Introduction to basic lab equipment and components essay sample

To use an electronics lab, it is necessary to become familiar with some typical equipments and components, to reduce the accident and damaging the equipments. So the experiment will be accomplished with the right result and everything still in one peace.

Objective:

• To be familiar and understandings the operation of the basic components and equipments in electronics lab. • To know the color code of the resistor.

Theory:

Resistor is a common components use in electronics lab. Resistors come in various shapes and sizes. The larger the physical size, the greater the wattage ratting. Therefore, it is important to know the exactly value for each resistor by its code color before using it.

Analogue Multimeter, every electronic lab has different types of meters. However, there are some basic meters that are common and may appear to be different only because they are made by different manufacturers, analogue Multimeter must be able to measure dc and ac voltage, dc current and resistance.

The oscilloscope graphs the instantaneous value of voltage versus time on the screen. The main usage of oscilloscope is to view the alternating current or ac waveform, so that waveform measurement can be made. The screen of the scope is divided by reticules into ten horizontal divisions and eight vertical divisions. Each major division is divided into 5 minor divisions. The vertical axis on the screen is the voltage scale and horizontal axis is the time scale. The oscilloscope in the labs is dual-channel. This means that you can

display two waveforms from two different inputs on the screen at the same time. The oscilloscope is the only device that permits direct measurement of peak-to-peak values on any shape of waveform. It is important to realize that the oscilloscope cannot change the waveform; it only changes the view of the waveform.

Apparatus/Method:

• Resistor: 330, 680, 3K, 5. 1K, 10K, 15K, 30K, 100K.

• Multitester.

• Oscilloscope.

• Power supply.

• Bread board.

• BNC-Crocodile clips.

PART A, Resistor Color Code:

The resistor color code in Table 1 must be used, the percentage tolerance value must be determined of each 8 resistors, from the smallest to the largest of which had been chosen. Then the result must be recorded in table 2. PART B, Measuring resistors using an analogue Multimeter: The Ω range must be settled, it will be noticed that the instrument will function as an ohmmeter. The provided resistor must be used, each resistor must be selected for measurement and the coded value must be used as guide, an appropriate multiplier scale must be selected on the ohmmeter. The ohmmeter must be zero on this scale by shorting the terminals together with a test lead and the zero adjust control must be used to set the needle to zero. The value of the resistor must be measured and recorded in table 3.

PART C, Oscilloscope:

BNC is commonly used on Coaxial Cable, they are easily can be damaged so its mustn’t be forced onto a terminal, the BNC must be connected end of the test lead to the INPUT-CH1 jack and the RED alligator clip to the CAL. 2Vpp square wave hook. The BLACK alligator clip shouldn’t be connected. The large vertical volts/div switch must be rotated for CH1 to 5v (for 0. 5v/division) the vertical volts/div is controlled over the scale of the Y-axis. The large sweep time/div switch must be rotated to 2ms (for 2msec/division). The sweep time/div is tour controlled over the size of the x-axis. Now there is a square wave pattern on the CRT. That is the special calibration voltage output. There should be two complete cycles (5 divisions long) as measured on the horizontal axis.

The waves should be about 4 divisions tall. When the square waves are on the screen, the horizontal position control must be adjusted so that the waveform starts on the first vertical gratitude. This must be done if the period measurement is required. Then, the vertical position must be adjusted so that the waveform starts on the X-axis or center gratitude. This must be done if the voltage measurement is required. The waveform must be drowned to the scale on the chart in the result page. The time/div and the volts/div from the oscilloscope must be filled (step 3 and step 4). A continuous waveform must be seen by increasing the intensity. The intensity must be decreased when the drawing is completed. The CH1 volts/div control must be changed to 1v. The voltage must be measured and recorded in table 4. The sweep time/div should be changed to 5ms. The period must be measured and the result should be recorded in table 4. Table 4 must be completed.

Result/Data/Calculation:

Discussion/Recommendation:

The resistor tolerance can be measured by using the color code and the resistor color code table, for example:

A resistor coded: red-yellow-orange-gold

First digit= 2 (RED)

Second digit= 4 (YELLOW)

Multiplier= x10^3 (ORANGE)

Tolerance= 5% (GOLD)

The resistor value is 24 x 10^3Ω = 24 000Ω = 24k Ω± 5%

And the percentage of error can be measured by using the formula:

%Error = {[coded value- measured value]/coded value} x 100%

The voltage can be calculated from the oscilloscope by using the next formulas: Vpp = (# of division tall)*Volts/Div

The period can be calculated from the oscilloscope by using the next formula: T = (# of division long)* Sec/Div

The frequency formula:

F = 1/T

Conclusion:

As a conclusion, the experiment provided lots of information about the basic lab equipment and component, which had been collected during the lab class, so the experiment had been finished successfully, and accomplished its objects.

Reference/appendix:

• LAB 1 (KES 1181), Experiment 1 (introduction to basic lab equipment and components).

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