

Experiment no.1

§ Power Electronics lap. Instrument §

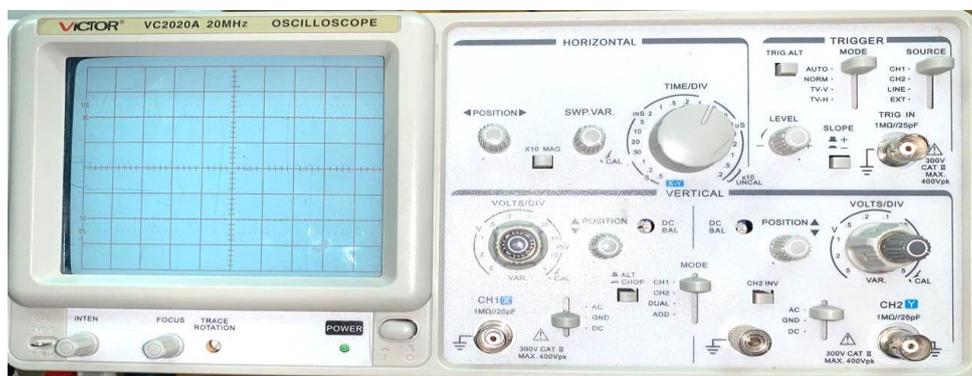
1.1 Objective:

The object of this experiment is to learn how to use the oscilloscope, function generator, DC power supply, and digital multimeter.

1.2 Theory:

There are many devices in the laboratory including:

1. **Oscilloscope:** The oscilloscope is the most important instrument available to the practicing technician or engineer. It permits the visual display of a voltage signal that can reveal a range of information of the operating characteristics of a circuit or system that is not available with a standard multimeter. At first glance, the instrument may appear complex and difficult to master. Be assured, however, that once the function of each section of the oscilloscope is explained and understood and the system is used throughout a set of experiments, your expertise with this important tool will develop quite rapidly.



In addition to the display of a signal, it can also be used to measure the average value, rms value, frequency, and period of a sinusoidal or non sinusoidal signal. The screen is divided into centimeter divisions in the vertical and horizontal directions. The vertical sensitivity is provided (or set) in volts/div., while the horizontal scale is provided (or set) in time (s/div.). If a particular signal occupies 6 vertical divisions and the vertical sensitivity is 5 mV/div., the magnitude of the signal can be determined from the following equation:

Amplitude of signal voltage = voltage sensitivity (V/div.) x deflection (div.)

$$V_s = (5 \text{ mV/div.}) (6 \text{ div.}) = 30 \text{ mv}$$

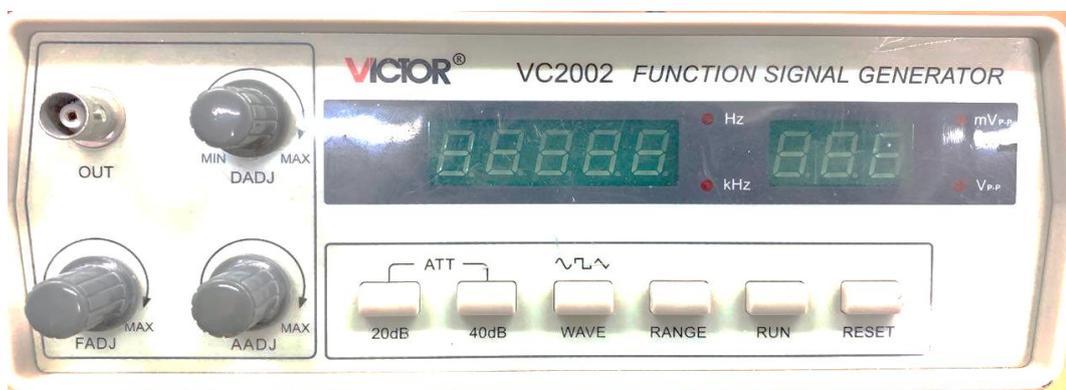
If one cycle of the same signal occupies 8 divisions on the horizontal scale with a horizontal sensitivity of 5 μ s/div., the period and frequency of the signal can be determined using the following equations :

Period of signal voltage = horizontal sensitivity (s/div.) x deflection (div.)

