LAB REPORT # 01

CSE102L System and Circuit -1

Batch 23

Spring 2022

Submitted by: **Ijaz Ahmad**

Registration No. : **21pwcse2057**

Class Section: **A**

"On my honor, as student of University of Engineering and Technology, I have neither given nor received unauthorized assistance on this academic work."

Student Signature: _____

Submitted to:

Engr. Faiz Ullah

Month, Day, Year (06, 04, 2022)

Department of Computer Systems Engineering
University of Engineering and Technology, Peshawar

ASSESSMENT RUBRICS LAB # 01

Introduction to Basic Electrical Equipments

LAB REPORT ASSESSMENT				
Criteria	**Excellent**	**Average**	**Nil**	**Marks Obtained**
1. Objectives of Lab	All objectives of lab are properly covered [Marks 1]	Objectives of lab are partially covered [Marks 0.5]	Objectives of lab are not shown [Marks 0]	
2. Resistance, Voltage & Current	Correct resistance, current and voltage statements and mathematical expressions are written. Circuit diagram shown is correct and properly labeled [Marks 2]	Correct resistance, current and voltage statements or mathematical expression or circuit diagram is missing or circuit diagram is not properly labeled [Marks 1]	Resistance, current and voltage statements, mathematical expression or circuit diagram are incorrect or missing. [Marks 0]	
3. Digital Multimeter	Properly defined DMM and explained functionality in terms of voltage, current and resistance. Explain all steps required to calculate (voltage, current and resistance) measurement. Properly labeled DMM diagram is shown. [Marks 2]	DMM and its functionality in terms of voltage, current and resistance are not properly explained. Steps required to calculate (voltage, current and resistance) measurement are partially shown. DMM diagram is shown but not labeled. [Marks 1]	DMM and its functionality in terms of voltage, current and resistance are not explained. Steps required to calculate (voltage, current and resistance) measurement are not shown. DMM diagram is not shown [Marks 0]	
4. Power Supply	Power supply is properly defined. Functionality and steps to provide source voltage to circuit are shown. Diagram is shown with all labels and available voltage values. [Marks 1]	Power supply is not well defined. Functionality and steps to provide source voltage to circuit are not properly shown. Diagram is shown with no labels. [Marks 0.5]	No steps for functionality of power supply are shown [Marks 0]	

5. Bread Board	Breadboard is properly defined. Functionality and steps to design series parallel circuit are shown. Open and short circuits are also defined. Diagrams are shown with all labels. [Marks 2]	Breadboard is partially defined. Functionality and steps to design series parallel circuit are not shown. Information about open and short circuits are unsatisfactory. Diagrams are shown with no labels. [Marks 1]	No steps for breadboard functionality are shown. [Marks 0]	
6. Observations & Calculations	All experimental results are completely shown in form of table for varying voltages and resistances. [Marks 2]	Experimental results are partially shown and some of the observations are missing [Marks 1]	No experimental results are shown [Marks 0]	

Total Marks Obtained:_____

Instructor Signature: _____

Experiment # 1

Introduction to Electrical Lab Equipment

Objective:

- To get familiar with the functionality and uses of different apparatus in the lab.
- To Learn the working principles of Oscilloscope.
- To gain knowledge about the Function of Function Generator.
- To know what is digital multimeter.
- To know the different nature of waves.

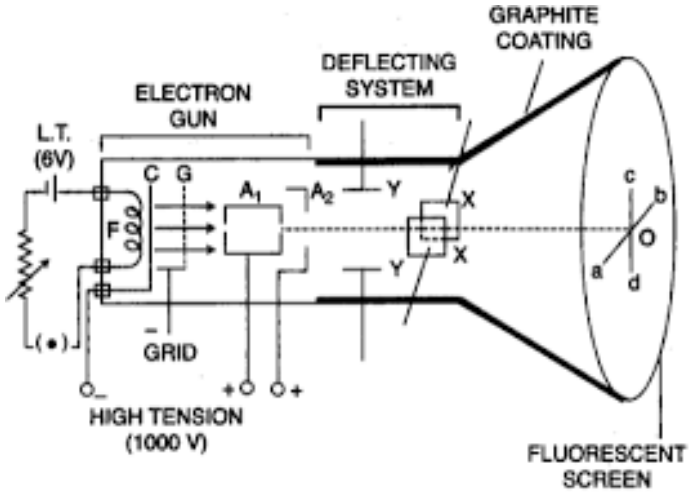
Apparatus:

1) Cathode Ray Oscilloscope
2) Digital Multimeter
3) Power Supply
4) Function Generator
5) Proto Breadboard
6) Connecting Wires

Cathode Ray Oscilloscope:

Cathode Ray Oscilloscope is an electrical instrument which is mainly used for showing electrical signals having specific frequency, time period and its behavior. The output of Cathode Ray Oscilloscope is totally depend on the signals from the input source of function generator.

An oscilloscope is a type of electronic test instrument that allows observation of constantly varying signal voltages, usually as a two-dimensional plot of one or more signals as a function of time. Other signals (such as sound or vibration) can be converted to voltages and displayed.



Construction of Cathode Ray Oscilloscope:

There are some essentials steps for constructing cathode ray oscilloscope

- Glass Envelop
- Electronic Gun Assembly
- Deflecting Plate
- Fluorescent Screen For CRT
- Cathode Ray Tube

WORKING PRINCIPAL:

Cathode Ray Oscilloscope working principle is that it depends on the electron ray movement because of the electrostatic force. When an electron ray touches or hits a phosphor face(screen), then there is a bright frame on the screen. A Cathode Ray Oscilloscope applies the electrostatic energy on the electron ray from two vertical ways.

Serial Number	Amplitude (volts)	Frequency (Hz)	Time Period (s)	Frequency Calculated (Hz)	Error (%)
1.	10 V	1.2 KHz	2.5 m sec	1.1 KHz	8.33 %
2.	2 mV	1 kHz	1 m sec	1 KHz	0 %
3.	10 mV	5 KHz	0.2 m sec	5 KHz	0 %
4.	5V	1.6 KHz	0.2 m sec	2.1 KHz	31.25 %

Digital Multimeter:

Digital Multimeter is a device used to calculate resistance, voltage, current in a circuit. Previously device used for this purpose were analogue mean they would give reading using a needle which is not a very accurate method of reading so a new device was invented which give readings in digits and hence it is called digital multimeter.

Digital Multimeter are also called VOM (volt-ohm-meter) because of its multiple functionalities. Digital Multimeter are cheaper and give greater precision over the analogue meters but still in some cases the analogue multimeters are preferred e.g. When the value is rapidly changing. Multimeter is a handheld device it is usually used for finding errors and faults in the circuits.

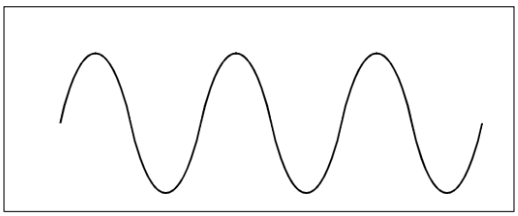
Figure 1 Digital Multimeter

Function Generator:

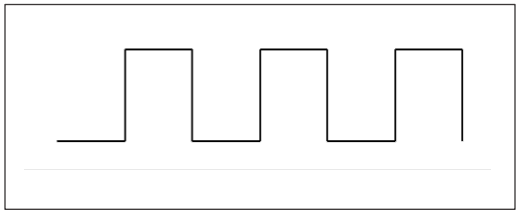
A function generator is usually a piece of electronic test equipment used to generate different types of electrical waveforms over a wide range of frequencies. Some of the waveforms produced by function generator are sinusoidal(sine), square, triangle, Sawtooth.

