

The logo features the text 'UDAAN 3.0' in white, bold, sans-serif font inside a red, rounded rectangular banner with a dotted border. Below the banner is a yellow sun partially obscured by grey clouds. Two white paper airplanes are shown in flight, one on each side of the banner, with dashed lines indicating their curved paths.

UDAAN 3.0

PHYSICS

ELECTRICITY

Lecture No.- 04

A portrait of a man with dark hair, a mustache, and glasses, wearing a black polo shirt. He has his arms crossed and is standing against a yellow background. The text 'ER. RAKSHAK SIR' is written in black, bold, sans-serif font on a yellow banner at the bottom right of the image.

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



\Rightarrow end-to-end
 \Rightarrow Same path

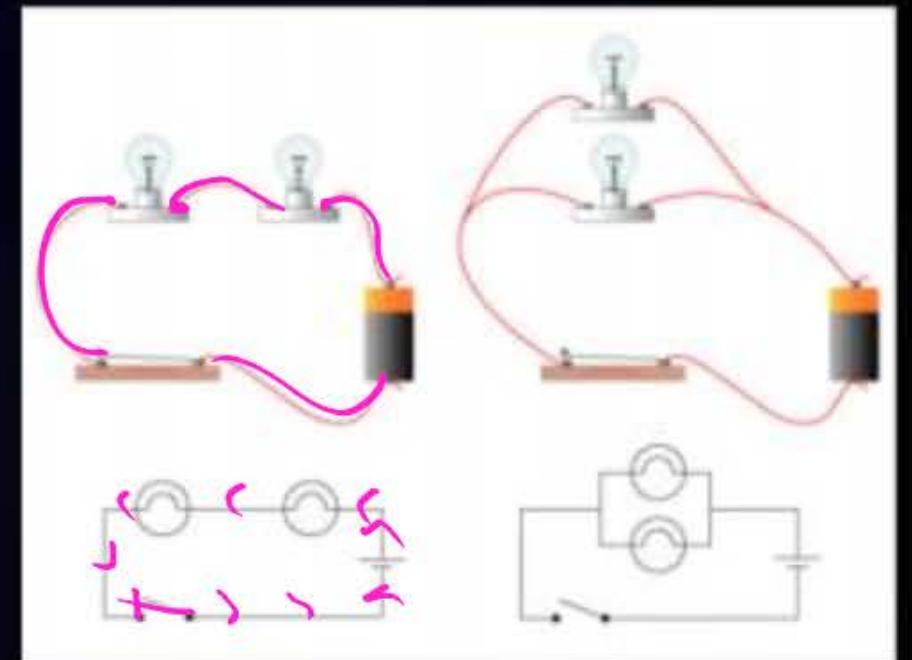
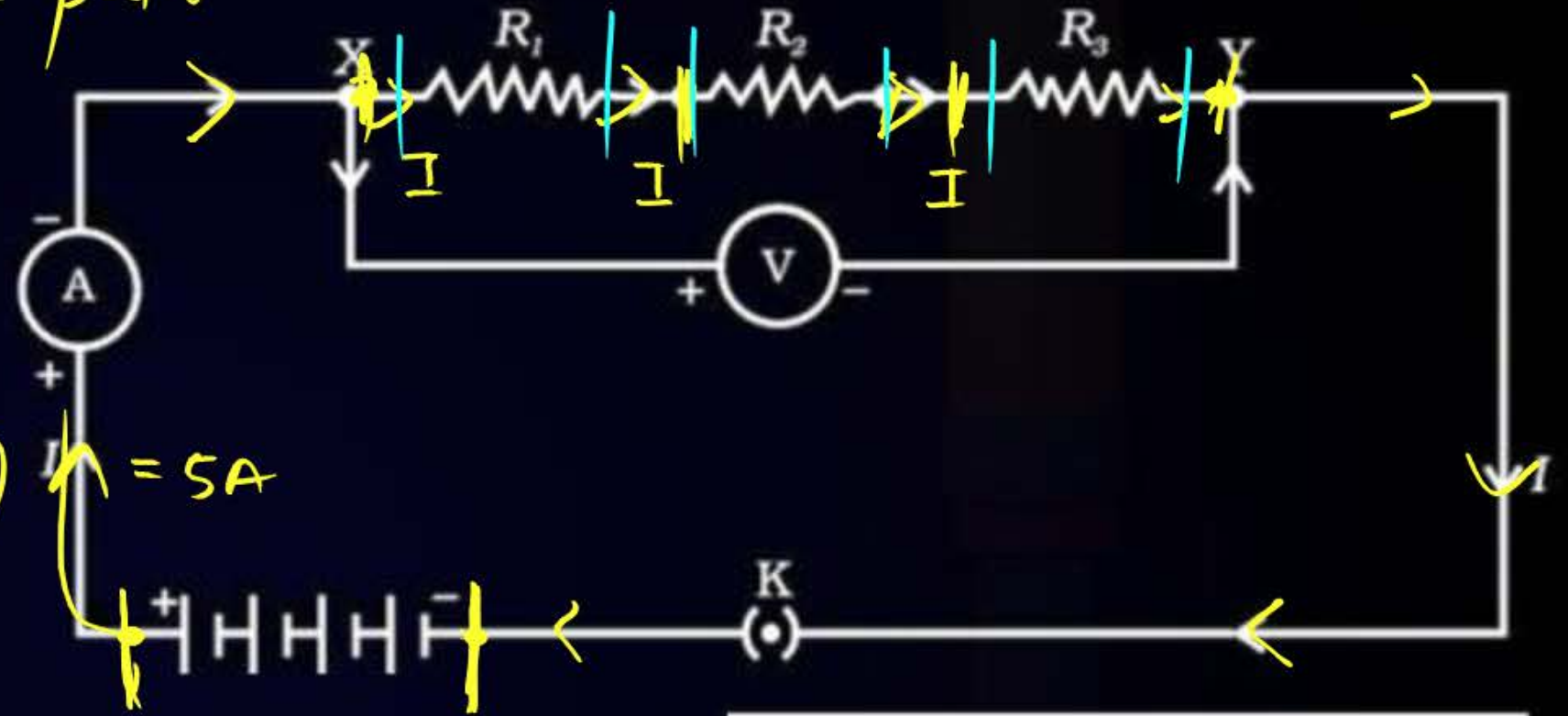
Series is a Potential Divider

