# ECE 233
# Laboratory Experiment 7
# Waveforms

**1.a.** Using signal generator generate a 250 Hz; 6 Volt peak-to-peak Sine wave ($V_{in}(t) = 3Sin(2\pi ft)$ where f=250 Hz). Observe the waveform on Oscilloscope (on CH1) when Volt/Div=1 Volt and Time/Div=1 msec (millisecond). Draw the signal observed on the Oscilloscope on Figure 1. Increase the frequency to 500 Hz. Plot the new signal over the first plot.

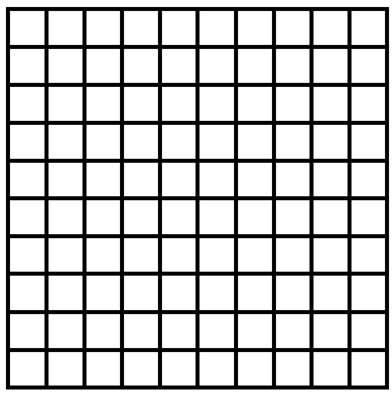



**Figure 1:** Plot of sinusoidal waveforms.

**1.b.** Using multimeter (in AC voltage measurements) find the RMS value for the Sine waves for both cases. (In AC measurements, the multimeter shows the RMS value for the signal)

$V_{RMS}$ (first signal)= $V_{RMS}$ (second signal)=

**2.a.** Using signal generator generate a 250 Hz; 6 Volt peak-to-peak triangular wave. Observe the waveform on Oscilloscope (on CH1) when Volt/Div=1 Volt and Time/Div=1 msec. Draw the signal. Now increase the frequency to 500 Hz. Draw the observed signal on the Oscilloscope on Figure 2. Now increase the frequency to 500 Hz. Plot the new signal over the first plot.

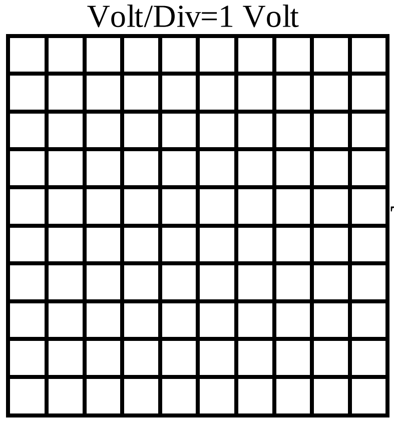


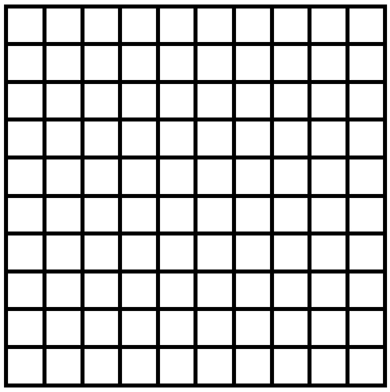

**Figure 2:** Plot of triangular waveforms.

**2.b.** Using multimeter (in AC voltage measurements) find the RMS value for the triangular waves for both cases. (In AC measurements, the multimeter shows the RMS value for the signal)

$V_{RMS}$ (first signal)= $V_{RMS}$ (second signal)=

**3.a.** Using signal generator give a 250 Hz; 6 Volt peak-to-peak square wave. Observe the waveform on Oscilloscope (on CH1) when Volt/Div=1 Volt and Time/Div=1 msec (milisecond). Draw the signal. Now increase the frequency to 500 Hz.. Draw the signal on Figure 3. Now increase the frequency to 500 Hz. Plot the new signal over the first plot

Volt/Div=1 Volt



Time/Div=1 msec

**Figure 3:** Plot of triangular waveforms.

**3.b.** Using multimeter (in AC voltage measurements) find the RMS value for the square waves for both cases. (In AC measurements, the multimeter shows the RMS value for the signal)

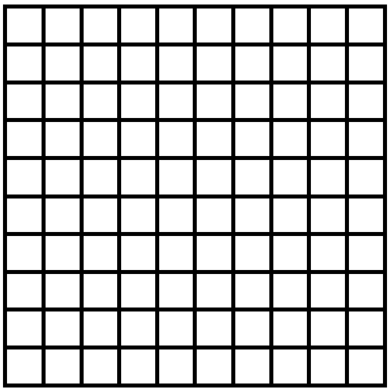
$V_{RMS}$ (first signal)= $V_{RMS}$ (second signal)=

**4.a.** Set up the circuit in the Figure 10. Adjust $V_{AC}(t) = 2Sin(2\pi ft)$ Volt, where f=1000 Hz ($V_{AC}$(t) will be provided using the AC Function Generator) and $V_{DC} = 2$ Volt DC ($V_{DC}$ will be provided using DC power supply). Use 1kΩ resistors for R. Connect CH 1 of the Oscilloscope as in the Figure 4. Draw the seen waveforms observed over CH 1 (on the Oscilloscope) when DC mode and AC mode are selected respectively at Figures 4 and 5. For your observations over the oscilloscope select Volt/Div=0.5 Volt, Time/Div= 0.5 msec (milisecond).

**4.b.** Repeat part **4.a.** However this time only change Volt/Div= 0.2 Volt, Time/Div= 0.2 msec. Draw the seen waveforms observed over CH 1 (on the Oscilloscope) when DC mode and AC mode are selected respectively at Figures 6 and 7.