Function generators are used in the development, test and repair of electronic equipment. For example, they may be used as a signal source to test amplifiers or to introduce an error signal into a control loop. Function generators are primarily used for working with analog circuits, related pulse generators are primarily used for working with digital circuits.

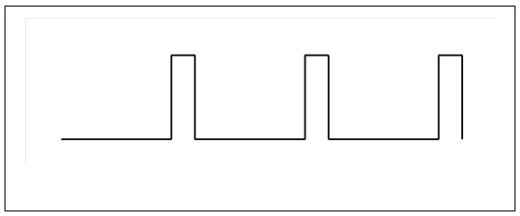
Different types of Waves are generated by Function Generator.



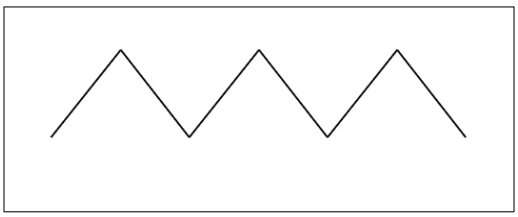
Sine Wave



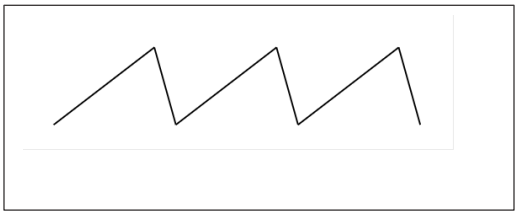
Square Wave



Pulse Wave



Triangle Wave



Saw Tooth Wave

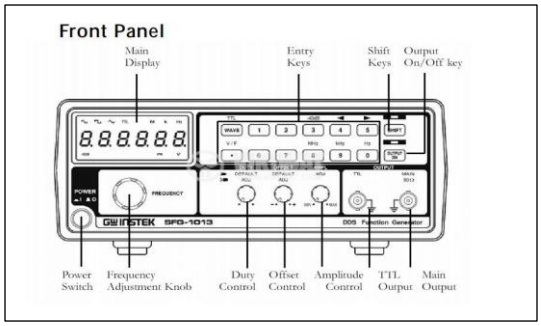


Figure 2 Function Generator

Power Supply:

An electrical instrument which is used supply is an electrical power to the circuit. The function of the power supply is to convert one form of electrical energy into another form. Power supplies can give us varying voltages and currents according to our need. Power supply has single power input and have multiple power outputs. Power supplies are made in different sizes and capacities. In some devices the power supplies are embedded inside the device while in some machines the power supplies are external.

Figure 6 Power Supply

Digital Multimeter:

A digital multimeter (DMM) 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 in the electrical/electronic industries.

Digital multimeters long ago replaced needle-based analog meters due to their ability to measure with greater accuracy, reliability and increased impedance.

Digital multimeters combine the testing capabilities of single-task meters—the voltmeter (for measuring volts), ammeter (amps) and ohmmeter (ohms). Often they include a number of additional specialized features or advanced options. Technicians with specific needs, therefore, can seek out a model targeted for particular tasks.

The face of a digital multimeter typically includes four components:

1. Display
2. Buttons
3. Dial (or rotary switch)
4. Input jacks

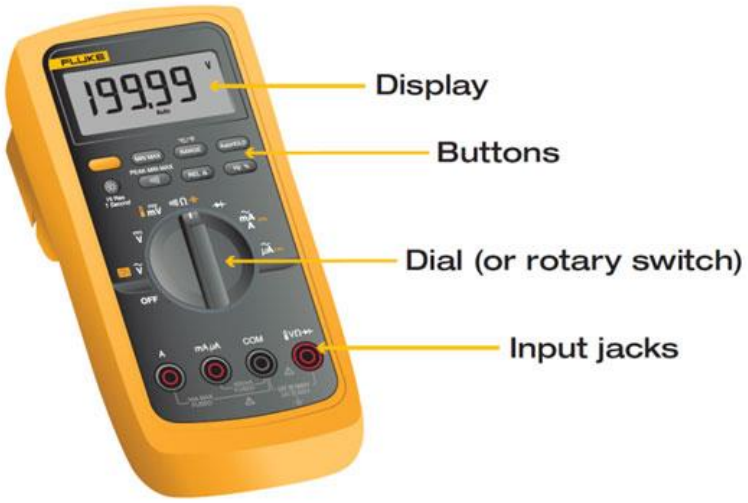


Figure 7 Digital Multimeter

The **Display** shows the digital reading on the screen. The reading is shown on the screen with digits.

