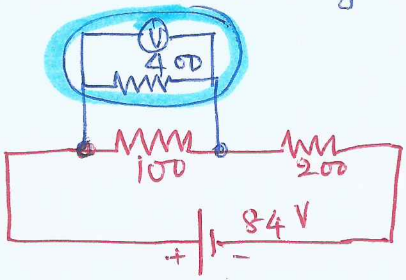
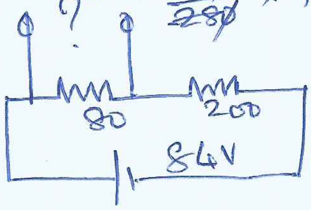
problem: A 100 ohm resistor and a 200 Ω resistor are connected in series across a 84 Volt cell. The p.d. across 100 Ω is found using a 400 Ω voltmeter (a) What will be the voltmeter reading? (b) what will be the pd across 100 Ω if measured using a potentiometer.

(a)



→



$? \rightarrow \frac{\cancel{84}^{3}}{\cancel{280}} \times 8\cancel{0} = 24V$

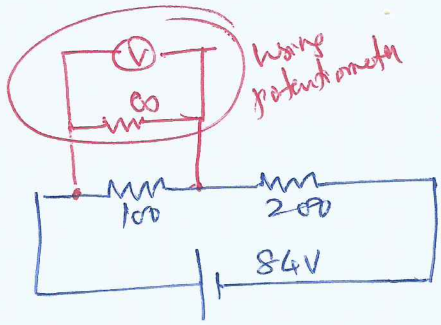
parallel combination of 100 Ω and 400 Ω

$\frac{1}{R} = \frac{1}{100} + \frac{1}{400}$

$= \frac{4+1}{400} = \frac{5}{400}$

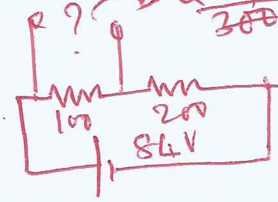
$R = \frac{400}{5} = 80\,\Omega$

(b)



using potentiometer

→



$R\ ? \rightarrow \frac{\cancel{84}^{28}}{\cancel{300}_{3}} \times \cancel{100} = \cancel{28}\ 28V$

More accurate

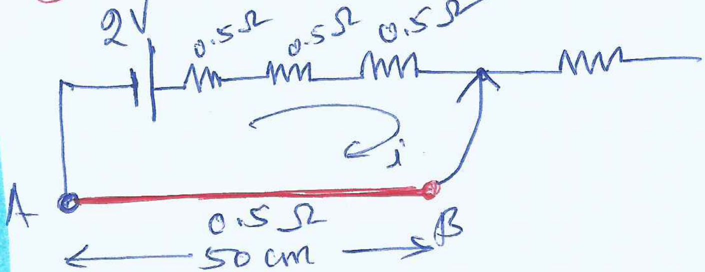
---

potentiometer problem (Neetam) page 294

(3) The potential gradient along the potentiometer wire shown in the figure is

✓ (a) 1.0 Vm^{-1} (b) 0.1 Vm^{-1}

(c) 0.5 Vm^{-1} (d) 0.05 Vm^{-1}



Current $i = \frac{2}{2\,\Omega} = 1\,A$

$V_{AB} = 0.5 \times 1A = 0.5\,V$

potential gradient $= \frac{\text{Total drop}}{\text{Total length of wire}}$

$= \frac{0.5}{0.5\,m} = \underline{1\,Vm^{-1}}$

Imp Tips (current Electricity)

Kirchhoff's Rules

I rule : Law of conservation of charge

The algebraic sum of the current meeting at a junction is zero, i.e. $\sum i = 0$.

- The current reaching junction is taken as POSITIVE
- The current leaving junction is taken as NEGATIVE

This law supports the concept that moving charges are not accumulated at a junction → hence law of conservation of charge.

$i_1 + i_2 - i_3 - i_4 - i_5 = 0$

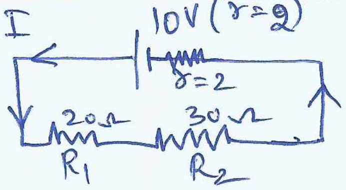
II Rule : Law of Conservation of energy

In a closed Loop, the algebraic sum of all the potential differences across ~~devices~~ components is zero. i.e. $\sum \Delta V = 0$.

