DC Circuit: RESISTORS
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How resistors work?

Series circuits

Parallel circuits

Applications:

- Adjust current flow
- Adjust & divide voltage levels
- Terminate transmission lines
- Bias active components

Ohm’s Law

\[ V = I \times R \]
\[ I = \frac{V}{R} \]
\[ R = \frac{V}{I} \]

Kirchhoff’s Current Law: At any node/junction – the sum of currents flowing into that node/junction is equal to the sum of currents flowing out of that node/junction.

Kirchhoff’s Voltage Law: The sum of all voltage drops around any closed loop must equal zero.

Power Dissipation (Watts)

\[ P = V \times I \]
\[ P = I^2 \times R \]
\[ P = \frac{V^2}{R} \]
Determine the following quantities for each of the two circuits shown below...

i. the equivalent resistance,
ii. the current from the power supply,
iii. the current through each resistor,
iv. the voltage drop across each resistor, and
v. the power dissipated in each resistor.

a.

b.
#2
Ohm’s Law: \( V = I \times R \)
What will happen to the current passing through a resistance, if the voltage drop across it is doubled and the resistance is halved?
a) The same  b) Double  c) Half  d) 4 times

#3
Find currents I and I₂
For the circuit shown
1) Find the total resistance in Ohm
2) Find the total current in milliA
3) Write the formula to calculate $V_B$ using voltage divider law
4) Find $V_B$ use the above formula
5) Find $V_C$
6) Find $B_C$
7) Find power dissipated of R1 in mWatt
Network Theorems

1) SUPERPOSITION THEOREMS

• Using to solve any circuit with two or more voltage or current sources.
• Keep one source while remove all the other sources. Only working with one source
• To remove the voltage source from the circuit: SHORT
• To remove the current source from the circuit: OPEN
• Do the calculation for each circuit and add up the result

1# Using superposition calculate VB

Remove E2 20V

Remove E1 40V
2# Using superposition calculate VR2

Remove E 10V

Remove 2A source
Network Theorems

2) THEVENIN’S THEOREM

- Any sources and components no matter how they are interconnected can be represented by an equivalent by one source $V_{TH}$ and one resistor $R_{TH}$.
- To calculate $V_{TH}$
  - Remove the Load then calculate the $V_{TH}$ across open circuit
- To calculate $R_{TH}$
  - Remove all sources then calculate the $R_{TH}$ across open circuit
In the following circuit find the current $I$ in $RL$ using Thevenin's theorem.

**#5**

![Circuit Diagram 1](image1)

**#6**

In the following circuit find the current $I$ in $RL$ using Thevenin's theorem.

![Circuit Diagram 2](image2)