UDAAN 3.0

PHYSICS

ELECTRICITY

Lecture No.- 04

ER. RAKSHAK SIR

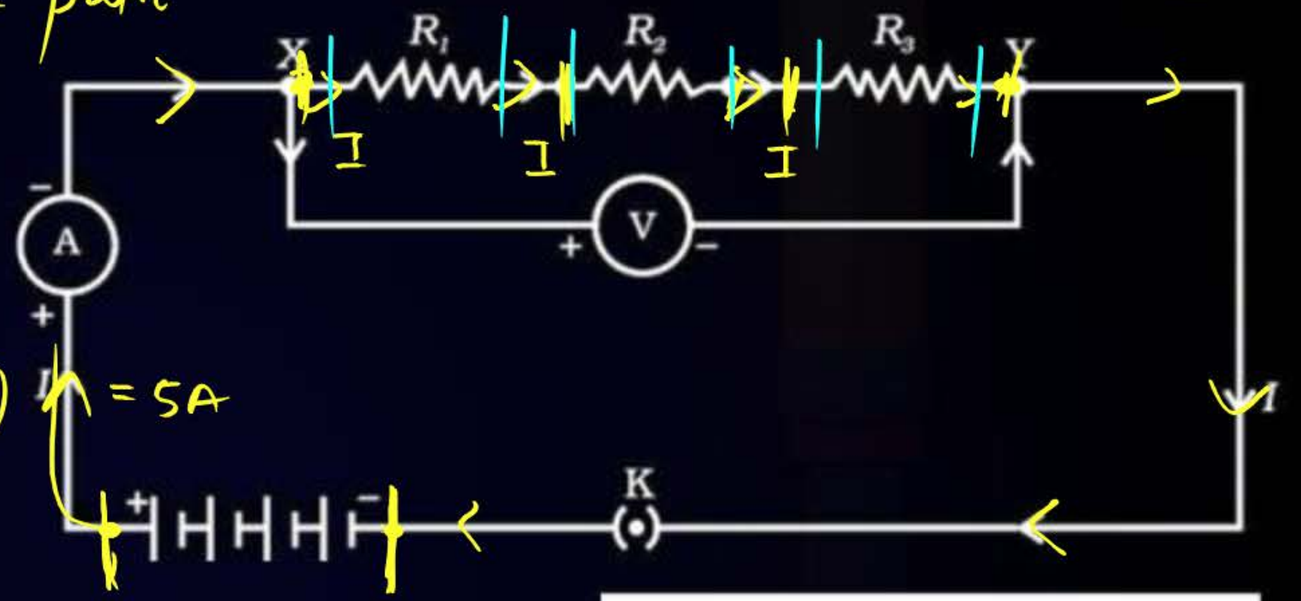
Today's Targets

1. SERIES CIRCUIT
2. PARALLEL CIRCUIT
3. COMBINATION OF RESISTORS
4. RESISTANCE OF AMMETER AND VOLTMETER
5. ~~WORKING OF RHEOSTAT~~

SERIES CIRCUIT

⇒ end-to-end
⇒ Same path

Series is a Potential Divider

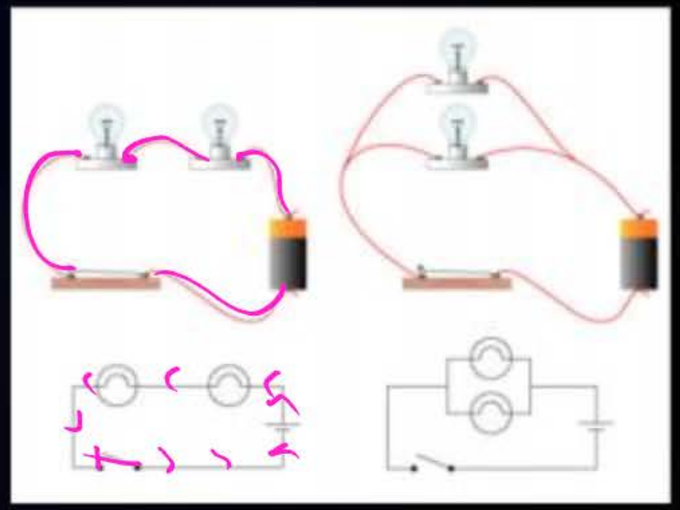


Properties

1. Current same (path same) I = 5A
2. Voltage divides according to Value of Resistance

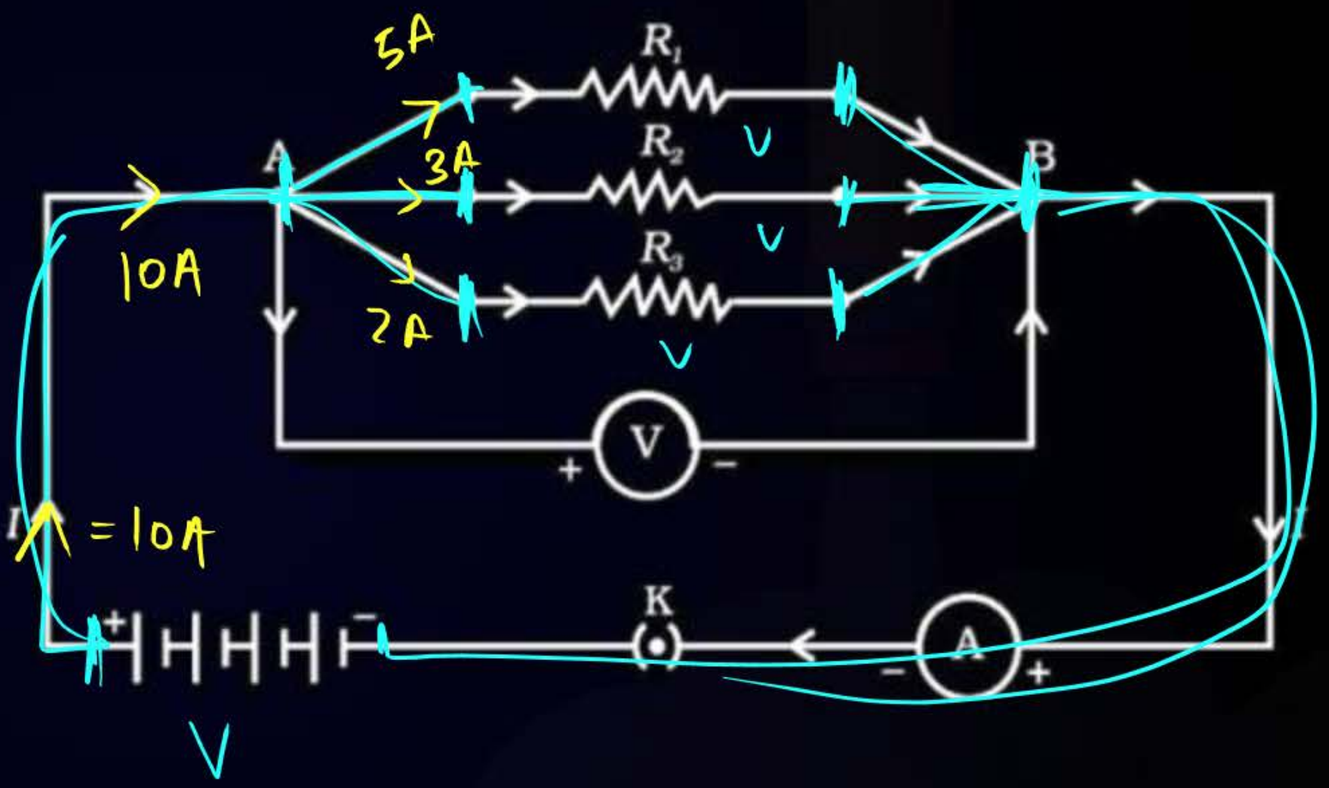
$$V = IR \Rightarrow V \uparrow \propto R \uparrow$$

I ↓ Same



PARALLEL CIRCUIT

1. Voltage same
2. Current divides according to inverse proportions with Resistance



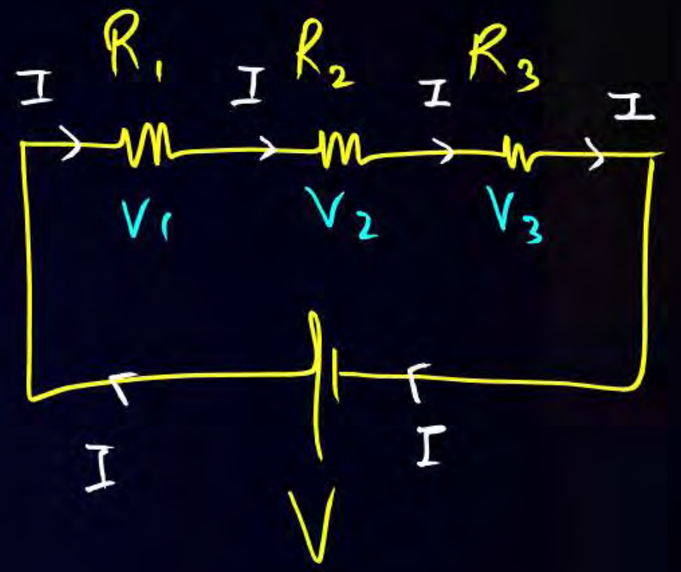
$$V = IR \Rightarrow I \downarrow = \frac{V \rightarrow \text{const.}}{R \uparrow}$$

