1. Give an example of Static Electricity.

***Lightning, Electrostatic Precipitator***

1. List 3 forms of Renewable Energy.

1.\_\_***Solar Panels*** \_***Tidal Power*** \_***Geo-Thermal***\_

2.\_\_***Hydro-Electric***\_\_***Wave - Energy***\_\_\_\_\_\_\_\_\_

3.\_\_***Bio-mass***\_\_\_***Wind Turbines***\_\_\_\_\_\_\_\_\_\_\_\_

1. What is a Load when referring to an Electrical Supply?

***An electrical device that uses the supplied electrical energy.***

1. What is the purpose of a Fuse/Circuit Breaker in an electrical circuit?

***To protect the wiring.***

1. What is the purpose of a Switch in an electrical circuit?

***To control the circuit.***

1. How many coulombs per second equal 1 Ampere?

***1 coulomb***

1. Draw a circuit containing a Power Supply, a Load, a Fuse, a Switch and Conductors.

A diagram of a fuse and switch

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**Conductor**

**Load**

1. How much current would flow in an Open Circuit?

***Zero Amperes.***

1. How much current would flow in a Short Circuit?

***Maximum Current.***

1. Convert the following values:

|  |  |
| --- | --- |
| **3M Ω** | **3 000 000 Ω** |
| **300 µA** | **0.3 mA** |
| **0.0065 W** | **6500 µW** |
| **3.3 kV** | **3300 V** |
| **27mA** | **0.027 A** |

1. Calculate the Resistance in a circuit with a 100V Supply and a Current of 8A.

***R = V / I = 100 / 8***

***R = 12.5Ω***

1. Calculate the Current in a circuit with a 24V Supply and a Resistance of 33Ω.

***I = V / R = 24 / 33***

***I = 0.727A***

1. Calculate the Voltage of a circuit with a Resistance of 10kΩ and a current of 3mA.

***V = I x R = 0.003 x 10 000***

***V = 30V***

1. Draw a graph showing the relationship between Voltage and Current in a DC circuit.

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1. How much Force is required to lift a toolbox weighing 15kg?

***F = m x a***

***F = 15 x 9.8***

***F = 147 Newtons***

1. Calculate the Work done if a cable drum weighing 20kg was lifted through a vertical distance of 2 metres?

***F = m x a = 20 x 9.8 = 196 Newtons***

***W = F x d***

***W = 196 x 2***

***W = 392 joules***

1. Calculate the Power needed to climb a 6-metre ladder in 30 seconds if you weigh 65kg and are carrying a tool bag weighing 5kg?

***F = m x a = (65 + 5) x 9.8 = 686 Newtons***

***W = F x d = 686 x 6 = 4116 joules***

***Power = Work / time***

***Power = 4116 / 30***

***Power = 137.2 Watts***

1. How much Power is dissipated in a circuit with an applied Voltage of 50V and a Resistance of 25Ω?

***P = V² / R = 50² / 25***

***P = 100W***

1. How much Power is dissipated in a circuit with an applied Voltage of 150V and a Current of 3A?

***P = V x I = 150 x 3***

***P = 450W***

1. How much Power is dissipated in a circuit with a Resistance of 30kΩ and a Current of 50mA?

***P = I² x R = 0.05² x 30000***

***P = 75W***

1. Can a Resistor with a Power rating of 5W and a value of 2kΩ be installed in a circuit with an applied Voltage of 120V and operate correctly?

***P = V² / R = 120² / 2000***

***P = 7.2W No, the resistor wattage is too small***

1. What type of meter is used to measure the Power in an electrical circuit?

***Wattmeter***

1. List four effects of Electric Current on the Human Body.

1. \_\_***Muscular contraction***\_\_\_\_\_\_\_\_\_\_

2. \_\_\_***Burns***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. \_\_\_***Stop Breathing***\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4.­­­­­­­­­­­­­­­­­­­­­­\_\_\_***Ventricular Fibrillation***\_\_\_\_\_\_\_\_

1. List six methods of producing an EMF.

1.\_\_\_***Magnetic / Mechanical***\_\_\_\_\_\_\_

2.\_\_\_***Photo Voltaic***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3.\_\_\_***Chemical***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4.\_\_\_***Thermocouple***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5.\_\_\_\_***Static***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6.\_\_\_\_***Piezo-electric***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. What two effects occur when Current passes through an Electrical Conductor?

1.\_\_\_\_***Magnetism***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2.\_\_\_\_***Heat***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. State a use for each of the effects in Q25.

1.\_***Motors***\_\_***Transformers***\_\_***Solenoids***\_\_

2.\_\_***Cooking\_\_\_Lighting\_\_\_\_Heating***\_\_\_\_

1. What is Galvanic Corrosion and how is it produced?

***When two dissimilar metals are in electrical contact and are exposed to an electrolyte.***

1. According to the AS/NZS 3000:2018, what are the two methods of Protection from Overcurrent?

a) ***Automatic Disconnection on the occurrence of an overcurrent, before this overcurrent attains a dangerous value, taking into accounts it’s duration.***

b) ***Limiting the maximum current to a safe value and duration.***

1. Calculate the Input Power of an Electric Motor that has an Output Power of 7kW with an Efficiency of 80%.

***Input = Output / Efficiency x 100%***

***Input =7000 / 80 x 100%***

***Input = 8750W or 8.75kW***

1. What is the difference between a Primary Cell and a Secondary Cell?

***A Secondary Cell can be Re-Charged, where a Primary Cell cannot.***

1. A 4 band Carbon Resistor has a colour coding of Orange, Violet, Brown and Silver and when measured with an Ohmmeter has a Resistance of 327Ω.

Is this Resistor within Tolerance?

***Resistor Nominal Value = 370Ω ± 10%***

***Max Value = 407Ω Min Value = 333Ω***

***Resistor is out of Tolerance.***

1. Give an example of where a series circuit is used in the Electrical Industry.

***A Fuse in series with a switch in series with a Load.***

1. What is Kirchhoff’s Voltage Law for Series DC circuits?

***The algebraic sum of the voltage drops in a series circuit equals the supply voltage.***

1. Calculate the volt drop across each resistor, in the following circuit, with an applied voltage of 5.4V.

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***Rt = R1 + R2+ R3 = 2 + 3 + 4***

***Rt = 9Ω***

***It = Vt/Rt = 5.4 / 9***

***It = 0.6A***

***VR1 = IR1 x R1 = 0.6 x 2***

***VR1 = 1.2V***

***VR2 = IR2 x R2 = 0.6 x 3***

***VR2 = 1.8V***

***VR3 = IR3 x R3 = 0.6 x 4***

***VR3 = 2.4V***

**Check: VT = V1 + V2 + V3**

**VT = 1.2 + 1.8 + 2.4**

**VT = 5.4V**

1. Calculate the total Resistance, total Current and the Power dissipated by each resistor, in the following circuit, with an applied Voltage of 45V.

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***Rt = R1 + R2 + R3 = 2 + 3 + 4***

***Rt = 9Ω***

***It = Vt / Rt = 45 / 9***

***It = 5A***

***PR1 = I ² R1 = 5² x 2***

***PR1 = 50W***

***PR2 = I ² R2 = 5² x 3***

***PR2 = 75W***

***PR3 = I ² R3 = 5² x 4***

***PR3 = 100W***

**Check:**

**Pt = Vt x It = 45 x 5**

**Pt = 225W**

**Pt = PR1 + PR2 + PR3 = 50 + 75 + 100**

**Pt = 225W**