The **Buttons** are used for different features in multimeter.

The **Dial** is used to set the range before taking the reading. It is good to set the dial at a range closer to the actual reading in order to get the accurate readings. Before taking the readings of the voltage it is a precaution to set the dial at minimum before taking the reading otherwise the device could damage.

The **Input jacks** are used to insert the knobs into the device in order to connect the apparatus for measurement. Different input jacks are used for measuring voltage and currents.

Experiment:

To find the voltage and current of power supply using Digital Multimeter.

Procedure:

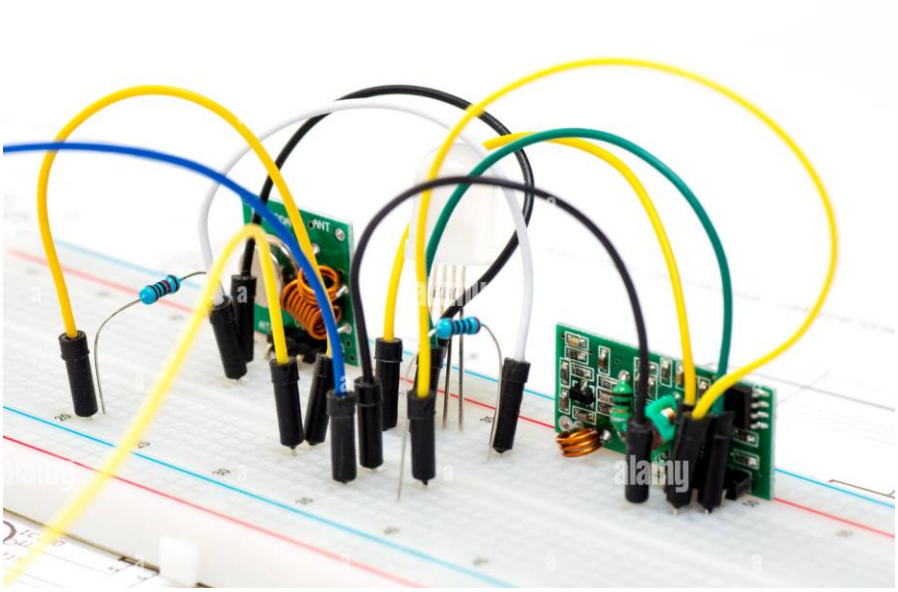
1. Connect the knobs to the power supply and note the reading given on the power supply.
2. Connect the multimeter with the knobs, negative with the negative one and positive with the positive one.
3. Set the multimeter at the minimum to measure the voltage and then turn ON the power supply.
4. Note the readings from the screen of the multimeter.
5. Find the current using the formula $= \frac{v}{r}$.
6. Compare the readings taken from the multimeter with the actual reading of the power and find the percentage error.

Observation:

Voltage			
Serial Numbers	**Power Supply (V)**	**Digital Multimeter (V)**	**Error (%)**
1.	5 V	4.89 V	2.2
2.	15 V	15.21 V	1.4
3.	15 V	15.12 V	0.8

Proto Breadboard:

protoboard (plural protoboards) (electronics) A board, having a matrix of small holes to which components may be attached without solder, used for the temporary construction and testing of electrical and electronic circuits.



Connecting wire:

Connecting wires allows an electrical current to travel from one point on a circuit to another because electricity needs a medium through which it can move. Most of the connecting wires are made up of copper or aluminum.