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Section: A.

Q1(a) These are two well-known formula for calculating the total resistance ..... Write these two formulas.

Ans:- For two resistance

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$\frac{1}{R_T} = \frac{R_2 + R_1}{R_1 \cdot R_2}$$

$$\frac{1}{R_T} = \frac{R_1 + R_2}{R_1 \cdot R_2}$$

$$R_T = \frac{R_1 \cdot R_2}{R_1 + R_2}$$

For more than two resistance

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

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Q1(b) A quantity often useful in electric circuit analysis is conductance ..... $G = \frac{1}{R}$

In a series ..... parallel resistor.

Ans: In a parallel circuit resistance decreases and conductance increases with the addition of more resistors.

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2}$$

So $G_1 = \frac{1}{R_1}$, $G_2 = \frac{1}{R_2}$

$$G_T = G_1 + G_2$$

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Q2 In the given circuit, three resistors ③ recieve the same amount of voltage (24 Volts) from single source. Calculate the amount ..... resistors.

Ans: Given

$R_1 = 1\Omega$

$R_2 = 2\Omega$

$R_3 = 3\Omega$

$V = 24V$

Soln: $\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$

$\frac{1}{R_{eq}} = \frac{1}{1} + \frac{1}{2} + \frac{1}{3}$

$= \frac{3 + 6 + 2}{6}$

$\frac{1}{R_{eq}} = \frac{11}{6}$

$R_{eq} = \frac{6}{11} = 0.54\Omega$

Now Find I

For I_1

$V = I_1 R_1$

$I_1 = \frac{V}{R_1}$

$I_1 = \frac{24}{1}$

$\boxed{I_1 = 24A}$

For I_2

$V = I_2 R_2$

$I_2 = \frac{V}{R_2}$

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

$\boxed{I_2 = 12A}$

For I_3

$V = I_3 R_3$

$I_3 = \frac{V}{R_3}$

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

$\boxed{I_3 = 8A}$

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* Power

for P_1, $I_1 = 24A$, $V = 24V$

$P_1 = I_1 \times V$

$= 24 \times 24$

$= 576$ Watts

for P_2, $I_2 = 12A$, $V = 24$

$P_2 = I_2 \times V$

$= 12 \times 24$

$= 288$ Watts

for P_3, $I_3 = 8A$, $V = 24$

$P_3 = I_3 V$

$P_3 = 8 \times 24$

$P_3 = 192$ Watts

Resistor	Voltage	current	Power
1Ω	24V	24A	576 watts.
2Ω	24V	12A	288 watts
3Ω	24V	8A	192 watts

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Q3 Differentiate between the following

(a) Current and Voltage.

Ans: Current:

Current is the rate of flow of electric charge in a circuit. Its unit is Amphere and donated with 'A'. Current is the effect (Voltage being the cause). Current cannot flow without voltage. Current is same throughout all components connected in series. and current is distributed over components connected in series.

Voltage: Potential

Voltage is the ^ difference in charge between two points in a electric field. Its S.I unit is Volts and represented by 'V'. Voltage is the cause. Voltage can exist without current. It is measured by Voltmeter. Its an electrostatic field. Voltage is distributed in series and is same in parallel circuit.

(b) Resistance and Conductance:

Ans Resistance is a property of conductor which tells us how much the resistor resists or opposes the current to pass through it.

Whereas conductance is a property of a conductor which tells us how much the resistor allows the current to pass through it.

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(c) Power and energy.

Ans Energy is what makes change happen and can be transferred from one object to another. Energy can also be transformed from on form to another. While power is the rate at which energy is transferred. It is not energy but is often confused with energy. The watt is the most commonly used unit of measure for power. It measures the rate of energy transfer.

(d) Inductance and Capacitance.

The key difference between inductance and capacitance is that inductance is the property of current carrying conductor which generates a magnetic field around the conductor whereas capacitance is the abillity of capacitor to hold and store electric charges in a circuit.

(e) Synchronous motor and Asynchronous motor.

Ans Synchronous motor is a machine whose rotor speed and the speed of the stator magnetic field is equal $N = N_S = 120f/p$. Its efficiency is greater. These motors are costly. While Asynchronous motor is a machince whose rotor rotates at the speed less than the synchronous speed.

$N < N_S$.

They are less costly and less efficient.

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