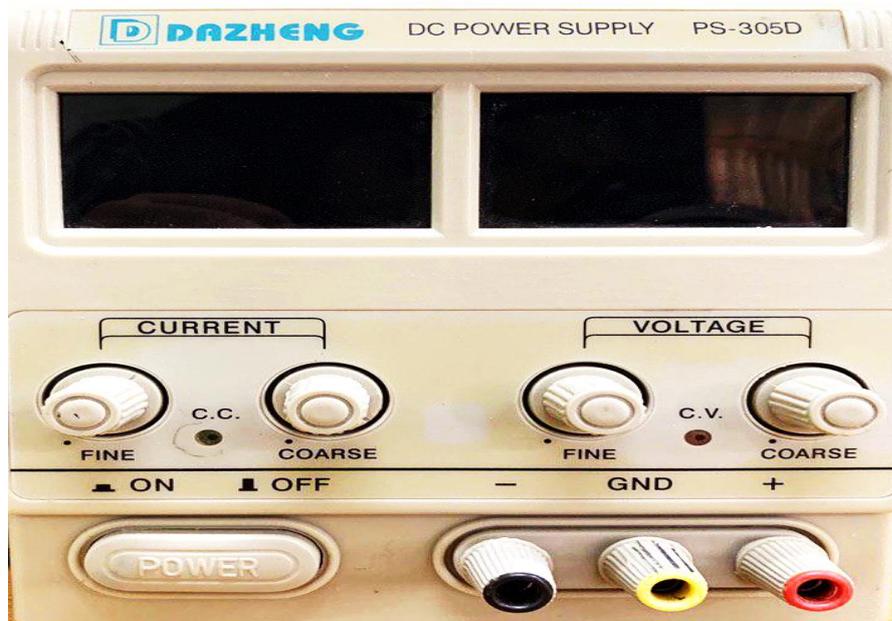
$$T = (5 \mu\text{s /div.})(8 \text{ div.}) = 40 \mu\text{S}$$

$$\text{And } f = 1/40\mu\text{S} = 25\text{kHz}$$

2. Function Generator: The function generator is a voltage supply that typically provides a sinusoidal, square-wave, and triangular voltage waveform for a range of frequencies and amplitudes. The frequency and the amplitude of these voltage functions can be set by the proper dial positions and their associated multipliers. For more precise settings of these parameters, the oscilloscope is used.



3. **DC power supply**: A DC power supply is one that supplies a constant DC voltage to its load. Depending on its design, a DC power supply may be powered from a DC source or from an AC source such as the power mains.

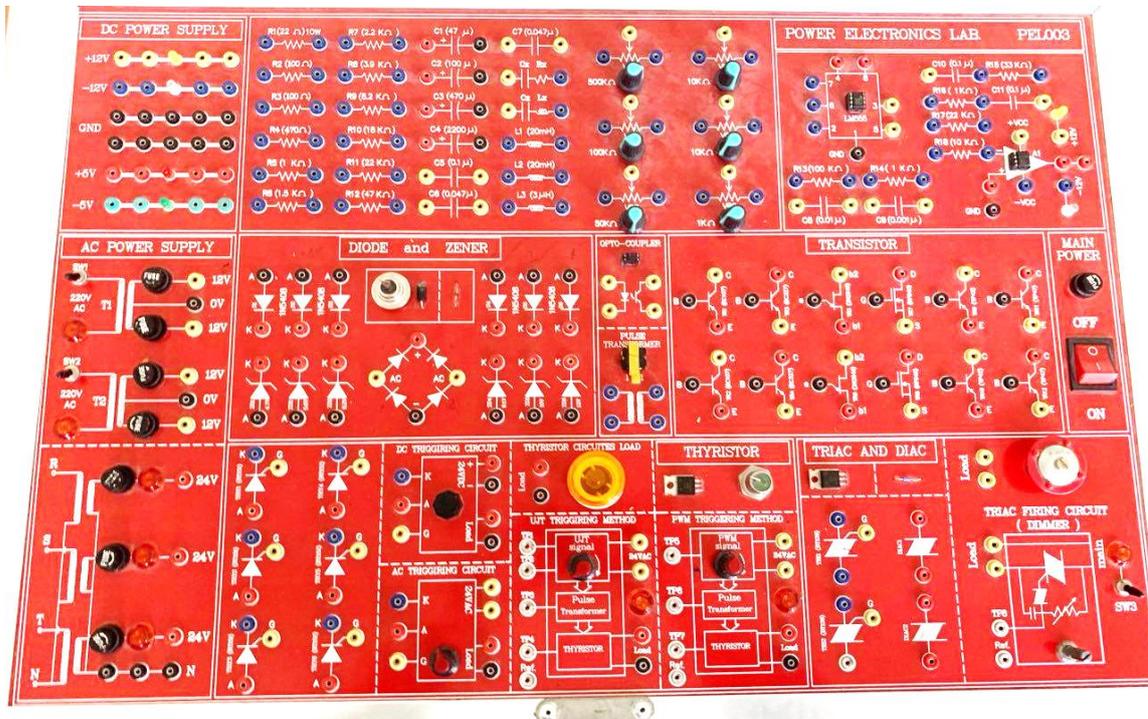


4. **Digital multimeter**:

is a test tool used to measure two or more electrical values- principally voltage (volts), current (amps) and resistance (ohms). It is a standard diagnostic tool for technicians in the electrical/electronic industries



5. **Electronic board:** A board includes a set of electronic elements and sources of AC and DC and a number of circuits.



1.3 Procedure:

1. Connect Ac function generator to the Oscilloscope (CH1).
2. Set the function generator by an ac voltage (6 V) and a frequency (250HZ), the wave must be (sinu-soidal wave, Square wave and Triangular wave).
3. Draw the wave shown in the screen of the Oscilloscope.

1.4 Discussion:

1. What are the types of Electrical voltage.
2. What types of signals does the Function Generator generate?
3. What is the benefit of the oscilloscope?