- Traverse the loop either in clockwise or anticlockwise direction. It does not matter, but stick to one convention when solving the problem.

- While traversing a **closed loop**, if −ve pole of the cell is encountered first (instead of +ve pole), then its emf is taken as −ve, otherwise +ve
- The pd (or voltage) across a component is taken as +ve if conventional current direction is in the same sense as one moves in a closed loop.
- The pd (or voltage) across a component is taken as −ve if conventional current direction is in the opposite sense as one moves in the closed loop.

- This rule supports the law of conservation of energy.



(Take anti clockwise direction)

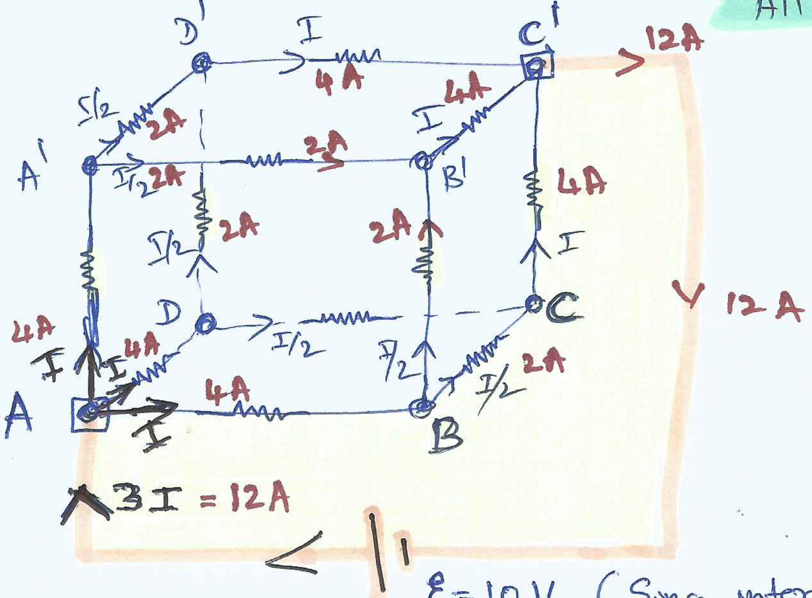
In this closed loop, the eqn is

$I R_1 + I R_2 + I r - 10 = 0$

This is important.

Current Electricity : NCERT book page 116, Ex. 3.6

All Resistors = 1 Ω.



$\mathcal{E} = 10\,V$ (Since internal resistance of cell $r = 0$)

Given from figure (problem)

- Current drawn from cell $\mathcal{E}$ = $3I$
- emf of cell = $10\,V$

∴ Since total current drawn from cell is $3I$, whatever may be the circuit around it, its equivalent resistance ~~will~~ will be

$$R_{eq} = \frac{\mathcal{E}}{3I} = \frac{10}{3I} \qquad \therefore \boxed{R_{eq} = \frac{10}{3I}} \rightarrow (1)$$

To find I : Kirchhoff's Loop rule on loop $ABCC'\mathcal{E}A$

$$IR + \frac{I}{2}R + IR - 10 = 0 \qquad (\text{Since } R = 1\,\Omega)$$

$$\frac{5}{2} I = 10$$

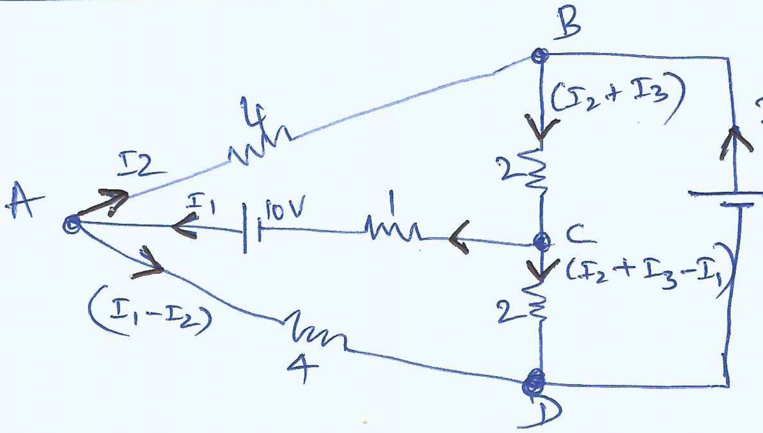
$$I = \frac{2}{\cancel{5}} \times \cancel{10}^{\,2} = 4\,A \qquad \boxed{I = 4\,A} \rightarrow (2)$$