Properties

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

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

\downarrow Same \uparrow \uparrow

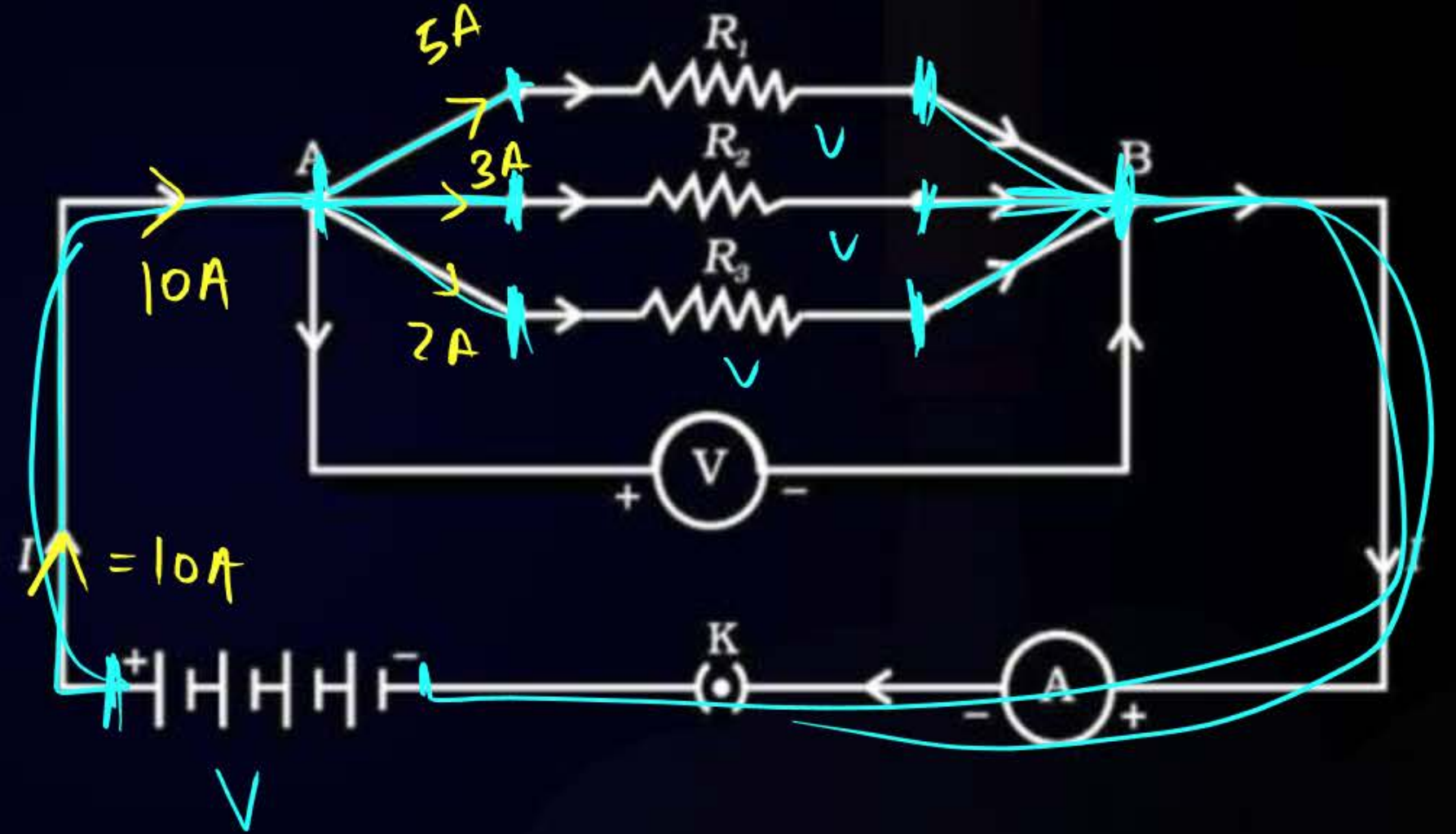




PARALLEL CIRCUIT



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



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

Same



COMBINATION OF RESISTORS



Series:

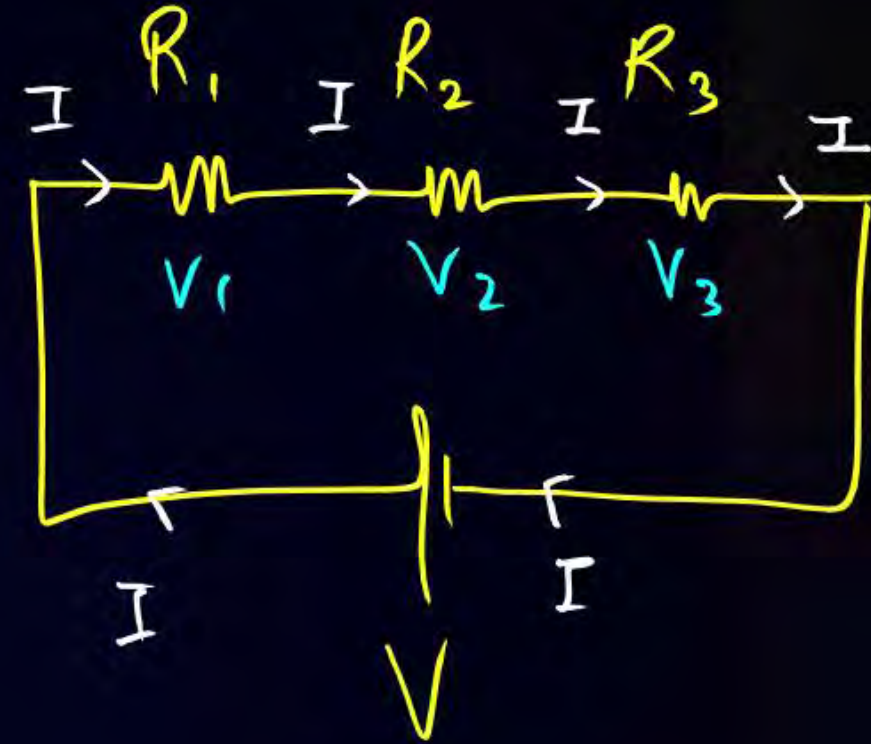
$$V_t = V_1 + V_2 + V_3$$

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

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

$$R_t = R_1 + R_2 + R_3$$

Total / Net / Equivalent / effective





COMBINATION OF RESISTORS

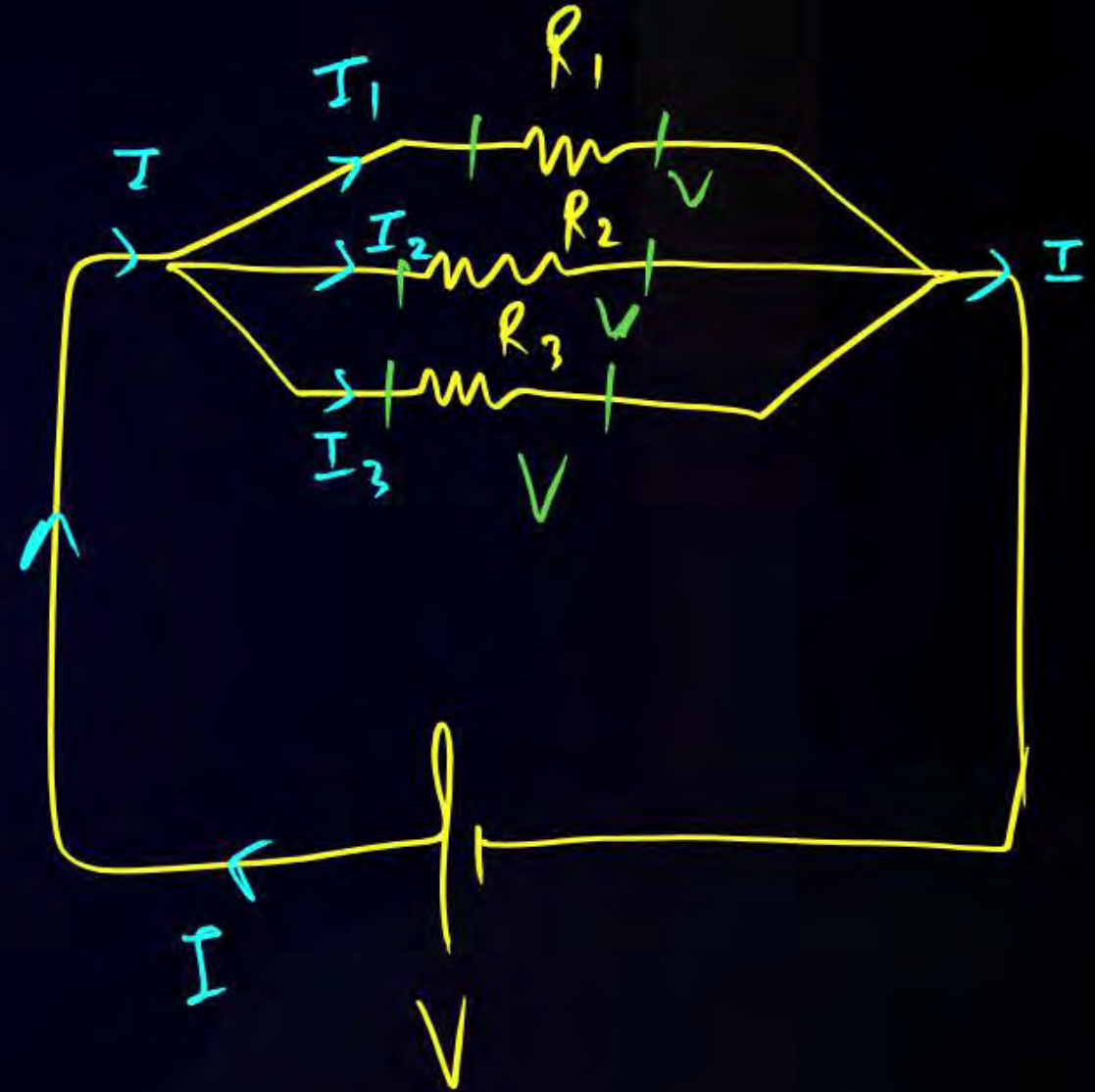
