CONTENT SUMMARY:
A branch of electricity apart from static electricity is current electricity or electric current.

Current electricity:
Current electricity is the flow of electron, charge, or quantity of electricity through a conductor in a second. The quantity of electricity is measured in Coulomb. Q = I × time, where Q = quantity of electricity, I = electric current. Electric current, 'I' is measured in Ampere. And the time 't' is measured in second.

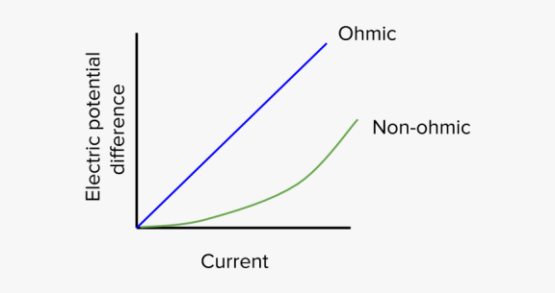
Definition of conductor, semiconductor, and insulator:

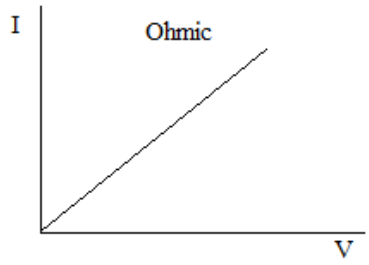
Conductor:	Semiconductor:	Insulator:
Conductor is a material that allows the flow of electric current through it. It is a Ohmic material. Examples: metal, human body, inorganic solvent	A semiconductor is a material that partly allows the flow of electric current through it. This type of material falls between the conductor and insulator. It is a non-Ohmic material Examples: diode, thermistor, rectifier	Insulator is a material that disallows the flow of electric current through it. Example of insulators: paper, plastic, wood, rubber, glass, organic solvent

Exercise:

i. Define a conductor, insulator, and semiconductor.
ii. Find the quantity of electricity passed, if the current of 2A flows through a conductor in (¾) minute.

Ohm's law:
Ohm's law states that the electric current flowing through a conductor, is directly proportional to the potential difference across it, provided that temperature and other physical properties are constant.
V α I, thereby V = IR, where I is the electric current,
V is the measured potential difference,
'R' is constant and it is called the resistance. The resistance can be influenced by change in physical properties.





Differentiating between Ohmic and Non-Ohmic conductor

Ohmic conductor:	Non Ohmic conductor
1. Ohmic conductors obey Ohm's law 2. Electric current passing through this conductor is directly proportional to the potential difference applied to it.	1. Non Ohmic conductors do not obey Ohm's law. 2. Electric current passing through this conductor is not directly proportional to the potential difference applied to it.

Resistance:
Resistance is the obstruction given to the flow of electric current by a conductor, and the resistance is measured in Ohm (Ω). R = (V/I)

Potential difference:
Potential difference (P.d) is measured in Volt (V). Potential difference can be defined as the work done in moving one Coulomb of charge from one end of a conductor to the other end of the same conductor. It is the work done in moving charge from one point to another point in a circuit. V = IR

Electromotive force:
Electromotive force (e.m.f) is also measured in Volt (V). Electromotive force (e.m.f), can be defined as the total work done in moving one Coulomb of charge through the whole circuit from one terminal to another.
E = Ir + IR = Ir + V, where R = external resistance, r = internal resistance, I = current, E = e.m.f, V = P.d.

Basic measuring instrument:
The basic measuring instruments used in electric circuit include:

a. Ammeter: This is used to measured electric current, and electric current is measured in Ampere (A).
b. Voltmeter: This is used to measured potential difference across a conductor, and potential difference is measured in Volt (V).
c. Ohmmeter: This is used to measured resistance of a conductor, and resistance is measured in Ohm (Ω).
d. Galvanometer: This is used to detect the direction of electric current in a circuit.

Exercise:

i. Differentiate between electromotive force and potential difference
ii. Find the potential difference applied across the end of a conductor of resistance 45Ω when a current 4A is flowing through it.
iii. Describe an Ohmic and non-Ohmic conductors

Factors affecting resistance of a conductor:
Resistance of a conductor can be affected by temperature and other physical properties of the conductor such as: length, area, and others. Resistance of a conductor increase as the temperature of the conductor increases; thereby the relationship of resistance with temperature can be expressed with 'coefficient of resistance'.

The coefficient of resistance, α, can be defined as the change in resistance per unit resistance, and per temperature rise. $R_t - R_o = R_o(\alpha t)$, where '$R_o$' is the initial resistance, 't' is the temperature change, 'R_t' is the new resistance, 'α' is the coefficient of resistance.

Resistance of a conductor is directly affected by the length of the conductor, but inversely with respect with the area. $R = \rho(L/a)$, where ρ is the constant of proportionality called the resistivity. Resistivity is measured in Ohm – metre (Ωm). The reverse of resistance is conductance (G), G = (1/R), the unit of conductance is Siemens. $G = \gamma (a/L)$, where 'γ' is the conductivity.

Exercise:

i. An iron wire has a resistance of 50Ω at 20^{o}C. What is its resistance at 100^{o}C? (Coefficient of resistance for iron = 0.00625/K)
ii. Find the resistance of 100metres of aluminium wire whose diameter is 2mm? (resistivity (ρ) of Al = 3.2×10^{-8} Ωm)