$$\therefore R_{eq} = \frac{10}{3I} = \frac{\cancel{10}^{\,5}}{\cancel{12}_{\,6}} = \frac{5}{6}\,\Omega \simeq 0.8\,\Omega$$

$$\therefore \boxed{R_{eq} = 0.8\,\Omega} \rightarrow (3)$$

Ans

Current Electricity : NCERT book : page 117 : Ex 3.7



To find $I_1, I_2, I_3 = ?$

Consider Loop ABDCA

$$4I_2 + 2(I_2+I_3) + I_1 - 10 = 0 \longrightarrow (1)$$

Loop ACDA: $10 - I_1 + 2(I_2+I_3-I_1) - 4(I_1-I_2) = 0 \rightarrow (2)$

Loop DBED: $-2(I_2+I_3-I_1) - 2(I_2+I_3) + 5 = 0 \longrightarrow (3)$

$$I_1 + 4I_2 + 2I_2 + 2I_3 = 10$$

$$\boxed{\begin{aligned} I_1 + 6I_2 + 2I_3 &= 10 \rightarrow (4) \\ 7I_1 - 6I_2 - 2I_3 &= 10 \rightarrow (5) \\ -2I_1 + 4I_2 + 4I_3 &= 5 \rightarrow (6) \end{aligned}}$$

Add (4) & (5)

$$\begin{aligned} I_1 + \cancel{6I_2} + \cancel{2I_3} &= 10 \\ + \quad 7I_1 - \cancel{6I_2} - \cancel{2I_3} &= 10 \\ \hline 8I_1 &= 20 \end{aligned}$$

$\therefore I_1 = \frac{20^5}{8_2} = \frac{5}{2}$

$\boxed{I_1 = 2.5\ A}$

From (2)

$$I_1 - 2(I_2+I_3-I_1) + 4(I_1-I_2) = 10$$

$$I_1 - 2I_2 - 2I_3 + 2I_1 + 4I_1 - 4I_2 = 10$$

$$\cancel{3I_1 - 6I_2 - 2I_3 = 10}$$

$$7I_1 - 6I_2 - 2I_3 = 10$$

From (3)

$$2[I_2+I_3-I_1] + 2[I_2+I_3] = 5$$

$$2I_2 + 2I_3 - 2I_1 + 2I_2 + 2I_3 = 5$$

$$-2I_1 + 4I_2 + 4I_3 = 5$$

~~(4) (5) (6) becomes~~

$$\cancel{\tfrac{5}{2} + 6I_2 + 2I_3 = 10}$$

$$\cancel{6I_2 + 2I_3 = 10 - 2.5 = 8.5}$$

$$\cancel{6I_2 + 2I_3 = 8.5 \rightarrow (7)}$$

$$\cancel{17.5 - 6I_2 - 2I_3 = 10}$$

$$\cancel{-6I_2 - 2I_3 = -7.5 \rightarrow (8)}$$

~~Add (7) & (8)~~ $\cancel{6I_2 + 2I_3 = 8.5}$

$\cancel{-6I_2}$

PTO.

Contd....

Contd.. . from pre. page. Since $i_1 = 2.5A$

⑤ → $7I_1 - 6I_2 - 2I_3 = 10$

$-6I_2 - 2I_3 = -7.5$

$2I_2 + 2I_3 = 5$

Add $-4I_2 = -2.5$

$I_2 = \frac{5}{2} \times \frac{1}{4} = \frac{5}{8}$

$\boxed{I_2 = \frac{5}{8}\ A}$

⑥ $-2I_1 + 4I_2 + 4I_3 = 5$

$4I_2 + 4I_3 = 5 + \cancel{\frac{2.5}{2}}$

$4I_2 + 4I_3 = 10$

$2I_2 + 2I_3 = 5$

$2I_2 + 2I_3 = 5$

$2I_3 = 5 - \cancel{2} \times \frac{5}{\cancel{8}_4} = \frac{20-5}{4} = \frac{15}{4}$

$I_3 = \frac{15}{2 \times 4} = \frac{15}{8}\ A = 1\frac{7}{8}\ A$

$\therefore$ $\boxed{\begin{aligned} I_1 &= 2.5\ A \\ I_2 &= \frac{5}{8}\ A \\ I_3 &= 1\frac{7}{8}\ A \end{aligned}}$

Currents in various branches.