Parallel:

$$I_t = I_1 + I_2 + I_3$$

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

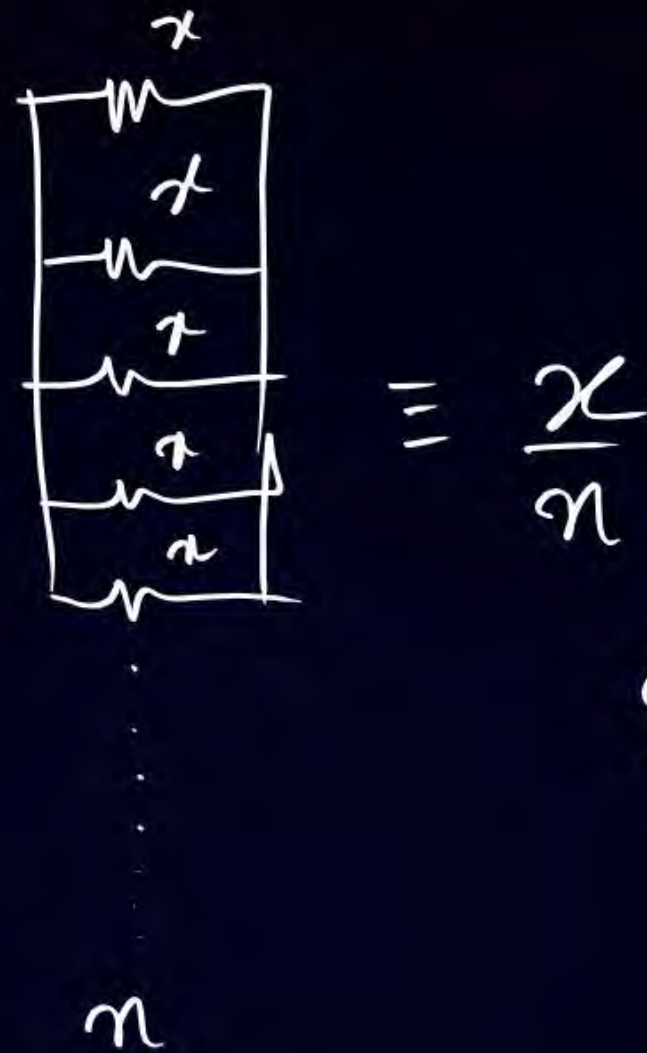
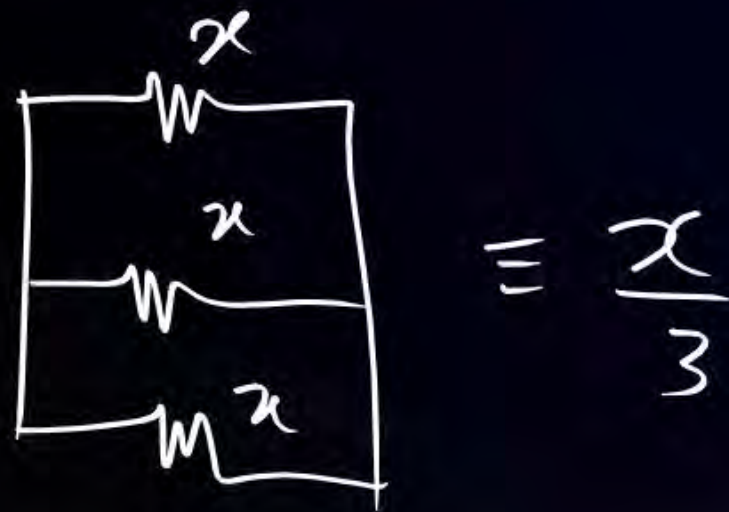
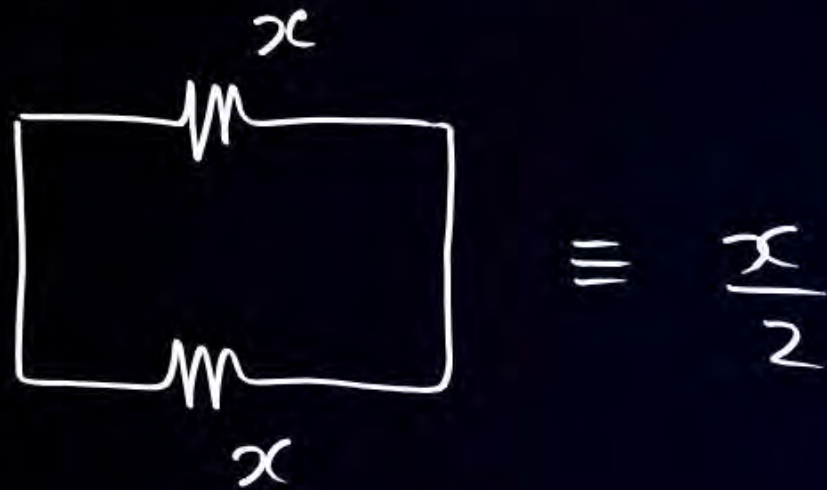
$$\frac{1}{R_t} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \quad (I = \frac{V}{R})$$

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

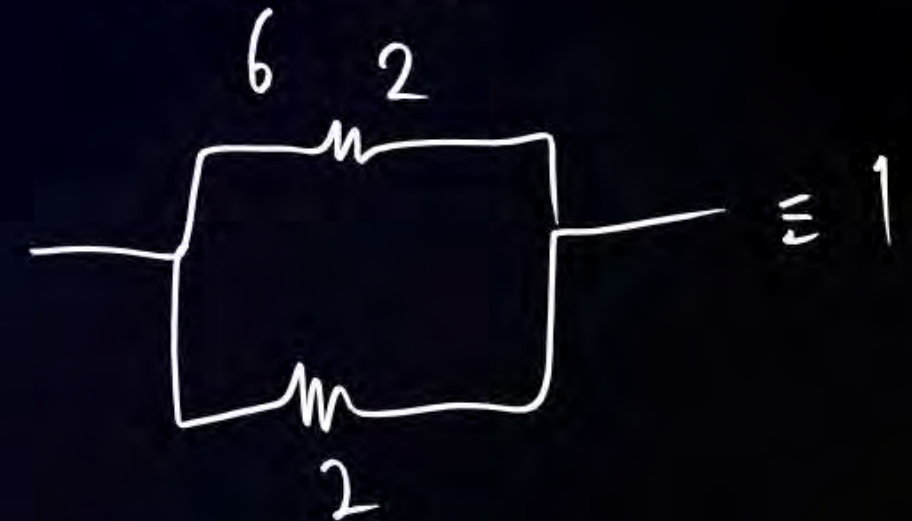
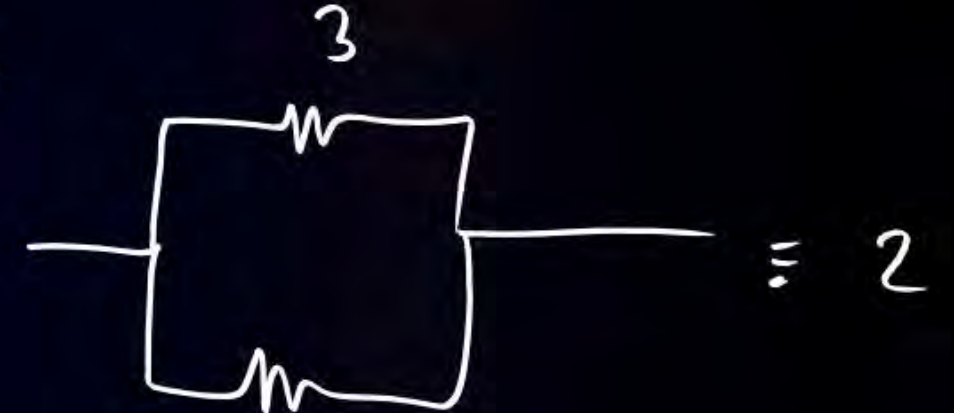
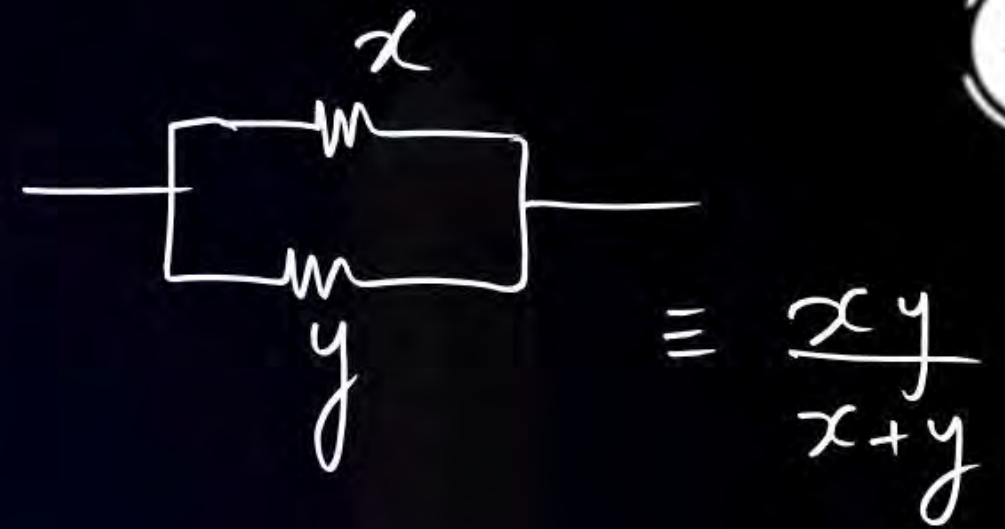


