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| ***Instructions:***   * ***Submission must contain only original, individual, and current work.*** * ***After completion, save as PDF before submitting.*** |

## Task 2.7.1

### Objective:

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| --- |
| Root mean square value measurement. |

### Results/Calculations:

#### Step 2: :

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| --- |
| ACrms = 2 \* 1/sqrt(2) = sqrt(2)V  DCoffset = 4V  DCrms = sqrt ( sqrt(2)^2 + 4^2) = sqrt(18)V |

#### Step 3-4:

Table :Sine RMS Voltage and Freq.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Quantity | Theoretical Value ( ) | Measured Vlaue ( ) | %Error | Comments |
| **RMS Voltage ( V )** | 1.41 | 1.48 | 4.96% | Very close |
| **Frequency (kHz)** | 1 | 1 | 0% | Reading was spot on |

#### Step 5:

|  |
| --- |
| ACrms = 3 \* 1 / sqrt(3) = sqrt(3)  DCoffset = -2  DCrms = sqrt( sqrt(3)^2 + (-2)^2) = sqrt(7) |

Table :Triangle RMS Voltage and Freq.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Quantity | Theoretical Value ( ) | Measured Vlaue ( ) | %Error | Comments |
| RMS Voltage ( V) | 1.73 | 1.726 | .23% | Almost exact |
| Frequency (kHz) | 1 | 2 | 0 | It’s 2kHz on manual |

### Conclusion:

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| --- |
| Root mean square voltage can be calculated and predicted with equations. |

## Task 2.7.2

### Objective:

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| --- |
| Automation library: RMS measurement |

### Results/Calculations:

#### Step 3:

|  |
| --- |
| function [dc\_rms, ac\_rms] = dmm\_rms\_volt(instr)  fprintf(instr, 'MEAS:VOLT:AC? MAX');  ac\_rms = fscanf(instr, '%d');  fprintf(instr, 'MEAS:VOLT:DC? MAX');  dc\_offset = fscanf(instr, '%d');  dc\_rms = sqrt((ac\_rms^2) + (dc\_offset^2));  end |

#### Step 2:

Table : Type in an appropriate caption for the table below.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Signal | Theoretical DCRMS ( ) | Measured DCRMS ( ) | %Error | Theoretical ACRMS ( ) | Measured ACRMS ( ) | %Error |
| Sinewave | Calculated Value | Measured Data | Calculated Error | Calculated Value | Measured Data | Calculated Error |
| Triangle wave | Calculated Value | Measured Data | Calculated Error | Calculated Value | Measured Data | Calculated Error |

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| --- |
| Enter your comment here. |

### Conclusion:

|  |
| --- |
| RMS Values can be measured and interpreted in code. |

## Task 2.7.3

### Objective:

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| --- |
| Type in the objective of this task here. |

### Results/Calculations

#### Step 2-4 (code):

|  |
| --- |
| %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%  % ECE 20007 Instrument Control Skeleton File %  % 01/14/2019 %  %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%  %% Instrument Addresses  % These are found as VISA addresses in Keysight connection expert)  % Leave address blank for any unused instruments  fg\_addr = 'USB0::0x0957::0x2C07::MY57801794::0::INSTR';  dmm\_addr = '';  scope\_addr = '';  psu\_addr = '';  %% Connect to devices with addresses specified  instrreset;  fg = instr\_connect(fg\_addr, 'usb');  dmm = instr\_connect(dmm\_addr, 'usb');  psu = instr\_connect(psu\_addr, 'serial');  scope = instr\_connect(scope\_addr, 'usb');  %% Insert measurement code here  fg\_output(fg, 1, 'ON');  fg\_sin(fg, 1, 1400, 1.5, 1);  fg\_output(fg, 2, 'ON');  fg\_sin(fg, 2, 60, 2.8, 0)  %% Disconnect from all instruments used  instr\_disconnect(fg);  instr\_disconnect(scope);  instr\_disconnect(dmm);  instr\_disconnect(psu); |

#### Step 3:

Table : Type in an appropriate caption for the table below.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Signal | Theoretical DCRMS ( V ) | Measured DCRMS ( V ) | %Error | Theoretical ACRMS ( V ) | Measured ACRMS ( V ) | %Error |
| Sinewave | .53 | .529 | .19% | .53 | .529 | .19% |
| Triangle wave | .99 | .986 | .4% | .99 | .986 | .4% |

|  |
| --- |
| Very accurate |

### Conclusion:

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| The function generator can be read and interpreted in code. |

## Task 2.7.4

### Objective:

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| Verification of Ohm’s Law using an AC voltage source |

### Circuit Schematic(s):

|  |
| --- |
|  |
| Figure 1: AC Voltage across resistor. |

### Results/Calculations:

#### Step 3-4 (data)

Table : Measured Current and Voltage

| Set Amplitude  ( 0) | Meas’d RMS Voltage (mV ) | Meas’d Current (A ) |
| --- | --- | --- |
| 0 | 0 | 0 |
| 1 | .45 | .0003 |
| 2 | 1.4 | .00037 |
| 3 | 2.1 | .00046 |
| 4 | 2.8 | .00056 |
| 5 | 3.5 | .00065 |
|  |  |  |
|  |  |  |

| Set Amplitude  ( ) | Meas’d RMS Voltage ( ) | Meas’d Current ( ) |
| --- | --- | --- |
| Set Value | Measured Data | Measured Data |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

#### Step 4 (plot)

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|  |
| Figure 2: Type in an appropriate caption for the figure above. |
| Ohm’s law holds true for both AC and DC currents. |

### Conclusion:

|  |
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| Ohm’s law holds true for both AC and DC currents. |

## Task 2.7.5

### Objective:

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| Series and Parallel Bulbs |

### Circuit Schematic(s):

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| --- | --- |
|  |  |
|  | |
| Figure 3: Series and Parallel Circuits with bulbs. Bulbs are labelled B1 through B3 from left to right in Table VI and Table VII | |

### Results/Calculations:

#### Step1

Table : Bulb Voltate, Current, and Power

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Circuit | Bulb | Voltage ( V ) | Current ( mA ) | Power ( W ) |
| 3a | B1 | 1.67 | 31.1 | .52 |
| B2 | 1.48 | 31.1 | .46 |
| B3 | 1.161 | 31.1 | .36 |
| 3b | B1 | 3.77 | 48.58 | 1.83 |
| B2 | 1.06 | 24.3 | 2.1 |
| B3 | 1 | 24.3 | 2.1 |
| 3c | B1 | 4.51 | 54.6 | 2.5 |
| B2 | 4.7 | 54.6 | 2.57 |
| B3 | 4.7 | 54.6 | 2.57 |

#### Step 2:

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| --- |
| The current is different for each configuration. The more current, the brighter |

#### Step 3:

|  |
| --- |
| Modern buildings use parallel configurations because if one bulb goes out the rest still stay on, they are not dependent as the series is. |

#### Step 4:

Table : Type in an appropriate caption for the table below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Circuit | Bulb | Voltage ( ) | Current ( ) | Power ( ) |
| 3a | B1 | Measured Data | Measured Data | Calculated Value |
| B2 |  |  |  |
| B3 |  |  |  |
| 3b | B1 |  |  |  |
| B2 |  |  |  |
| B3 |  |  |  |
| 3c | B1 |  |  |  |
| B2 |  |  |  |
| B3 |  |  |  |

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| Describe your observations and explain them here. |

### Conclusion:

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| Type in conclusion for this task here. |