$AB = \frac{5}{8}\ A \quad I_2$

$AC = 2.5\ A \quad I_1$

$(DED) = 1\frac{7}{8}\ A \quad I_3$

$BC = I_2 + I_3 = \frac{5}{8} + \frac{15}{8} = \frac{20^5}{8_2} = 2.5A.$

$CD = \underbrace{I_2 + I_3}_{} - I_1$

$2.5 - 2.5 = 0$

$\therefore CD = 0\ A.$

$AD = I_1 - I_2 = \frac{5}{2} - \frac{5}{8}$

$= \frac{20-5}{8} = \frac{15}{8} = 1\frac{7}{8}\ A$

problem:

a) In a household electric circuit different appliances are connected in parallel to one another. Give 2 reasons.

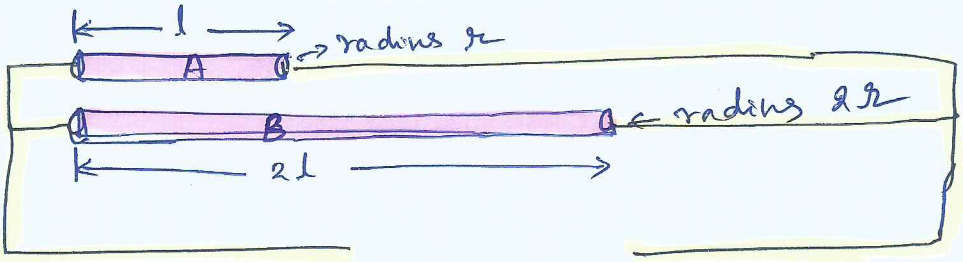
b) The electric power consumed by a device may be calculated by using either of the two expressions $P = I^2R$ or $P = V^2/R$. The first expression indicates that it is directly $\propto$ to R whereas the second expression indicates inverse proportionality. How can the seemingly different dependence of P on R in these expressions be explained?

c) Two metallic wires A & B are connected in parallel. Wire A has length l and radius r, wire B has length $2l$ and radius $2r$. Compute the ratio of the total resistance of parallel combination and the resistance of wire A and B?

Ans: (a) parallel combination is used in household circuit because
(i) individual appliance can be operated at any time. Even if one appliance fails, the remaining appliances continue to work.
(ii) All appliances will get the voltage of 220 V needed for their operation.

(b) $P = I^2R$, $P = \frac{V^2}{R}$ These two expressions are not independent expressions. Only R is constant. V and I are dependent parameters $V \propto I \Rightarrow V = IR$
Substituting these, we see both expressions are same.

(c)



→ Let Resistance of A = R_1 and Resistance of B = R_2

$$R_1 = \rho \frac{l_1}{A_1}$$

Given $l_1 = l$, $r_1 = r$, $A_1 = \pi r^2$

$$\boxed{R_1 = \rho \frac{l}{A}} \rightarrow (1)$$

$$R_2 = \rho \frac{l_2}{A_2}$$

$l_2 = 2l$
$r_2 = 2r$
$A_2 = \pi(2r)^2 = 4\pi r^2 = 4A$

$$R_2 = \rho \cdot \frac{2l}{4A} \rightarrow \boxed{R_2 = \rho \frac{l}{2A}} \rightarrow (2)$$

$$R_1 \parallel R_2 \rightarrow \frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{R_1 + R_2}{R_1 R_2} \quad \therefore R_T = \frac{R_1 R_2}{R_1 + R_2}$$

$$R_T = \frac{\rho \frac{l}{A} \cdot \rho \frac{l}{2A}}{\rho \frac{l}{A} + \rho \frac{l}{2A}} = \frac{\rho^2 \frac{l^2}{2A^2}}{\frac{3}{2} \cdot \rho \frac{l}{A}} = \frac{\cancel{\rho^2} \cancel{l^2}}{\cancel{2}\cancel{A^2}} \times \frac{\cancel{2}\cancel{A}}{3 \cancel{\rho l}} = \frac{1}{3} \rho \frac{l}{A}$$

$$\therefore \boxed{R_T = \frac{1}{3} \rho \frac{l}{A}} \longrightarrow (3)$$

$$\frac{(3)}{(1)} = \frac{R_T}{R_1} = \frac{\frac{1}{3} \cancel{\rho \frac{l}{A}}}{\cancel{\rho\, l/A}} = \frac{1}{3} \quad \therefore \boxed{\frac{R_T}{R_1} = \frac{1}{3}}$$

$$\frac{(3)}{(2)} = \frac{R_T}{R_2} = \frac{\frac{1}{3} \cancel{\rho\, l/A}}{\frac{1}{2} \cancel{\rho\, l/A}} = \frac{2}{3} \quad \therefore \boxed{\frac{R_T}{R_2} = \frac{2}{3}}$$

(a) A household uses following gadgets
(i) Refrigerator of rating 400W for 10 hrs each day
(ii) Two fans of rating 80W each for 12 hrs —"—
(iii) Six tubelights of rating 18 W each for 6 hrs —"—
Calculate the electricity bill of the household for the month of June ?
If the cost per unit of electric energy is Rs 3/-
(b) What is the meaning of the term "frequency" of an alternating current, what is its value in India.
(c) why is an ac considered to be advantageous over DC for long range Tx.

Ans (a) We know that Commercial unit of energy = "unit" = 1 KWh
Month June has 30 days.
Energy consumption for the month of June:

(i) Refrigerator → $400 \times 10 \times 30 = 120000$ W = 120.0 Kwh
(ii) Fans → $2 \times 80 \times 12 \times 30 =$ 57600 W = 57.6 KWh
(iii) Tubelights → $6 \times 18 \times 6 \times 30 =$ 19440 W = 19.44 KWh

Total June Consumption = 197.04 Kwh
≃ 197 units.

1 unit = Rs 3/-
197 units = 197×3 = Rs. 591/— is the electricity bill for the month June.

(b) In India, the armature of the AC Generator completes one full revolution in a time period $T = \frac{1}{50}$ sec

$f = \frac{1}{T} = 50$ Hz = 50 cycles/sec.

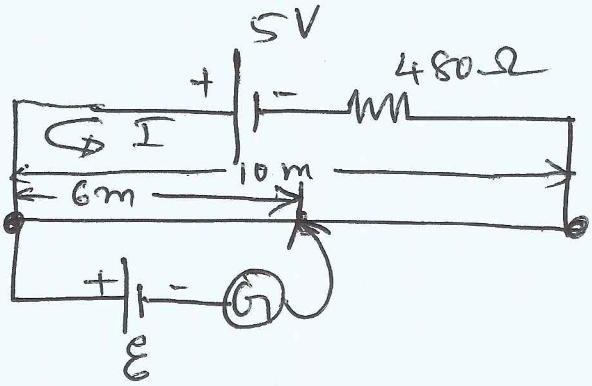
This means in One Second, 50 sinewaves are generated.
The freq. in India used = 50 Hz.

(c) AC can be transmitted over long distances without much loss of energy as compared to DC. Therefore, the cost of transmission is low.

Q: Current Electricity

A 10 m long wire of uniform cross sectional area and 20 Ω resistance is used in a potentiometer. The wire is connected in series with a battery of 5V along with an external resistance of 480 Ω. If an unknown emf E is balanced at 6 m length of the wire calculate (i) the potential gradient of the potentiometer wire (ii) the value of unknown emf $\mathcal{E}$.

Ans:



Given

wire length = 10 m

Resistance = 20 Ω

$$\therefore I = \frac{5}{480+20} = \frac{5}{500} = 0.01\ A$$

(i) Voltage drop across wire of 20 Ω = $20 \times 0.01 = 0.2\ V$

$$\therefore \text{potential gradient} = \frac{V}{l} = \frac{0.2\ V}{10\ m} = 0.02\ Vm^{-1}$$

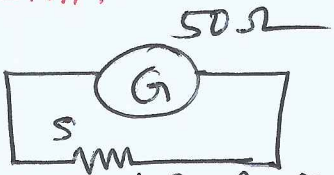
(ii) External emf $\mathcal{E}$ = Pot. drop of 6 m length

$$= 0.02 \times 6m = 0.12\ V$$

$\therefore$ External emf $\mathcal{E} = 0.12\ V$

Ans.

