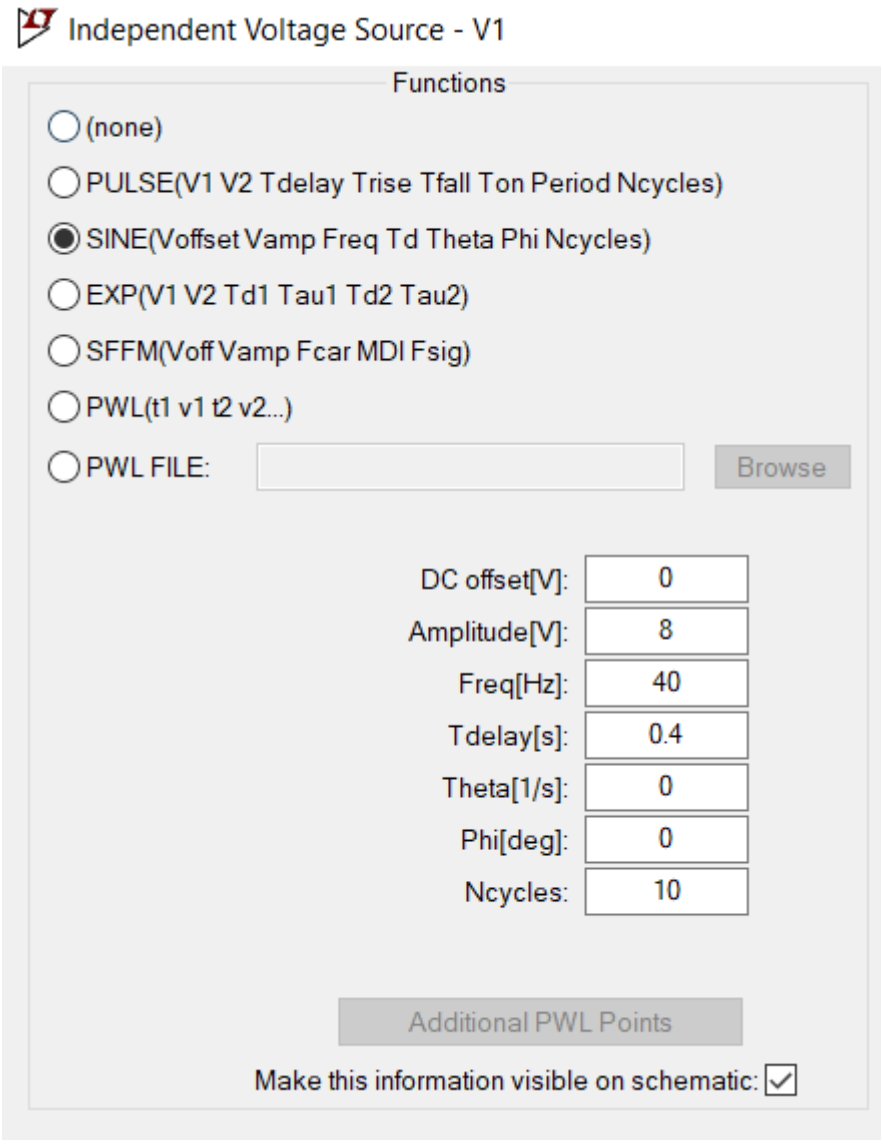
Results:



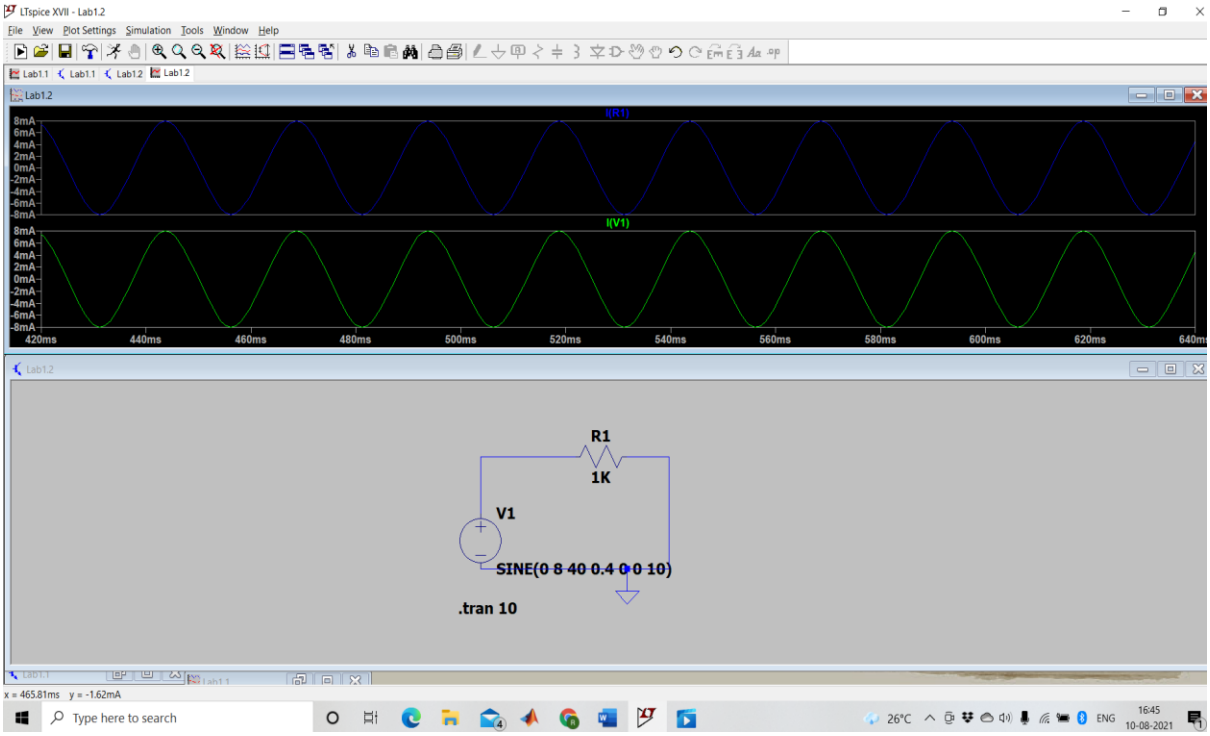
An enlarged image of the above is as follows :