**4.c.** Repeat part **4.a.** However this time only adjus $V_{AC}(t) = 4Sin(2\pi ft)$ Volt and $V_{DC} = 2$ Volt DC (choose Volt/Div= 0.5 Volt and Time/Div= 0.5 msec. Draw the seen waveforms observed over CH 1 (on the Oscilloscope) when DC mode and AC mode are selected respectively at Figures 8 and 9.

Volt/Div=0.5 Volt



Time/Div=0.5 msec

Volt/Div=0.5 Volt

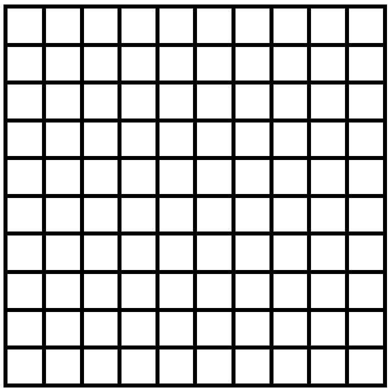
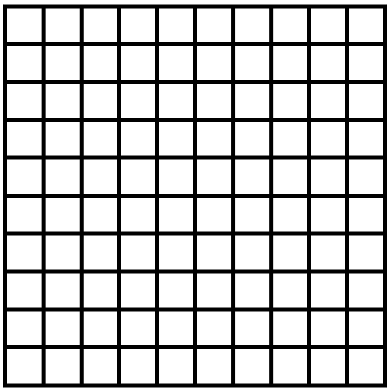


**Figure 4:** CH1 in DC mode.

**Figure 5:** CH1 in AC mode.

Volt/Div=0.2 Volt



Time/Div=0.2 msec

Volt/Div=0.2 Volt

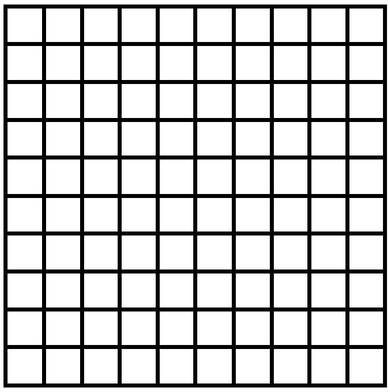
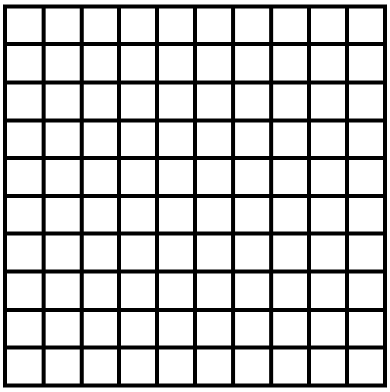


**Figure 6:** CH1 in DC mode.

**Figure 7:** CH1 in AC mode.

Volt/Div=0.5 Volt



Time/Div=0.5 msec

Volt/Div=0.5 Volt

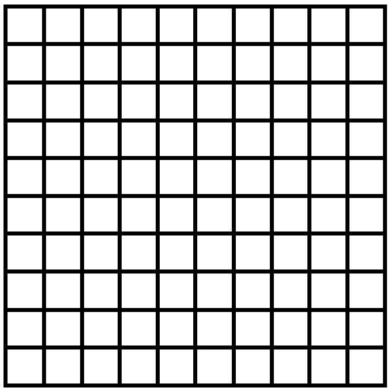


**Figure 8:** CH1 in DC mode.

**Figure 9:** CH1 in AC mode.

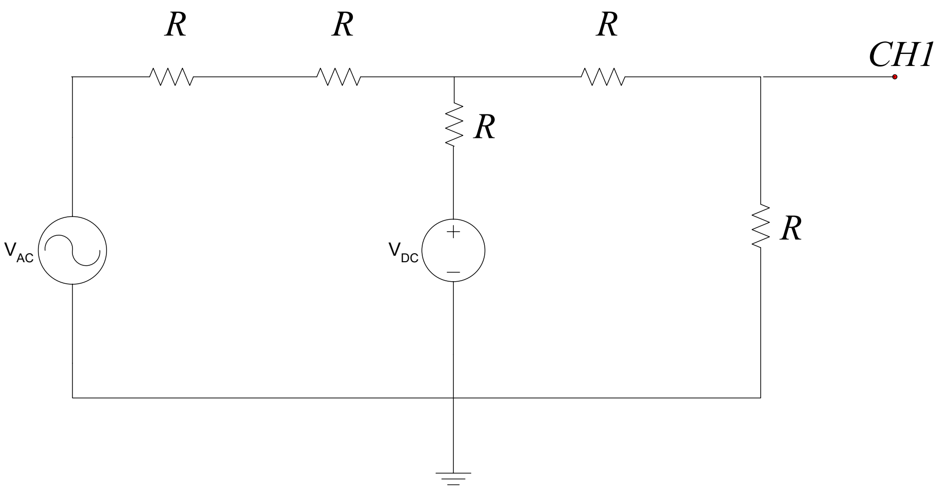



**Figure 10:** The circuit diagram.

**Equipment list:** 5×1kΩ