Q: A galvanometer having a R = 5 Ω gives a full deflection for a current = 0.05 A. Calculate length of shunt wire of 2 mm diameter required to convert the galvanometer to an ammeter reading current up to 5A. ρ of material = 5×10^{-7} Ω.m.



Vol. drop across galvanometer

$$50 \times 0.05 = 5 \times S$$

$$\therefore S = \frac{\cancel{50}^{10} \times 0.05}{\cancel{5}} = 0.5\ \Omega$$

dia. of wire = 2 mm

r = 1 mm

$= 10^{-3}$ m

$$S = \frac{\rho l}{A} \quad \therefore l = \frac{SA}{\rho} = \frac{\cancel{0.5}^{0.1} \times \pi \times \cancel{10^{-6}}}{\cancel{5 \times 10^{-7}}}$$

$$\therefore S = \pi\ m = 3.14\ m$$

Q : Current Electricity.

Two cells of emf 6 V and 12 V and internal resistance 1 Ω and 2 Ω respectively are connected in parallel so as to send current in the same direction thro' an external R = 15 Ω.

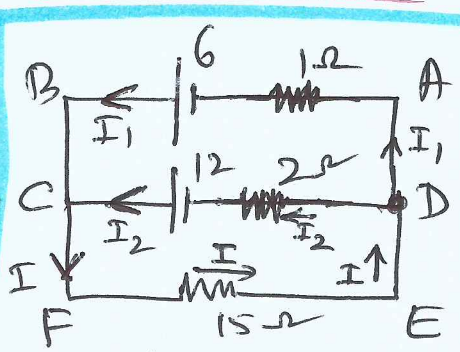
(i) Draw the circuit diagram

(ii) Using K' laws, Calculate

(a) current thro' each branch

(b) p.d. across 15 Ω Resistance

Nootan page 287.



IMP.

- Kirchhoff's Current law (KCL) or K I Law (or Junction law)
- Kirchhoff's Voltage Law (KVL) or K II Law (or Loop law)

Ans: Consider 2 loops ABFEA and DCFED (both anticlockwise direction)

$$\boxed{I = I_1 + I_2}$$

- Consider loop ABFEA

$$1 \cdot I_1 + 15I - 6 = 0 \quad (I_1 = I - I_2)$$

$$I - I_2 + 15I = 6$$

$$16I - I_2 = 6 \longrightarrow (1)$$

- Consider loop DCFED

$$2I_2 + 15I - 12 = 0$$

$$2I_2 + 15I = 12 \rightarrow (2)$$

From (1) and (2)

$$-2I_2 + 32I = 12$$

$$+2I_2 + 15I = 12$$

(+)

$$47I = 24$$

$$\therefore \boxed{I = \frac{24}{47} A}$$

From (1) → $16I - I_2 = 6 \quad \therefore I_2 = 16I - 6 = 16 \times \frac{24}{47} - 6$

$$= \frac{(16 \times 24) - 282}{47} = \frac{384 - 282}{47} = \frac{102}{47} A$$

$$\therefore \boxed{I_2 = \frac{102}{47} A}$$

$$I = I_1 + I_2$$

$$\therefore I_1 = I - I_2 = \frac{24}{47} - \frac{102}{47}$$

$$= \frac{24 - 102}{47} = -\frac{78}{47}$$

$$\therefore \boxed{I_1 = -\frac{78}{47} A}$$

Minus sign indicates the direction of current opposite to as shown in circuit diagram.

(i)

$$\boxed{I_1 = -\frac{78}{47} A; \quad I_2 = \frac{102}{47} A; \quad I = \frac{24}{47} A}$$

(ii) p.d. across 15 Ω = I × 15

$$= \frac{24}{47} \times 15 = \frac{360}{47} = 7.66 V$$

IMP

Imp. to solve problems involving bulbs.

Heating effect of current : Joule's law [current $\xrightarrow{\text{to}}$ heat]

WORK

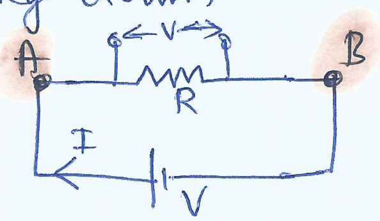
When current passes thro' a conductor, it becomes hot after some time. This effect is known as "heating effect of current" or "joule heating effect".

→ It forms the basis of working of various electrical appliances such as bulb, electric furnace, iron box, geyser, immersion rod etc.

According to joule, the amt. of heat produced (H) when current I flows through a conductor of resistance (R) for a time t is given by

$$\boxed{H = I^2Rt \text{ joule}} \quad \text{or} \quad \boxed{H = \frac{I^2Rt}{4.2} \text{ cal.}}$$

to prove this, consider the following circuit



- total charge flowing from A to B in time t is $\boxed{q = It}$
- ∴ Total workdone in carrying charge q from A to B is $W = (V \times q) = VIt$

$$\boxed{W = (IR)It = I^2Rt} \text{ joule.}$$

This work done is called electric work done. If this electric workdone appears as heat, then the amt. of heat produced in the conductor (of res. R) in time t is

$$\boxed{W = H = I^2Rt}$$

→ amt. of heat produced in R $H \propto R$, $H \propto I^2$, $H \propto t$

power

Electric power: The rate at which electric work ~~done~~ is done "by the source of emf" in maintaining the ~~electric~~ current in ~~the~~ electric circuit is called electric power of the circuit.

If current I Amps flows thro' a conductor of resistance R ohm for a time t second under a p.d. of V volt, then electric work done by the "source emf" to maintain the same current I in the conductor is given by $W = I^2Rt$ Joule

$$\therefore \text{Electric power} = \frac{W}{t} = \frac{I^2R\cancel{t}}{\cancel{t}} = I^2R \qquad \therefore P = I^2R \ Js^{-1} \text{ or watts.}$$

$$\boxed{P = I^2R = VI = V^2/R}$$

1 horse power = 746 W

Very imp

- Joule's heating is common to both dc and ac. So, ~~com~~ many appliances such as heater, press, geyser, toaster etc. work for both on dc & ac.
- If direction of current is reversed, heating continues since $H \propto I^2$

⊙ If the ~~resistances~~ resistors are connected in series, the current I is same thro' each resistor, then voltage across each resistor

Since $p = VI = I^2R$

$$\boxed{\begin{matrix} V \propto R \\ p \propto R \end{matrix}}$$ Imp

Using $p = I^2R$ and $V = IR$

This means, in series combinations,
→ p.d. across R will be more for higher resistances.
→ power consumed will be more for higher resistances

⊙ If Resistors are connected in parallel, the p.d. across ~~resistors is same (V)~~ each resistor is same (V)

Using $p = \frac{V^2}{R}$ and $I = \frac{V}{R}$

$$\boxed{p \propto \frac{1}{R} \quad \text{and} \quad I \propto 1/R}$$

It means in parallel ~~com~~ combination, the current & power consumed will be more in smaller R's

1. In house, electrical appliances are connected in parallel.
eg. when bulbs are connected in ~~Ro..~~ parallel, the bulb of Higher Wattage will give more light and will pass greater current thro' it.

parallel

- "Higher wattage bulb" has lesser resistance
  - → same ~~V~~ p.d. (230 Vrms) across bulb
  - → ~~lesser resistance~~
  - → ~~Since~~ $V = IR$ and since V is const, if R is less, I is more
  - → glows brighter.

Same V

2. In Series grouping of bulbs, the bulb of higher wattage will give less light and will have small R & p.d. across R.
- Higher wattage bulb (has lesser Resistance)
- Current thro' all bulbs → same
- p.d. across bulb = smaller for higher wattage bulb (due to less R)
- glows dimmer.