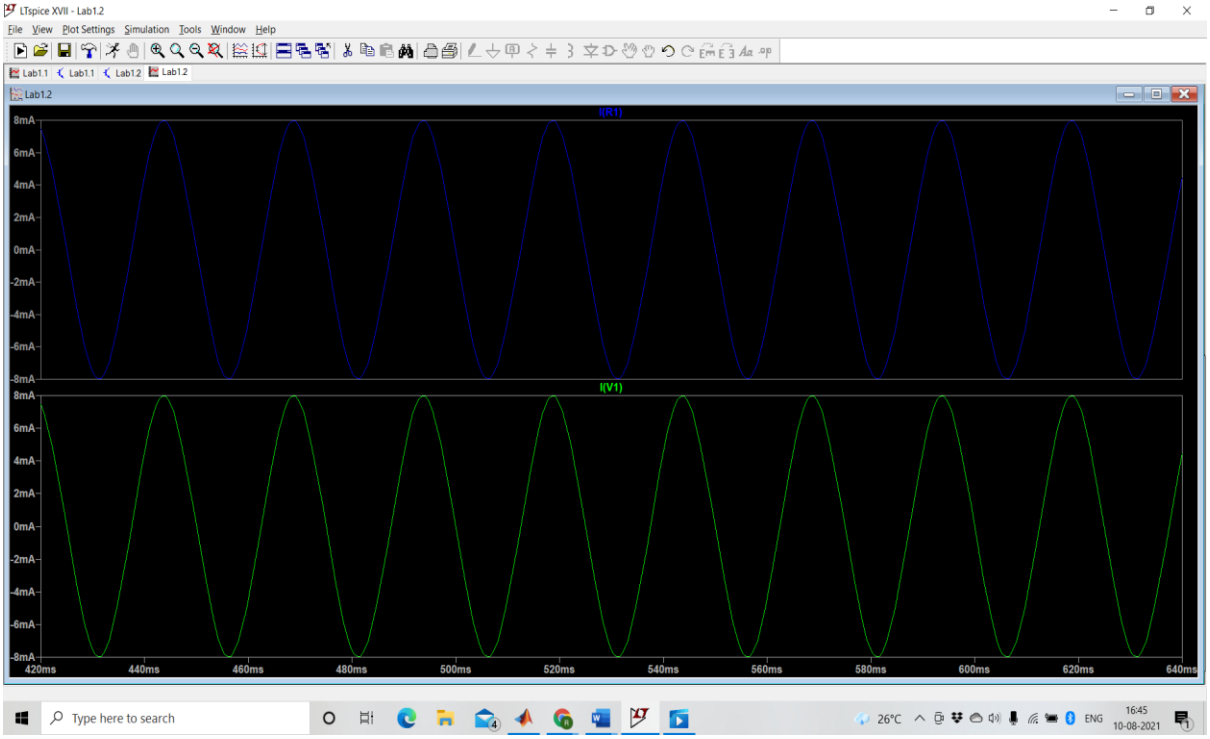


This experiment was also performed with another set of values for the AC voltage source:



The corresponding result obtained is as follows :


LTspice XVII - Lab1.2
File View Plot Settings Simulation Tools Window Help
Lab1.1 Lab1.1 Lab1.2 Lab1.2
Lab1.2
I(R1)
I(V1)
8mA 6mA 4mA 2mA 0mA -2mA -4mA -6mA -8mA
420ms 440ms 460ms 480ms 500ms 520ms 540ms 560ms 580ms 600ms 620ms 640ms
R1
1K
V1
SINE(0 8 40 0.4 0 0 10)
.tran 10
x = 465.81ms y = -1.62mA
Type here to search
26°C
ENG
16:45
10-08-2021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420ms 440ms 460ms 480ms 500ms 520ms 540ms 560ms 580ms 600ms 620ms 640ms
Type here to search
26°C
ENG
16:45
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Discussion:

In this version of performing Experiment 1, the input was generated through an AC voltage source. In real life, a typical AC source is basically an electric generator in which the rotor in a magnetic field generates sine waves as it rotates. So in an AC voltage source, the polarity of the positive and negative terminals change periodically while in the case of a DC source, polarity remains the same.

In an AC circuit, this can be mathematically represented as follows :

$\Delta V = \Delta V1 \sin(\omega t)$

Where ΔV is instantaneous voltage , $\Delta V1$ is the maximum voltage of the generator and ω is the angular frequency of the AC voltage source.

Ohm's law is applicable to circuits involving an AC voltage source too and is generally written as $I=V/Z$ where Z I the impedance of the circuit.

Hence the Plots we obtained above are in tandem with Ohm's Law