Introduction to DC Circuits

[1.1] Electrical Network

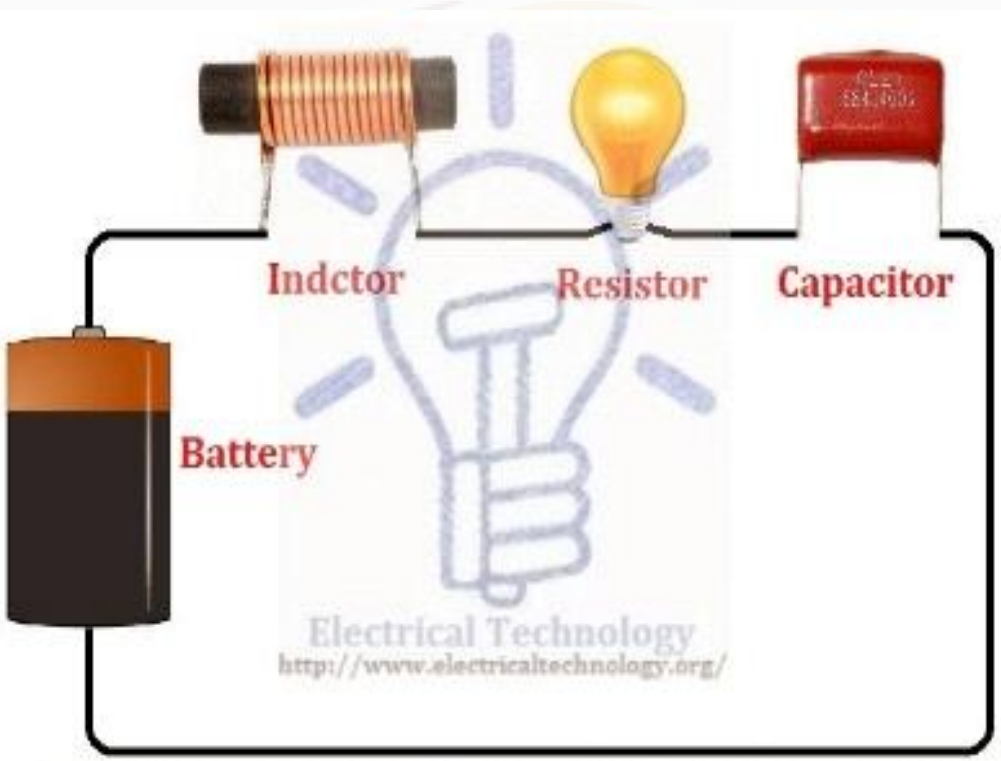
Combination of different electric elements or components which are connected in any way is called electric network.

[1.2] Complex Networks

A Circuit which contains on many electrical elements such as resistors, capacitors, inductors, current sources and Voltage source (both AC and DC) is called Complex network. These kinds of networks can't be solved easily by simple ohm's Law or Kirchhoff's laws. I.e. we solve these circuits by specific technique i.e. Norton's Theorem, Thevenin's Theorem, Superposition theorem etc.

[1.3] Circuit or Electric Circuit

Circuit is a close loop path giving a return path for the current. Or a close conducting path in which current can flow is called circuit



