**WEEK 10 YEAR 11 APPLIED TECHNOLOGY**

**STRAND: BASIC HOME IMPROVEMENT-ELECTRICITY**

**LESSON 74:** **RESISTORS IN PARALLEL CIRCUIT**

**LEARNING OUTCOME: CALCULATE COMBINED RESISTANCE, CURRENT & VOLTAGE**

* The combined resistance (R) is less than either of the separate parallel resistances (R1, R2) because the electrons find it easier to travel when they have more than one path they can take.
* The combined resistance R can be found from: 1/R=1/R1 + 1/R2

**EXAMPLE**: A Partial discharge (p.d) of 6V is applied to two resistors (of 3 and 6 Ω) connected to the series



Calculate:

1. The combined resistance
2. The current flow
3. The current across the 3 Ω resistor

**SOLUTION**

1. The combined resistance
* 1/R=1/R1+ 1/R2= 1/3+1/6= 2+1/6=3/6 =1/2
1. The current flow
* V= I × R 6 = I × 2 I = 6 /2 = 3A in the main circuit
1. The current across the 3 Ω resistor
* V= I1 × R 6 = I1 × 3 I1= 6 /3 = 2A in the 3Ω resistor

**LESSON 75:** **KNOWLEDGE OF WIRING-COLOR CODE**

**LEARNING OUTCOME: IDENTIFY THE WIRE COLOR CODE**

* The power supplied to our work places comes in as single phase or three phase power.
* There are three wires Active (or hot or live) wire, Neutral, returns the power or completes the circuit and Protective earth/ground for bypassing excess current to avoid electrical shocks.

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| **COLOR CODE** |
|  | Live wire | Neutral Wire | Earth/Ground |
| New Code | Brown | Blue | Green and yellow |
| Old Code | Red | Black | Green |
|  | Brings A.C. into the house and into electrical appliances. | The A.C. leaves the electrical appliances and the house. | This wire is connected to the ground. In case of short-circuits the excessive current goes to the earth or the fuse is burnt out or the circuit breaker trips off. |

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**LESSON 76:** **MATERIALS**

**LEARNING OUTCOME: IDENTIFY THE MATERIALS USED IN ELECTRICAL WORK**

1. **COPPER**
* Copper is one of the most widely used electrical materials.
* It is electrically conductive.
* This makes it ideal for making electrical wires, which need to transmit electricity from one place to another without losing too much of it to resistance.
* Copper is also widely used for electrical purposes because it is resistant to corrosion, and because it is easily formed into different shapes.
1. **BATTERIES**
* Batteries are a core electrical component, in that they are used by many different kinds of electrical devices.
* They store electricity, so that an electrical device can run off of it whenever it is hooked up to the battery.
* Batteries are often made out of different metals and chemicals with reactions that make current flow at a particular voltage.
1. **TRANSFORMERS**
* Transformers are lumps of iron with two coils of wire wrapped around them.
* They change AC voltage and current into higher or lower values through the principle of electromagnetic induction.
* The transformer "steps up" or "steps down" the voltage or current in order to fit it to the part of the circuit that it is in.
* This obviates a different power source for each different voltage a circuit needs.
1. **FUSES**
* Fuses are important electrical components because they protect other electrical components from damage.
* Fuses are simple strips of metal engineered to melt when the current in a circuit exceeds a certain level.
* When they melt (or "blow") the circuit is broken and current stops flowing.
* This prevents excess current from damaging expensive and delicate electronic parts.
1. **SWITCHES**
* Switches are used to route electrical currents from one place to another.
* A switch is a hinged metal arm that can be swung back and forth.

* When it touches the switch contact it is "closed," and electricity is able to flow.
* When it is moved away from the contact it is "open," and can no longer conduct electricity.
1. **SOLDER**
* Solder is another basic electrical material.
* It is a soft metal alloy (often lead and tin) that is easily melted.
* A special tool called a soldering iron is used to melt it and apply it to electrical components that need to be connected.
* When the solder cools, it hardens, binding the components together and conducting electricity from one to the other

**LESSON 77:** **BASIC ELECTRICAL TOOLS**

**LEARNING OUTCOME: IDENTIFY THE TYPES OF ELECTRICAL TOOLS**

1. **WIRE STRIPPERS**
* Wire strippers are used to cut the insulation off of the wire.
* They are equipped with different sized cutting teeth for various sized wires.
* They also have a cut-off portion in order to cut the wire.

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1. **SIDE CUTTER DIAGONAL PLIERS**
* These cutting pliers sometimes called side snips, are used to cut wire.
* They are specially designed with a cutting edge that goes down to the tip of the pliers

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* The advantage being that you can get into tight areas to trim wires.
* There are some that are equipped with live wire detection capabilities

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1. **LINESMAN PLIERS**
* These pliers are the do-it-all pliers. They cut, twist wires together, and grip wires for pulling.
* They have a squared off end that is great for twisting wires together, a centre cutting blade for cutting wire, and a grip area between the handles to pull wire

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1. **SCREWDRIVER**
* A screwdriver is a tool, manual or powered, for turning (driving or removing) screws.
* A typical simple screwdriver has a handle and a shaft, and a tip that the user inserts into the screw head to turn it.
* The shaft is usually made of tough steel to resist bending or twisting.

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1. **DIGITAL MULTIMETERS**
* Digital multimeters can solve most electrical problems - at the hands of a qualified electrical test profession.

* In fact, with a good wiring diagram and a good meter, a trained electrical professional can find the cause of almost any problem.
* There are two basic types of multimeters, digital and analogue.
* Analogue multimeters have a needle and DMs have an LCD or a LED display.
* With today's demand for accuracy in testing electrical systems, it makes more sense to have a digital multimeter but an analogue multimeter still has its uses

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**LESSON 78:** **SAFETY IN ELECTRICITY**

**LEARNING OUTCOME: IDENTIFY THE SAFETY IN ELECTRICITY**

* Never use electrical tools on damp ground or around water
* Keep a safe distance from pad mounted transformers
* Do not overload electrical outlets with too many electrical plugs. Buy one surge protector with many outlets instead of ‗daisy-chaining‘ smaller power splitters
* Wear rubber gloves and rubber boots when working near electrical components.
* Inspect tools and appliances for wear and damage prior to use
* Use electrical tape for power cord management, do not use staples
* Always use the correct size fuse, never use a fuse with a larger amperage allowance than the original
* When working near power lines, use ladders made of wood instead of metal
* If you have a bad feeling about some work concerning electricity, stay away!
* Know where breakers and electrical boxes are in case of an emergency

* Label circuit breakers clearly
* Do not use electrical outlets or cords with exposed wiring
* Do not touch a person or electrical apparatus in the event of an electrical accident. Always disconnect the current first.
* Do not clean tools with flammable or toxic solvents.

**ACTIVITY**

1. A Partial discharge (p.d) of 6V is applied to two resistors (of 4 and 5 Ω) connected to the series



4Ω

5Ω

 Calculate:

1. The combined resistance
2. The current flow
3. The current across the 4 Ω resistor
4. State the new color code for a live wire
5. State three safety in electricity

**WORKSHEET**

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| **1. Name the following**  |
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