Same I

IMP ~~pa~~ - parallel combination of electrical appliances

Total power consumption = ?? prove

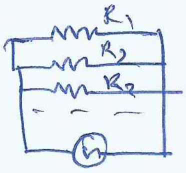
- Let P_1, P_2, P_3 be power of 3 electrical appliances and having resistances R_1, R_2, R_3 Connected in parallel
- Suppose they are operated by mains voltage V ($230\,V_{rms}$)

→ Let P be the total power ; R be the total resistances then as per parallel combination of Resistors

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

Multiplying both sides by V^2, we get

$$\frac{V^2}{R} = \frac{V^2}{R_1} + \frac{V^2}{R_2} + \frac{V^2}{R_3}$$



$$\boxed{P = P_1 + P_2 + P_3}$$

Hence total electric power consumed = Sum of the powers of the individual appliances.

Q. Why parallel arrangement is used in domestic wiring!

- Electrical appliances in India are designed to work at a voltage of 230 V AC, 50 Hz. parallel arrangement ensures ~~that~~ 230 V ~~of~~ to each electrical appliance.
- In parallel circuit, if one electrical appliance has gone bad (not working), other appliances continue to work normally.
- In parallel circuits, each electrical appliance ~~has its~~ can have its own switch due to which it can be turned on or off independently.
- In the parallel connection of electrical appliances, the overall resistance of the household circuit is reduced resulting in higher current from mains.

- ~~Total power~~ To get ~~to~~ total power, add the powers of all individual electrical appliance.

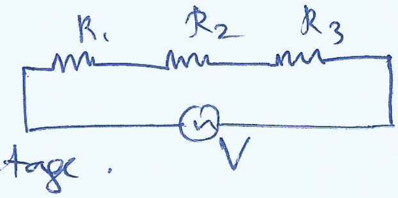
$$P = P_1 + P_2 + P_3 - - - -$$

easy to charge the customer by the electricity board.

Series combination of Electrical appliances.

Total power consumption = ?

Consider electrical appliances of powers P_1, P_2, P_3 having resistances R_1, R_2, R_3 connected in series.



Suppose they are operated at mains voltage.

Since $P = VI = V^2/R = I^2R$

$\therefore$ ~~$R_1 =$~~ ~~$R_1 = \frac{V^2}{P_1}$~~

Let total power = P
total Resistance = R

$\therefore R = R_1 + R_2 + R_3$

~~$\frac{V^2}{P}$~~ Divide V^2 on both sides

$$\frac{R}{V^2} = \frac{R_1}{V^2} + \frac{R_2}{V^2} + \frac{R_3}{V^2}$$

$$\boxed{\frac{1}{P} = \frac{1}{P_1} + \frac{1}{P_2} + \frac{1}{P_3}}$$

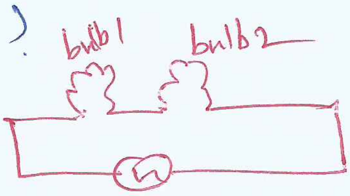
Using $P = \frac{V^2}{R}$

$\therefore R = \frac{V^2}{P}$

$\therefore \frac{R}{V^2} = \frac{1}{P}$

$\therefore$ Total power consumed = parallel calculation of ~~all~~ individual powers (Similar to ~~R's in p~~ resistances in parallel)

eg: Two bulbs of 40W each are connected in series. What is the total power consumed?



For series combination, power relation is

$$\frac{1}{P} = \frac{1}{P_1} + \frac{1}{P_2}$$

$$= \frac{1}{40} + \frac{1}{40} = \frac{2}{40} = \frac{1}{20}$$

$\therefore$ $P = 20\,W$

$\frac{40 \times 40}{40+40} = \frac{40 \times 40}{80} = 20$

eg 2: Two electric bulbs of 50W and 100W are given. When they are ① connected in series ② in parallel, which bulb will glow more

$\rightarrow$ parallel connection: $P = V^2/R \Rightarrow P \propto \frac{1}{R}$ and glow $\propto$ power of a bulb.

Since ~~R is less~~ $R_{100W} < R_{50W}$, $P_{100V} > P_{50W}$

Thus 100W will glow more than that of 50W bulb.

$\rightarrow$ Series Connection: $R_{50W} > R_{100W}$ (Since $R = V^2/P$). Since current is same in series connection $P = I^2R \Rightarrow$ ~~$P_{50W} \propto P_{100}$~~ and since $R_{50W} > R_{100W} \Rightarrow P_{50W} > P_{100W}$ (Since glow $\propto$ to power of bulb)

$\Rightarrow$ 50W bulb will glow more than 100W bulb.