GALGOTIAS UNIVERSITY

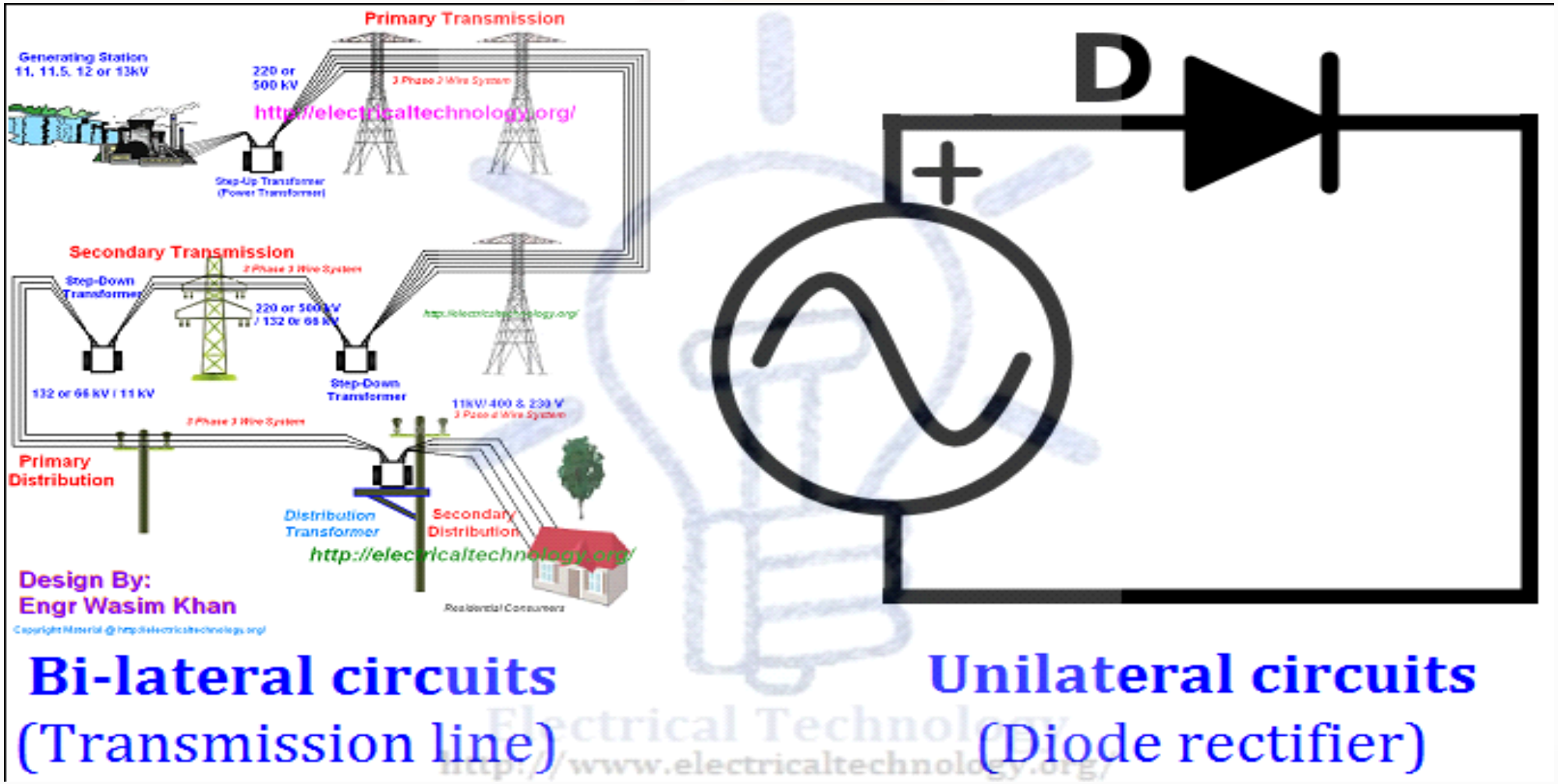
[1.4] Unilateral and Bilateral circuits

❖ Unilateral circuits

In unilateral circuits, the property of circuit changes with the change of direction of supply voltage or current. In other words, unilateral circuit allows the current to flow only in one direction. Diode rectifier is the best example of unilateral circuit because it does not perform the rectification in both direction of supply.

❖ Bi-lateral circuits

In bilateral circuits, the property of circuit does not change with the change of direction of supply voltage or current. In other words, bilateral circuit allows the current to flow in both directions. Transmission line is the best example of bilateral circuit because, if you give supply from any direction, the circuit properties remain constant


Primary Transmission
Generating Station
11, 11.5, 12 or 13kV
220 or
500 kV
3 Phase 3 Wire System
http://electricaltechnology.org/
Step-Up Transformer
(Power Transformer)
Secondary Transmission
3 Phase 3 Wire System
Step-Down
Transformer
220 or 500 kV
/ 132 or 66 kV
132 or 66 kV / 11 kV
Step-Down
Transformer
11kV/ 400 & 230 V
3 Phase 4 Wire System
3 Phase 3 Wire System
Primary
Distribution
Distribution
Transformer
Secondary
Distribution
http://electricaltechnology.org/
Residential Consumers
Design By:
Engr Wasim Khan
Copyright Material @ http://electricaltechnology.org/
D
+
Bi-lateral circuits
(Transmission line)
Unilateral circuits
(Diode rectifier)

[1.5] Active and Passive Circuits:

❖ Active Circuit

A circuit which contains one or more E.M.F (Electro motive force) sources is called Active Circuit

❖ Passive Circuit

A circuit in which no EMF source exist is called Passive Circuit

The Main Difference between Active and Passive Components

❖ Active Components:

Those devices or components which required external source for their operation is called Active Components.

For Example: Diode, Transistors, SCR etc…

Explanation: Diode is an Active Components as it requires an External Source to its operation. If we connect a Diode in a Circuit and then connect this circuit to the Supply voltage., then Diode will not conduct the current until the supply voltage reaches to 0.3V (in case of Germanium) or 0.7V (in case of Silicon).

