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Subject Basic electro mechanical engineering

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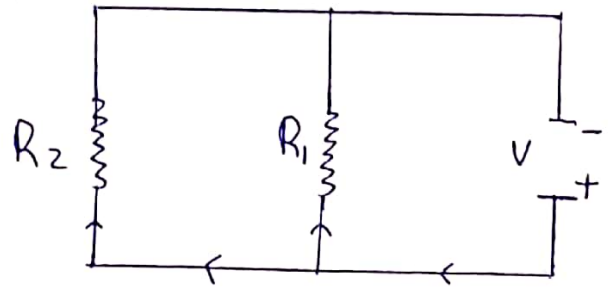
Question 1

Answer

Solution:-

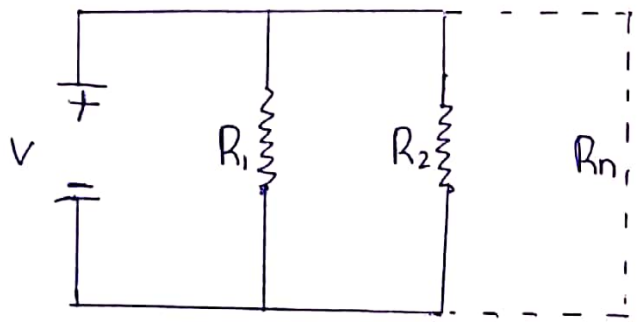


well Known Formula For two Resistance

(i) $\frac{1}{R_{total}} = \frac{1}{R_1} + \frac{1}{R_2}$

$$R_{total} = \frac{R_1 \cdot R_2}{R_1 + R_2}$$

(ii)



For any number of Resistance

$$\frac{1}{R_{total}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \cdots + \frac{1}{R_n}$$

$$R_{total} = \frac{R_1 \cdot R_2 \cdots R_n}{R_1 + R_2 + R_3 + \cdots R_n}$$

(B)

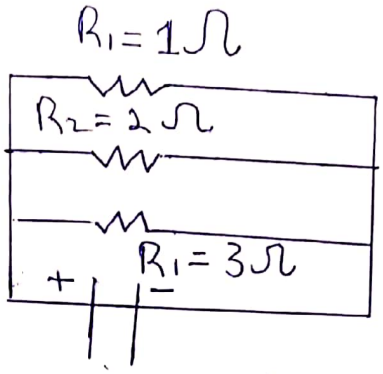
" In the addition of parallel resistor in Parallel circuit resistortance decrease and Increase with the addition of more resistors.

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

Question 2

Answer

Solution:



To Find I_1

$$I_1 = \frac{V}{R_1} \Rightarrow I_1 = \frac{24}{1} \quad \boxed{\Rightarrow I_1 = 24\ A}$$

$$P_1 = I^2R \Rightarrow P_1\ (1)^2\ (1) \quad \boxed{\Rightarrow P_1 = 1\ W}$$

To Find I_2:

$$I_2 = \frac{V}{R_2} \Rightarrow I_2 = \frac{24}{2}$$

$$\boxed{\Rightarrow I_2 = 12\ A}$$

$$P_2 = \frac{V^2}{R_2} \Rightarrow P_2 = \frac{(24)^2}{2} \quad \boxed{\Rightarrow P_2 = 288\ W}$$

To Find I_3: $I_3 = \frac{V}{R_3} = \frac{24}{3}$

$$\boxed{\Rightarrow I_3 = 8A} \quad P_3 = \frac{V^2}{R_3} = \frac{(24)^2}{3}$$

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

Question 3
Answer:.
Differentiate between the Following.
a) Current and Voltage

Current:-

Current is the rate at which charge is Flowing in a circuit.
It is the amount of charge that pass through any point of the circuit Per unit time.
current is measured in ampere A where $1A = 1CS^{-1}$.
unit: Coulomb/Sec = Ampere (A).
This gives the wire a net charge of zero.

Voltage:.

Voltage, electric Potential difference.
Voltage is the pressure from an electrical circuit Power Source that Pushes charged electrons (current) through a conducting loop, enabling them to do work Such as illuminating a light. In brief Voltage = Pressure, and It is measured in Volts(V).
Voltage, also called electromotive force, is a quantitive expression of the Potential difference in charge between two Points in an electrical Field.

(B) Resistance and Conductance.

Resistance:-

Resistanee is a measure of the opposition to current Flow in an electrical circuit. Resistance is measured in ohms, Symbolized by the Greek letter omega. (Ω).
Circuit depends on two things. Amount of charge that flows through.

- Voltage provided by Sources.
- Electric resistance of the conductor.

$R = \frac{V}{I}$ unit:- ohm's.

Conductane:-

Conductane is the measure of how easily electrically Flows along a certain Path through an electrically element.

- 1/P and has the unit of Siemens per metre, S/m.

C) Power and energy.

Power:-

The Capacity or ability to direct or Influence the behaviour of other or the the Couarse of events.

- Move oR travel with great Speed oR Force.

$P = IV$

- unit of power is the Watt (W).

Energy:.

In Physics, energy is the Quantitative. Prothat must be transfered to an object in order to Perform work on, or to heat, the object.

- The SI unit of energy is Joule.
- The Formula For the energy of motion is $kE = .5 X m X V^2$.

D) Inductance and Capacitance.

Inductance:.

In electromagnetism and electrons, inductance is the tendency of an electrical conductor to oppose a change in the electric current creates Flowing through it. the Flow of electric current creates a magnetic field around the Conductor. OR tendency of an electrical Conductor to oppose a change in the electric current Flowing through It is called inductance.

Its unit is henry.

Capacitance :-

Capacitance is the ratio of the change in electric charge of a System to the Corresponding change in its electric Potential, there are two closely related notions of capacitance; Self Capacitance and mutual Capacitance. Any object that can be electrically charged exhibits Self Capacitence.

SI unit : farad.

other units; $\mu F, nF, PF$

SI base units $= A^2 S^4 Kg^{-1} m^{-2}$

Dimension; $M^{-1} L^{-2} T^4 I^2$

e) Synchronous motor and Asynchronous motor

Synchronous motor:-

- Construction is complicated.
- Separate Dc Source is required For rotar excitation.
- The Speed is always Synchronous irrespective of the load
- It can be used as Synchronous condenser For P.f improvement.
- Speed Control is not possible.

Asynchronour or Induction motor:-

- Self Starting.
- Construction is Simpler, particularly in case of cage rootor.
- Speed Control is Possible through difficult.
- It can not be used as Synchronous condenser.
- Phenomenon of hunting is absent.
- Motor is cheap, especially cage rotors and maintenance Free.