# YILDIRIM BEYAZIT UNIVERSITY
CENG 205 LABORATORY
EXPERIMENT 4

Objective

Introduce Alternating Current (AC) and Direct Current (DC)

Theory

DC is defined as the unidirectional flow of the electric charge. In spite of this, in AC the movement of electric charge periodically reverses direction. The abbreviations DC and AC are often used to refer simply alternating and direct, as when they modify current or voltage. Fig. 1 shows DC and AC voltages.
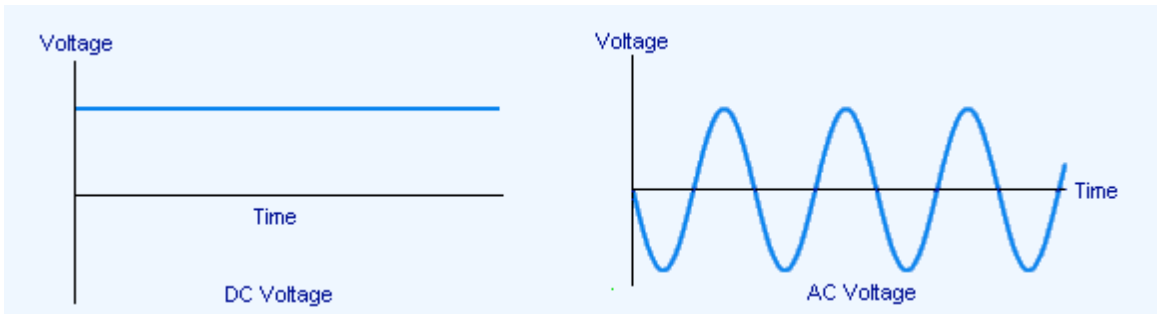
AC voltage is often expressed as root-mean-squared (RMS) value, written as V_{rms}. For the sinusoidal voltage RMS value is calculated as follows;

$$V_{rms} = \frac{V_{peak}}{\sqrt{2}}$$

Oscilloscopes measure the peak value of the voltage across an electrical element, but multimeters measure the RMS value of the voltage across the element.

Pre-work

1) Study AC and DC concepts. Write down your studies.
2) Calculate desired values given in Question part by hand.

Questions:

1) A simple resistive circuit with AC voltage source is given in Fig. 2.
$V_s = 6 * \sin(2\pi * 1500t)$. The source has 1.5 kHz frequency and 6V peak-to-peak voltage.
Calculate and sketch the AC and DC voltages across every resistor. Calculate the RMS value of each voltage.

2) Repeat part 1 for $V_s = 6 * \sin(2\pi * 1500t)$. There is 3V DC offset for the source, you can use superposition theorem to calculate AC and DC components)
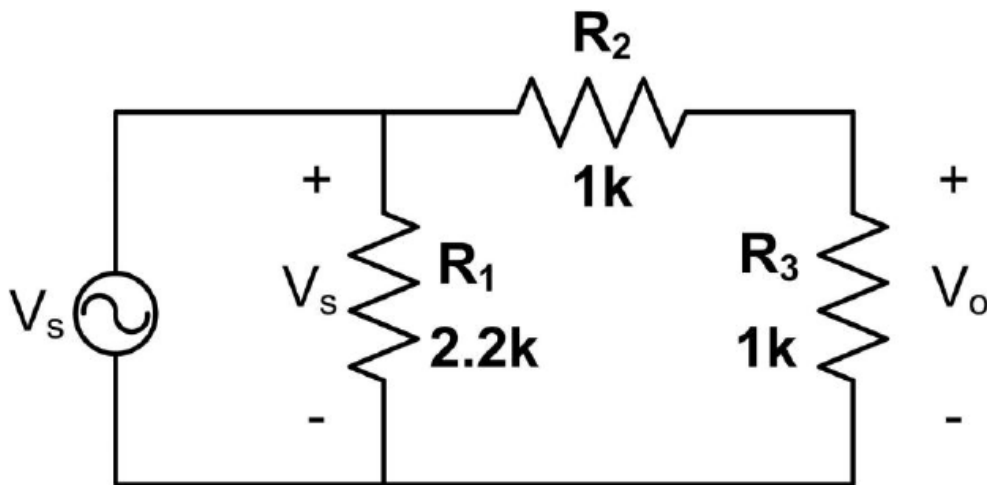

Fig. 2

Laboratory Exercises:

1) Set up the circuit given in Fig. 2.
2) Adjust the signal generator to $V_s = 6 * \sin(2\pi * 1500t)$

3) Measure the AC and DC voltages across each resistor by using multimeter. Is there any difference between the measurements and calculation? Explain briefly.

4) Observe the voltages Vs and Vo by using oscilloscope. Is there any difference between the measurements and calculation? Explain briefly.

5) Repeat parts 2, 3, and 4 for $V_s = 3 + 6 * \sin(2\pi * 1500t)$