VIDEO- COMPONENTS

https://www.youtube.com/watch?v=iHmSj6v7LOE

GALGOTIAS UNIVERSITY

❖ **Passive Components:**

Those devices or components which do not required external source to their operation is called Passive Components.

Example: Resistor, Capacitor, Inductor etc…

[1.6] Other important related terms to Electric Circuits and Networks

❖ **Node**

A point or junction where two or more circuit's elements (resistor, capacitor, inductor etc) meet is called Node

❖ **Branch**

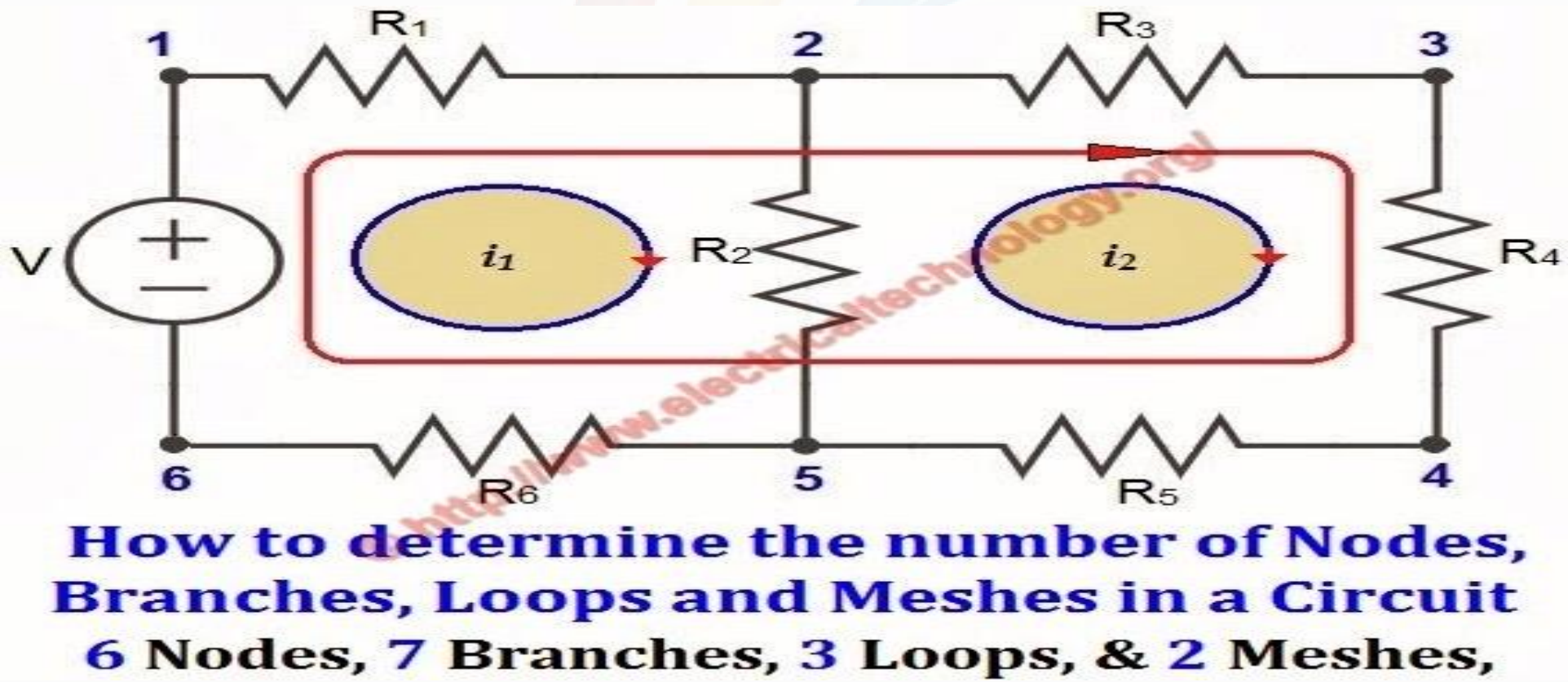
That part or section of circuit which locate between two junctions is called branch. In branch, one or more elements can be connected and they have two terminals.

❖ Loop

A closed path in circuit where more than two meshes can be occurred is called loop i.e. there may be many meshes in a loop, but a mesh does not contain on one loop.

❖ Mesh

A closed loop which contains no other loop within it or a path which does not contain on other paths is called Mesh.

GALGOTIAS UNIVERSITY

- Determine the number of Nodes, Branches, Loops and Meshes in a Circuit: