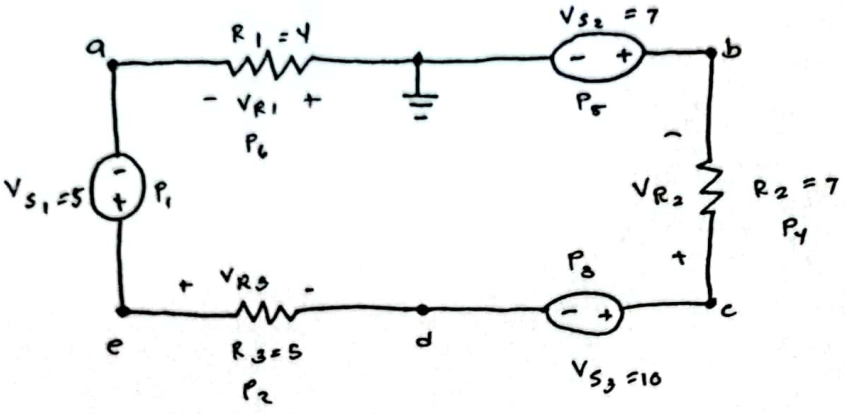
MALLARI, ELLA MARIE A. BSCPE 2-4



SOLUTION

$$I = \frac{V_{TOTAL}}{R_{TOTAL}} = \frac{V_{S1} - V_{S2} + V_{S3}}{R_1 + R_2 + R_3}$$

$$= \frac{5 - 7 + 10}{4 + 7 + 5}$$

$$I = \frac{8}{16} = \frac{1}{2}$$

$$\boxed{I = 0.5\ A}$$

* For V_a

$V_a = -V_{R1} = -2V$

or

$V_a = -V_{S1} + V_{R3} - V_{S3} + V_{R2} + V_{S2}$

$= -5 + 2.5 - 10 + 3.5 + 7$

$\boxed{V_a = -2V}$

* V_{R1}, V_{R2}, V_{R3}

$V_{R1} = IR_1 = 0.5(4) = 2V$

$V_{R2} = IR_2 = 0.5(7) = 3.5\ V$

$V_{R3} = IR_3 = 0.5(5) = 2.5\ V$

* For V_b

$V_b = V_{S2} = 7V$

or

$V_b = -V_{R2} + V_{S3} - V_{R3} + V_{S1} - V_{R1}$

$= -3.5 + 10 - 2.5 + 5 - 2$

$\boxed{V_b = 7V}$

* For V_c

$V_c = V_{R2} + V_{S2}$

$= 3.5 + 7$

$V_c = 10.5\ V$

or

$V_c = V_{S3} - V_{R3} + V_{S1} - V_{R1}$

$= 10 - 2.5 + 5 - 2$

$\boxed{V_c = 10.5}$

* For V_d

$V_d = -V_{S3} + V_{R2} + V_{S2}$

$= -10 + 3.5 + 7$

$V_d = 0.5V$

or

$V_d = -V_{R3} + V_{S1} - V_{R1}$

$= -2.5 + 5 - 2$

$\boxed{V_d = 0.5V}$

* For V_e

$V_e = V_{R3} - V_{S3} + V_{R2} + V_{S2}$

$= 2.5 - 10 + 3.5 + 7$

$V_e = 3$

or

$V_e = V_{S1} - V_{R1}$

$= 5 - 2$

$\boxed{V_e = 3}$

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* For V_{ac}

$V_{ac} = -V_{S1} + V_{R3} - V_{S3}$

$= -5 + 2.5 - 10$

$V_{ac} = -12.5\,V$

or

$V_{ac} = -V_{R1} - V_{S2} - V_{R2}$

$= -2 - 7 - 3.5$

$\boxed{V_{ac} = -12.5\,V}$

* For V_{bc}

$V_{bc} = -V_{R2} + V_{S3} - V_{R3}$

$= -3.5 + 10 - 2.5$

$V_{bc} = 4V$

or

$V_{bc} = V_{S2} + V_{R1} - V_{S1}$

$= 7 + 2 - 5$

$\boxed{V_{bc} = 4V}$

* For V_{ce}

$V_{ce} = V_{S3} - V_{R3}$

$= 10 - 2.5$

$V_{ce} = 7.5V$

or

$V_{ce} = V_{R2} + V_{S2} + V_{R1} - V_{S1}$

$= 3.5 + 7 + 2 - 5$

$\boxed{V_{ce} = 7.5V}$

Power of each e:

* For P_1

$P_1 = -V_{S1} I$

$= -(5)(0.5)$

$\boxed{P_1 = -2.5\,W}$

delivering power

* For P_2

$P_2 = V_{R3} I$

$= 2.5\,(0.5)$

$\boxed{P_2 = 1.25\,W}$

absorbing

* For P_3

$P_3 = -V_{S3} I$

$= -(10)(0.5)$

$\boxed{P_3 = -5\,W}$ delivering power

* For P_4

$P_4 = V_{R2} I$

$= 3.5\,(0.5)$

$\boxed{P_4 = 1.75\,W}$

absorbing power

* For P_5

$P_5 = V_{S2} I$

$= 7(0.5)$

$\boxed{P_5 = 3.5\,W}$

absorbing power

* For P_6

$P_6 = V_{R1} I$

$= 2(0.5)$

$\boxed{P_6 = 1\,W}$

absorbing power

By Tellegens Theorem

$\sum P = 0$

$-P_1 + P_2 - P_3 + P_4 + P_5 + P_6 \boxed{= 0}$

$-2.5W + 1.25W - 5W + 1.75W + 3.5W + 1W \boxed{= 0}$

$\boxed{0 = 0}$

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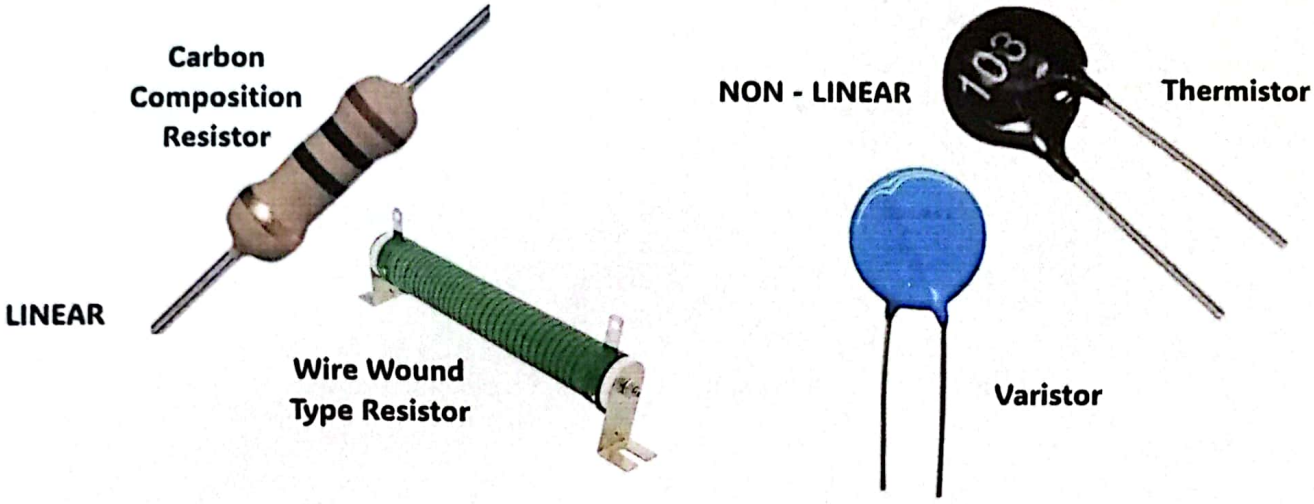
Different Kinds of Resistors



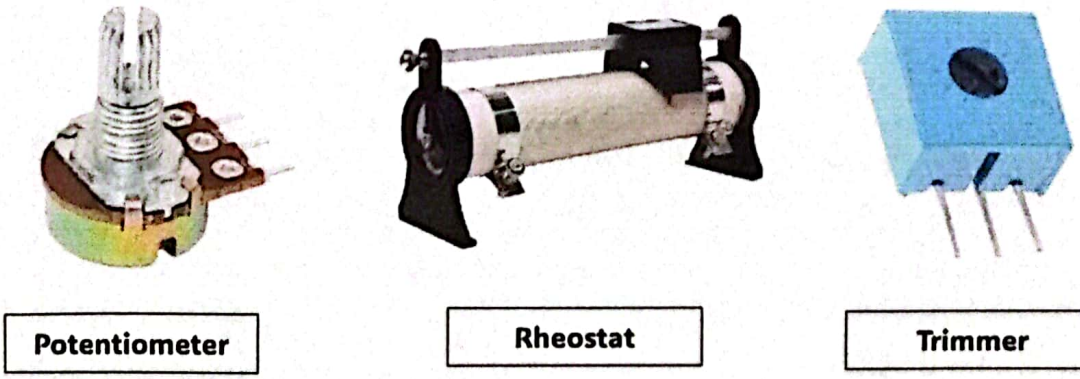
- **Linear Resistors**

  When temperature and voltage are applied, the value of a resistor is said to be linear. Resistances generate a voltage drop between themselves when current passes through them. Variable resistors and fixed resistors are the two fundamental categories of resistors having linear characteristics.

- **Non-Linear Resistors**

  Resistors that do not follow Ohm's law are known as non-linear resistors because the electric current they let flows through them varies in response to variations in applied voltage or temperature.

Different Kinds of Variable Resistors



- **Potentiometer**

  A potentiometer is a manually adjustable variable resistor with three terminals. A wiper, or sliding contact, is attached to the third terminal and slides across the resistive element. Two terminals are linked to the opposite ends of the resistive element. In essence, a variable resistance divider is what a potentiometer is. Potmeters and pots are other names for potentiometers.

- **Rheostat**

  A rheostat is an adjustable resistor used to regulate current. Without disrupting the circuit, they can alter its resistance. The design bears a striking resemblance to a potentiometer. It just needs two connections, even in cases where there are three terminals (like in a potentiometer). One end of the resistive element is linked to the first wire, while the wiper (sliding contact) is connected to the second wire. Unlike potentiometers, rheostats require a sizable current. They are therefore mainly constructed as wirewound resistors. The resistive wire windings are encircled by an insulating ceramic core, and the wiper passes over them.

- **Trimmer**

  Trimpot, also known as a trimmer potentiometer, is a small potentiometer used in circuits for adjustment, tuning, and calibration. It is a a variable resistor that can be used for the adjustment of tunes as well as calibration of circuits. It can be adjusted to the exact resistance. And it is mounted directly on the circuits. Trimmer-type resistors can be single or multi-turn. The multi-turn trimmer resistors can provide high resolution.