Electronic values

A- Rational

We will clarify the concept of Basics of Electricity and Electronic values

B- Central Idea

1. definition of the electricity

2. types of electronic elements

3. conductors and insulators

C. Chapter objectives

After studying the: electronic values. the student will be able to

1- Understand conduction.

2- Be able to describe the electricity.

3- Be able to understand the electronic values

What is electricity?

Electricity is the flow of electrical power or charge. It is a secondary energy source which means that we get it from the conversion of other sources of , like coal, natural gas, oil, nuclear power and other natural sources, which are called primary sources

**Current**

is the quantity of electrons passing a given point. The unit of current is the Ampere. One Ampere is 6,280,000,000,000,000,000 electrons passing a point in one second. Electrical current flows from a region of high charge or potential to a region of low potential.

**Voltage (V or E)**

Voltage is electrical pressure or force. Voltage is sometimes referred to as Potential. Voltage Drop is the difference in Voltage between the two ends of a conductor through which current is flowing.

**Power (P)**

The work performed by an electrical current is called Power. The unit of Power is the **Watt**.

**Resistance (R)**

Conductors are not perfect. They resist to some degree the flow of current. The unit of resistance is the **Ohm.**

**Load**

The part of the circuit which performs work (e.g. a motor, a light bulb or a

LED, etc.) is called Load.

**Ohm's Law**

A set of rules that show the relationships among Current, Voltage, Power and Resistance. Given any two of the above, one is able to calculate the other two using the following formulas:

E = I x R

I = E / R

R = E / I

P = E x I

**Direct Current Electricity**

An electrical current can flow in either of two directions through a conductor. If it flows in only one direction whether steadily or in pulses, it is called direct current (DC). Almost all the projects in class will be powered by DC electricity. In order to be able to work with DC we need to convert the alternating current (AC) from the outlets into a direct current, which we use to power our circuits. A wall adapter transforms AC into DC, the wall adapter in our lab kit transforms 120 VAC into 9/12VDC. The maximum current it can provide is 1000mA (1A). The wall adapter has two wires that go to our circuits - one for positive power supply and one for negative (ground, or GND).

4. self test

Choose the correct statement

1. The unit of resistance is the ---

a. Ohm b. Ampere c. Volte

2. DC current flows

a. in either directions b. in only one direction c. none

**multimeter**

A multimeter is a useful tool that helps us finding the positive and negative

side of different sections for measuring voltage (volt-meter), current (am-meter) and resistance (ohm-meter), hence the name: multimeter. The multimeter has two test probes - one red (for positive) and one black (for negative). We know that our power supply has an output of 9/12VDC, so we first need to set the multimeter amplitude of positive side and the negative probe on the negative side, we should get a read-out of roughly 9/12VDC on the multimeter .

**Breadboard**

Breadboards are useful solderless prototyping boards that allow you to test out circuits quickly. In general it is a good idea to build every circuit on a breadboard first before you even think about soldering the parts together. Thus, it is important to understand how a breadboard works.

**Wires and Cables** Wires and cables are used to carry an electrical current. Most wire is protected by an insulating covering of plastic or rubber. A wire can be either solid or stranded. Cables have one or more conductors and more insulation than ordinary wire.

**Diodes**

A diode is an electronic device that allows current to flow through it in one direction only. It is a one-way turnstile for electrons. There are many different classes of diodes for many different purposes

**Capacitors**

Capacitors are electronic devices that store electrons. The simplest capacitor is two conductors separated by an insulating material called dielectric. The minus side of the capacitor is charged with electrons. These electrons in the charged capacitor will gradually leak through the dielectric until both conductor plates have an equal charge. The capacitor is then discharged. The ability to store electrons is called capacitance. Capacitance is specified in Farads. A 1-Farad capacitor connected to a 1 Volt supply will store 6,280,000,000,000,000,000 electrons. Once a capacitor has reached its maximum charge, it blocks DC voltage. This is used in electronic circuits to allow an alternating current (AC) signal to flow through a capacitor while it blocks DC. Sometimes capacitors are also used as smoothing or filtering device. Putting a capacitor across the plus and minus pole of a component filters out voltage spikes. Yet another use of capacitors makes use of their ability to store charge for highspeed use. This feature is applied for example in a photo flash.

**Transistors**

A transistor can be used as a switch and signal amplifier. It is an electronic device with three contacts: the emitter (E), base (B) and collector (C). A very small current on the transistor's base can control a much larger current flowing through a passage between collector and emitter.

**Electronic Component Symbols**