$\Downarrow$

Same

COMBINATION OF RESISTORS

Series:



$$V_t = V_1 + V_2 + V_3$$

$$IR_t = IR_1 + IR_2 + IR_3 \quad (V = IR)$$

$$IR_t = I(R_1 + R_2 + R_3)$$

$$\boxed{R_t = R_1 + R_2 + R_3} \equiv$$

Total / Net / Equivalent / effective

COMBINATION OF RESISTORS

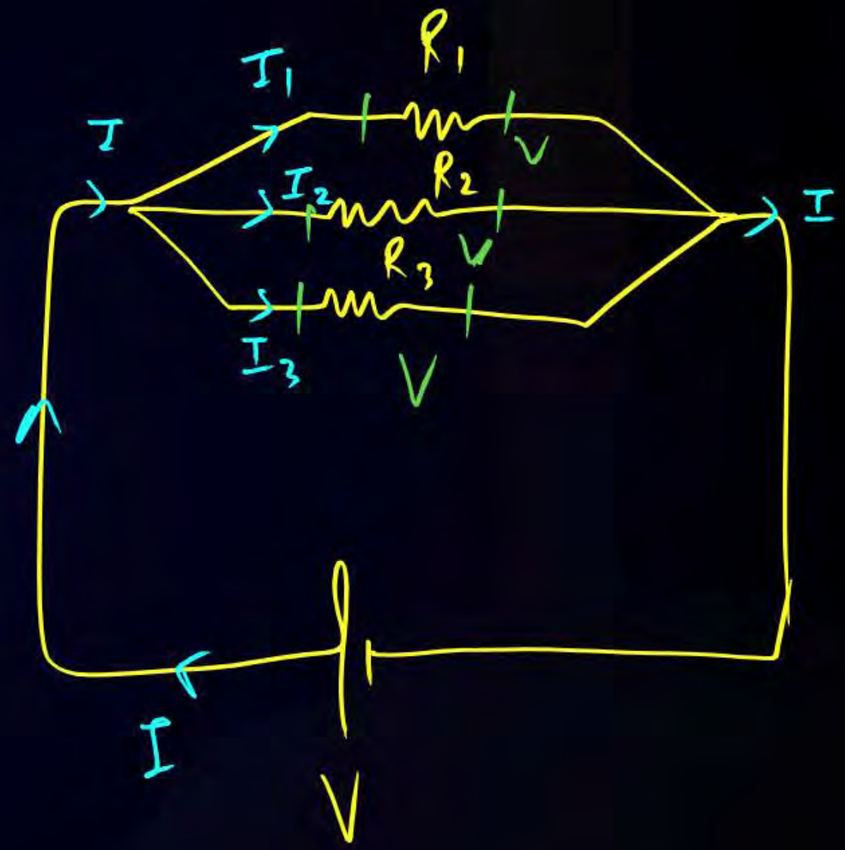
Parallel:

$$I_t = I_1 + I_2 + I_3$$

$$\frac{V}{R_t} = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3} \qquad (V = IR)$$

$$\frac{\cancel{V}}{R_t} = \cancel{V}\left(\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}\right) \qquad \left(I = \frac{V}{R}\right)$$

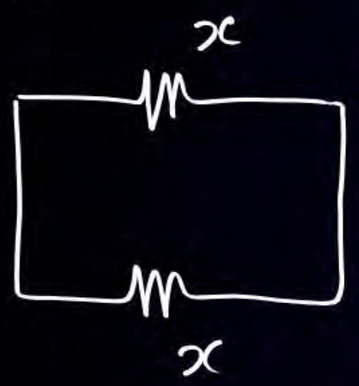
$$\boxed{\frac{1}{R_t} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}}$$



(Not for Subjective)

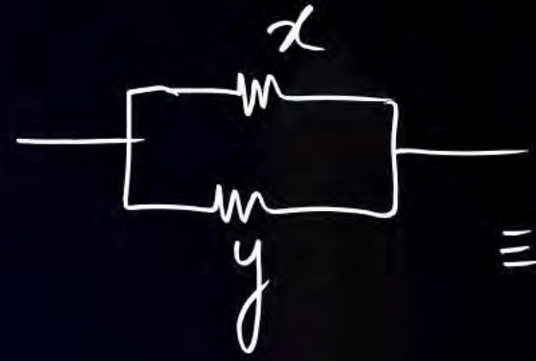
PRACTICE PROBLEMS 1 :

Jugaad Wallah :-

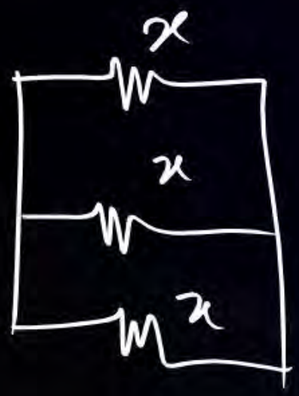


$\equiv \frac{x}{2}$

$\equiv \frac{x}{n}$

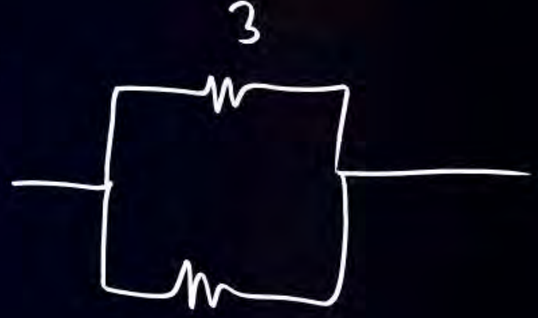


$\equiv \frac{xy}{x+y}$

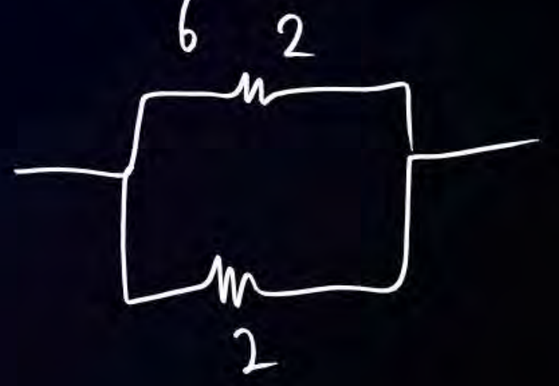


$\equiv \frac{x}{3}$

eg:



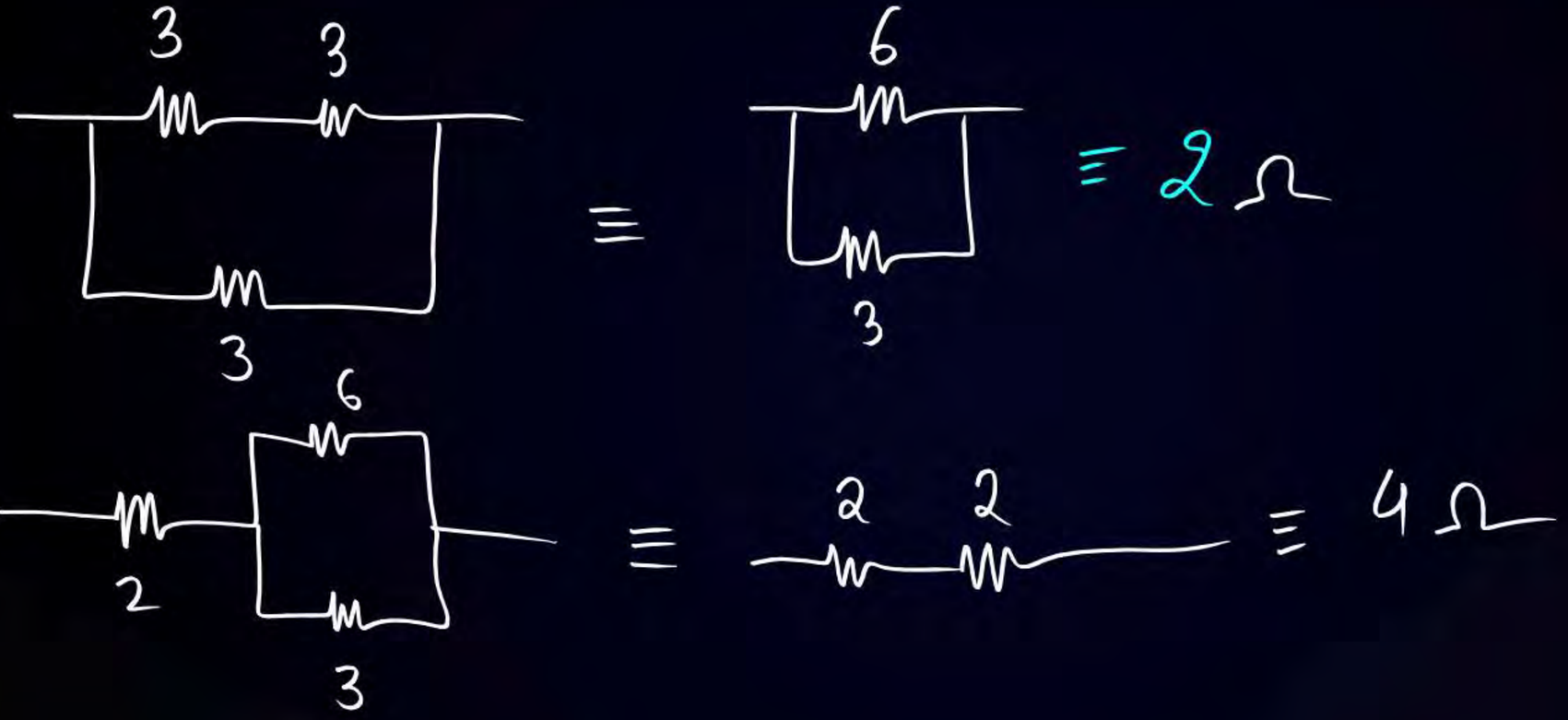
$\equiv 2$



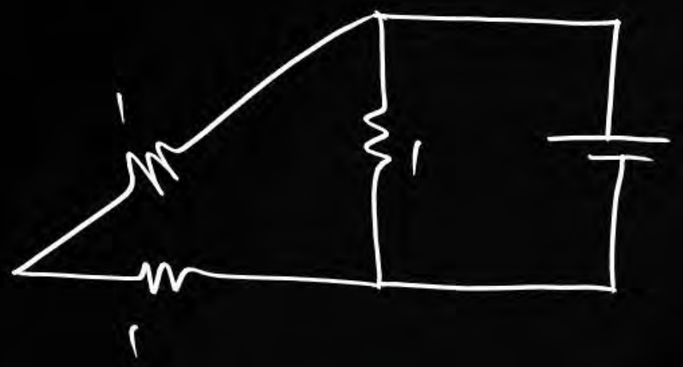
$\equiv 1$

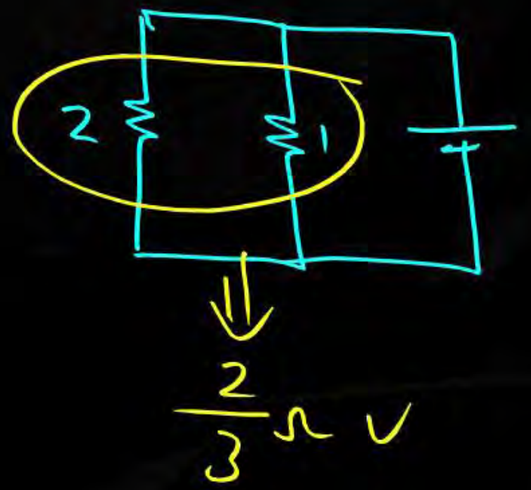
PRACTICE PROBLEMS 2:

Mixed → Kamzor Kadi

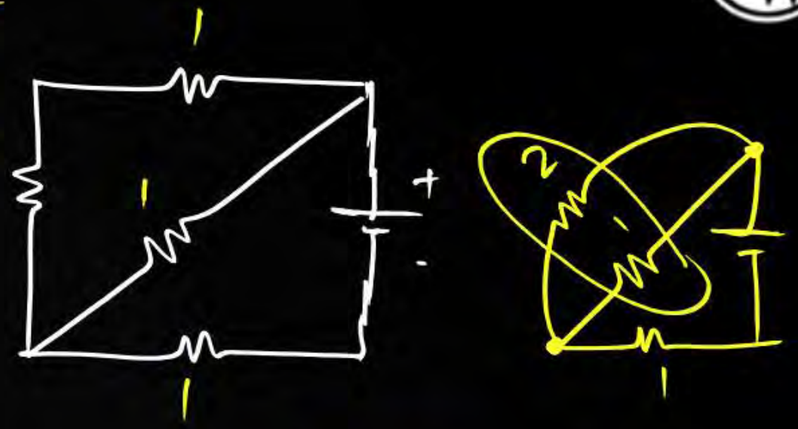


Ques 1





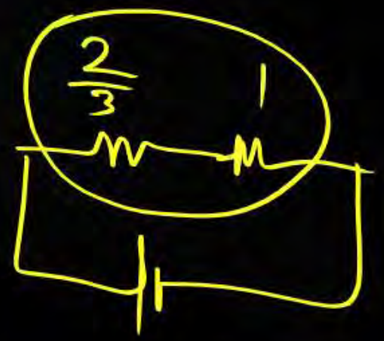
Ques 2



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

$$\frac{1}{R_t} = \frac{1}{2} + \frac{1}{1} = \frac{1}{2} + 1 = \frac{3}{2}$$

$$R_t = \frac{2}{3}\ \Omega$$



$1 + \frac{2}{3} = \frac{5}{3}\ \Omega$

Ans

Question

Imp.

Jugaad Wallah

How can three resistors each of resistances 3 Ω be connected to give a total resistance of

(i) 4.5 Ω

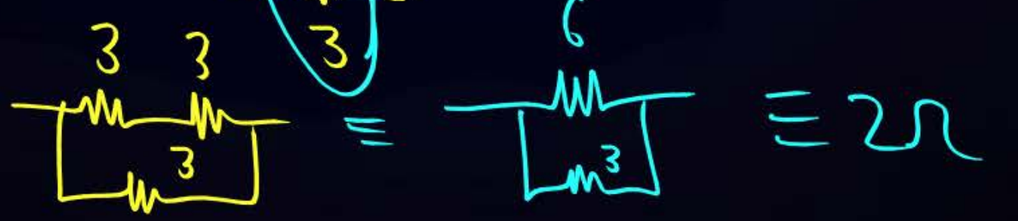
(ii) 2 Ω

Pure Series  $\equiv 9\Omega$

Pure parallel  $\equiv \frac{1}{R_t} = \frac{1}{3} + \frac{1}{3} + \frac{1}{3} = \frac{3}{3} \Rightarrow R_t = 1\Omega$

i) 

$\equiv 4.5\Omega$

ii) 

$\equiv 2\Omega$

Question

H.W.

Show how you would connect three resistors, each of resistance 6 Ω, so that the combination has a resistance of

(i) 9 Ω

(ii) 4 Ω

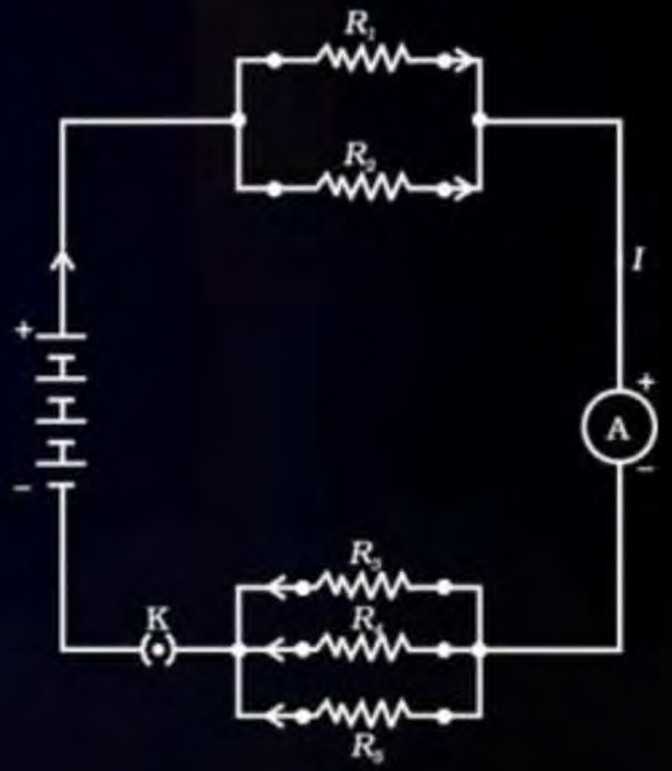
Question

H.W.

If in figure, $R_1 = 10\ \Omega$, $R_2 = 40\ \Omega$, $R_3 = 30\ \Omega$, $R_4 = 20\ \Omega$, $R_5 = 60\ \Omega$, and a 12 V battery is connected to the arrangement. Calculate:

(a) The total resistance

(b) The total current flowing




Practice → NCERT
Solved examples
In Text
Back Exercise
Thank You