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Dept : Civil ENGINEERING

SEMESTER: 1st

SUBJECT: BASIC ELECTROMECHANICS

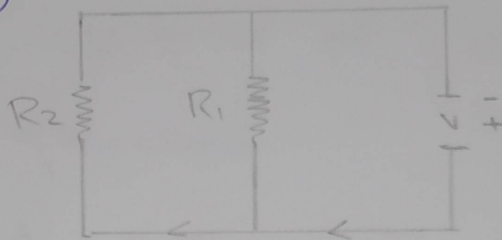
DATE: 22 Aug, 2020

QUESTION: 1

Sol:

Two formula for well-known
for total resistance.

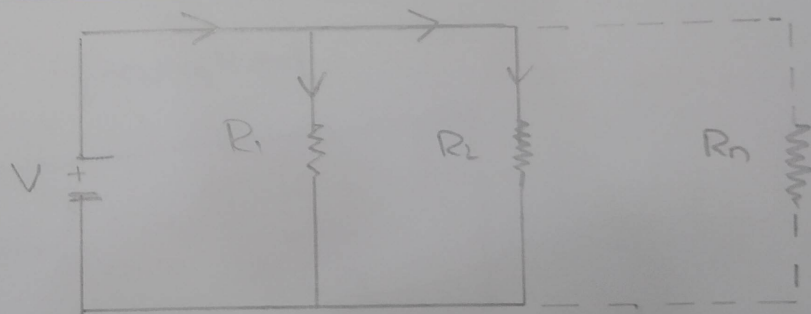
(a)



$$\frac{1}{R_{\text{Total}}} = \frac{1}{R} + \frac{1}{R_2}$$

$$R_{\text{Total}} = \frac{R_1 \cdot R_2}{R_1 + R_2}$$

(B)



For any number of resistance

$$\frac{1}{R_{\text{Total}}} = \frac{1}{R} + \frac{1}{R_2} + \frac{1}{R_3} + \dots + \frac{1}{R_n}$$

$$R_{\text{Total}} = \frac{R_1 \cdot R_2 \cdot \dots \cdot R_n}{R_1 + R_2 + R_3 + \dots + R_n}$$

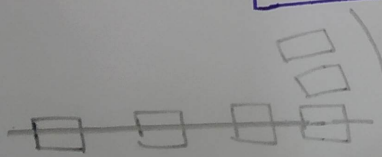
(B) Formula for total 'n' number of resistance in parallel

$$R_{\text{Total}} = \frac{R_1 \cdot R_2 \dots R_n}{R_1 + R_2 + \dots R_n}$$

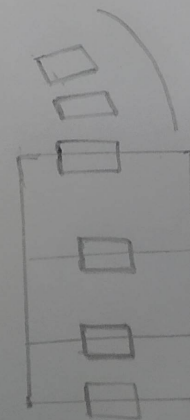
So total resistance decrease with addition of more resistors in parallel.

and we also know that resistance is inversely proportional to conductance therefore total conductance is increases with addition of more resistor in parallel.

$$R = \frac{1}{G}$$



increase in R with more resistor
decrease in G with more resistor



Adding successive resistor in parallel

QUESTION :- 2

ANSWER :-

GIVEN :-

$$V = 24 \text{ volt}$$

$$R_1 = 1 \Omega$$

$$R_2 = 2 \Omega$$

$$R_3 = 3 \Omega$$

REQ :-

Current $I = ?$

Power $P = ?$

Sol :-

To find current, $I = ?$

Using ohm's law

$$V = IR$$

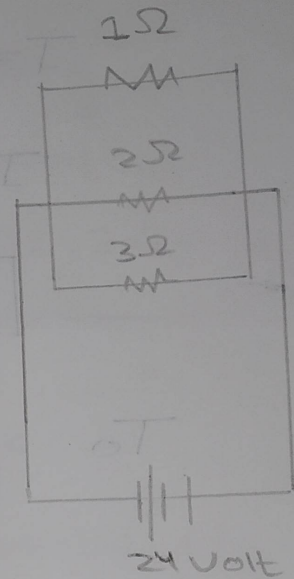
$$I = \frac{V}{R}$$

$$I = \frac{24V}{1 \Omega}$$

$$I = 24A$$

$$I_2 = \frac{V}{R}$$

$$I_2 = \frac{24}{2}$$



$$I_3 = \frac{V}{R}$$

$$I_3 = \frac{24}{3}$$

$$\boxed{I_3 = 8 \text{ A}}$$

To find Power for each Resistor

$$P_1 = I_1 V$$

$$P_1 = (24)(24)$$

$$\boxed{P_1 = 576 \text{ W}}$$

In kilowatt

$$\Rightarrow P = 0.5 \text{ kW}$$

$$P_2 = I_2 V$$

$$P_2 = (12)(24)$$

$$\boxed{P_2 = 288}$$

$$\Rightarrow P_2 = 0.28 \text{ kW}$$

$$P_3 = I_3 V$$

$$P_3 = (8)(24)$$

$$\boxed{P_3 = 192 \text{ W}}$$

$$\Rightarrow P = 0.19 \text{ kW}$$

Q:-3

Current

- 1) Current is rate of charge flow between two points caused by voltage.
- 2) Currents are same through all components connected in series.
- 3) Current not speed up what flows into components must flow out.
- 4) Current add up for components connected in parallel.
- 5) measure in amp (ampere)

Voltage

- 1) is the potential difference force between two points in electric field which cause current to flow in circuit.
- 2) Voltage is supplied by battery (or power supply)
- 3) Voltage is used up in components, but not in wires.
- 4) Voltage are same across all components connected in parallel.
- 5) measured in volt.

Power

- 1) Energy is defined as Capacity to do some work.
- 2) Energy change from one form to another
- 3) Energy is time quantity or component
- 4) Energy can be stored

Energy

- 1) Power is defined as defined rate at which a specific work is done or which the energy is transmitted.
- 2) Power cannot be transformed from one type to another
- 3) it is an instantaneous quantity.
- 4) Power cannot be stored.

INDUCTANCE

- 1) Inductance is property of current carrying conductors which generates a magnetic field around conductor
- 2) Inductance is measured by Henry (H)
- 3) Inductance is dominating component in low pass filter

CAPACITANCE

- 1) Capacitance is ability of device to store electric charges
- 2) Capacitance is measured in Farad (F)
- 3) Capacitance is dominating in high pass filters

Synchronous

- 1) Speed control is not possible
- 2) not self starting
- 3) Motor is sensitive to sudden load change and hunting result
- 4) Construction is complicated

Asynchronous

- 1) Speed control is possible through difficult
- 2) self starting
- 3) Do not cause any harm or hunting
- 4) It is simpler.

Resistance

- 1) Resistance is opposition that substance offers to flow of electric current
- 2) Unit of resistance is ohm.
- 3) resistance is ratio of P.I to current.

Conductance

- 1) is the measure of how easily electricity flow along a certain path through a electrical element
- 2) unit of conductance is siemens (S)
- 4) Conductance is degree to which object conducts electrical