(Not for Subjective)
PRACTICE PROBLEMS 1:

Jugad Wallah :-

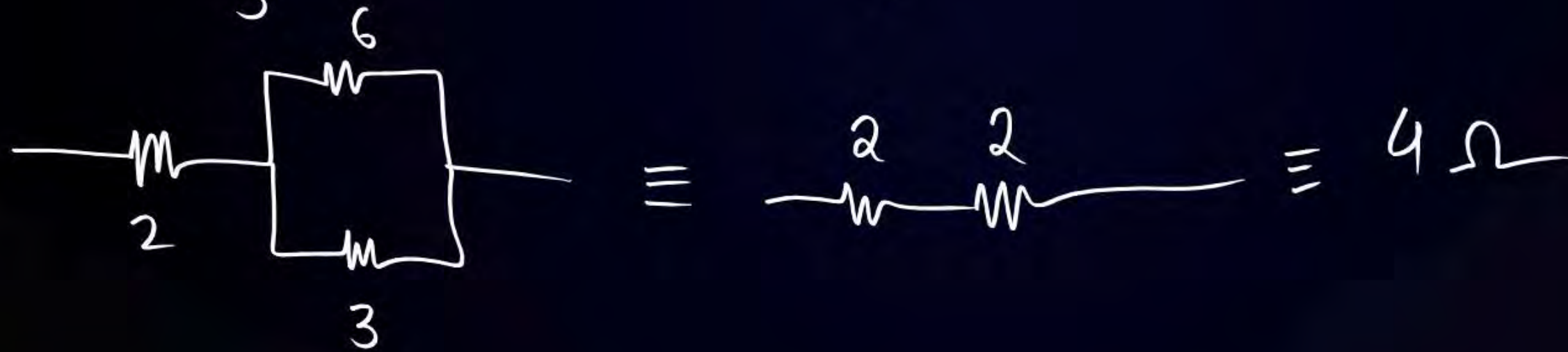
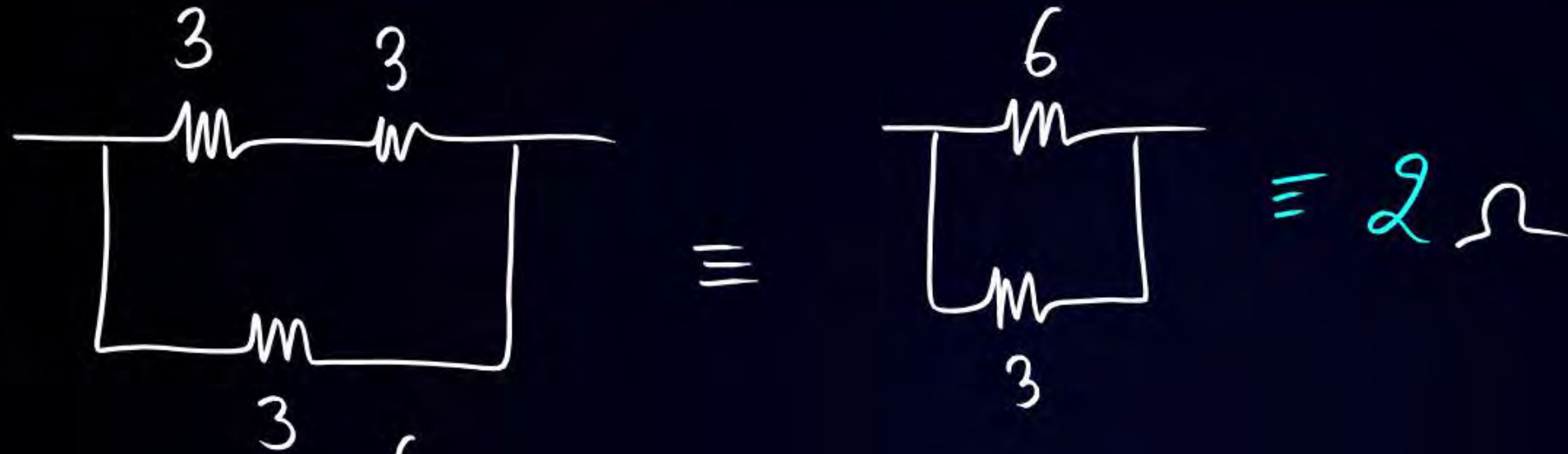


eg:-



PRACTICE PROBLEMS 2:

Mixed \rightarrow Kamzor Kadi



Ques 1



$$\frac{2}{3} \Omega \checkmark$$

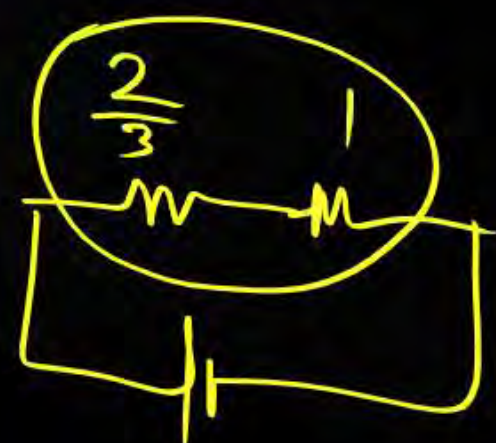
Ques 2



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

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

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



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

Ans

Question



Imp.

Tugrad Wallah

How can three resistors each of resistances $3\ \Omega$ be connected to give a total resistance of

(i) $4.5\ \Omega$

(ii) $2\ \Omega$



Pure Series $\begin{array}{c} 3 \quad 3 \quad 3 \\ \text{---} \text{---} \text{---} \end{array} \equiv 9\ \Omega$

Pure parallel $\begin{array}{c} 3 \\ \text{---} \\ 3 \\ \text{---} \\ 3 \end{array} \equiv \frac{1}{R_t} = \frac{1}{3} + \frac{1}{3} + \frac{1}{3} = \frac{3}{3} \Rightarrow R_t = 1\ \Omega$

i) $\begin{array}{c} 3 \\ \text{---} \end{array} \begin{array}{c} 3 \\ \text{---} \\ 3 \\ \text{---} \end{array} \equiv \begin{array}{c} 3 \quad 1.5 \\ \text{---} \text{---} \end{array} \equiv 4.5\ \Omega$

ii) $\begin{array}{c} 3 \quad 3 \\ \text{---} \text{---} \\ \text{---} \\ 3 \end{array} \equiv \begin{array}{c} 6 \\ \text{---} \\ 3 \end{array} \equiv 2\ \Omega$

Question

How



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

(i) $9\ \Omega$

(ii) $4\ \Omega$

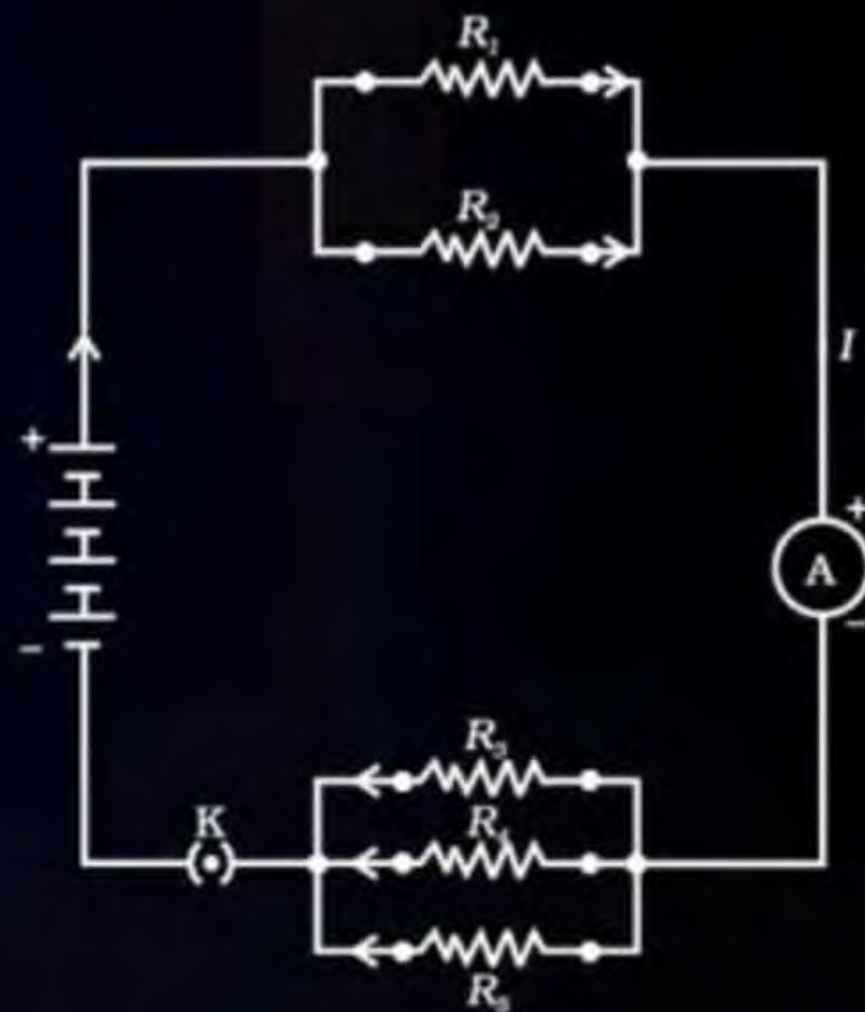
Question

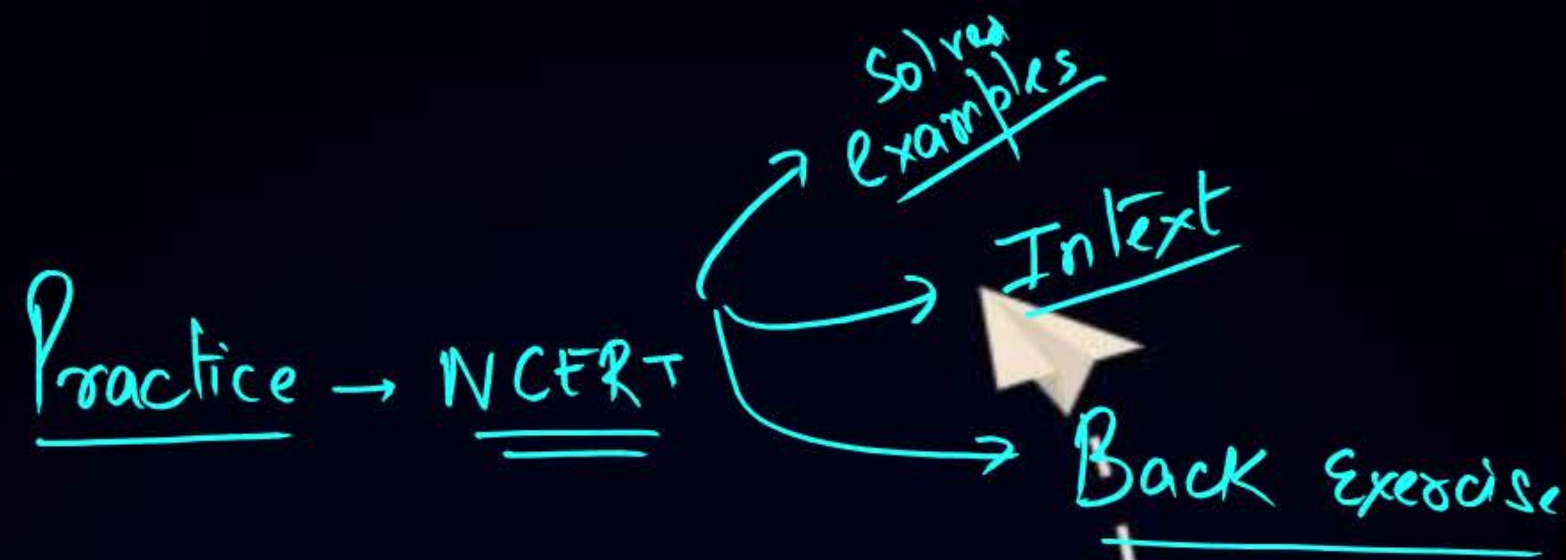
H.W.



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





Thank
You

