Color	1st band	2nd band	3rd band (Multiplier)	4th band tolerance
B - Black	0	0	10^0	
B - Brown	1	1	10^1	± 1%
R - Red	2	2	10^2	± 2%
O - Orange	3	3	10^3	
Y - Yellow	4	4	10^4	
G - Green	5	5	10^5	± 0.5%
B - Blue	6	6	10^6	± 0.25%
V - Violet	7	7	10^7	± 0.1%
G - Grey	8	8	10^8	± 0.05%
W - White	9	9	10^9	
Gold	—	—	0.1	± 5%
Silver	—	—	0.01	± 10%
None	—	—	—	± 20%

Minimum

Four-Band Axial Resistors
5- Band Axial Resistors

Energy in a Resistor: Instantaneous Power absorbed in the resistor

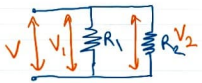
$$p = v \times i = \underline{i^2 R \text{ (Watt)}}$$

Therefore, the energy converted into heat energy is given by

$$W = \int_0^t p\,dt = \int_0^t i^2 R\,dt = \underline{i^2 R t \text{ Joules}}$$

Series & Parallel Arrangements of Resistors

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



$$R_{eq} = R_1 \| R_2 = \frac{R_1 \times R_2}{R_1 + R_2}$$

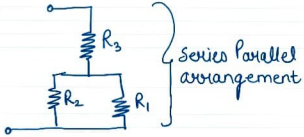
Characteristics of Parallel circuits

1- The Voltage across all the resistances is the same.
2- The total current is the sum of the currents flowing through the parallel resistances.

1- The Voltage across all the resistances is the same.
2- The total current is the sum of the currents flowing through the parallel resistances.
3- The reciprocal of the equivalent resistance of a parallel circuit is equal to the sum of the reciprocal of the individual resistances.
4- The highest current passes through the highest Conductance (with the lowest resistance)

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

The current through resistors in a series stays the same, but the voltage across each resistor can be different.
The sum of potential differences is equal to the total voltage

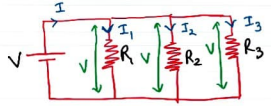


$$R_{eq} = (R_1 \| R_2) + R_3 = \frac{R_1 \times R_2}{R_1 + R_2} + R_3$$

Characteristics of Series Circuits

1- The same current flows through each resistance
2- The supply voltage, V is the sum of the voltage drop across each resistance
3- The equivalent resistance is equal to the sum of the individual resistances.

Minimum



$I = I_1 + I_2 + I_3$

$I_1 = \frac{V}{R_1}$, $I_2 = \frac{V}{R_2}$, $I_3 = \frac{V}{R_3}$

$$I = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3}$$

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

$$\boxed{I = V \times \frac{1}{R_{eq}}} \quad ; \quad R_{eq} = \frac{V}{I}$$

Ques: Consider an electric circuit as shown below

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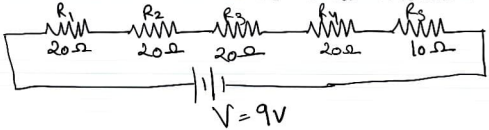


(a) $R_{eq} = R_1 + R_2 + R_3 + R_4 + R_5$

$= 20 + 20 + 20 + 20 + 10 = 90\ \Omega$

(b) Current through each resistor

$V = IR$

$I = \frac{V}{R_{eq}} = \frac{9}{90} = 0.1\ Amp$

(c) Potential drop across each resistor.

$V = IR$

Potential drop across $R_1 = IR_1 = V_1$

" " " $R_2 = IR_2 = V_2$

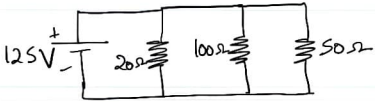
" " " $R_3 = IR_3 = V_3$

$IR_4 = V_4$

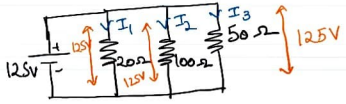
$IR_5 = V_5$

$V = V_1 + V_2 + V_3 + V_4 + V_5$

Ques) Three resistances of values 20Ω, 100Ω & 50Ω are connected in parallel to each other across a voltage source of 125 V.



(a) $R_{eq} = ?$ $\quad \frac{1}{R_{eq}} = \frac{1}{20} + \frac{1}{100} + \frac{1}{50}$



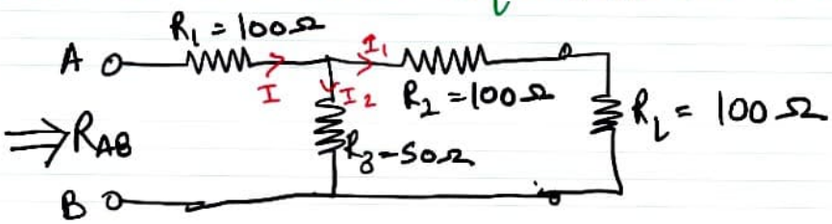
(b) Current across each Resistor

$I_1 = \frac{V}{R} = \frac{125}{20} =$

$I_2 = \frac{125}{100}$, $I_3 = \frac{125}{50}$

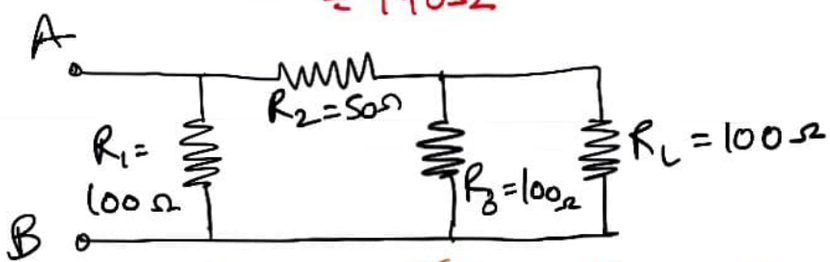
(c) Potential drop across each resistor will be same.

Ques) Calculate the equivalent Resistance of a given Ckt.



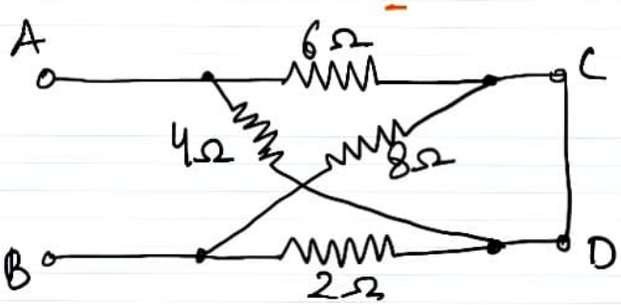
$$R_{AB} = R_{eq} = R_1 + (R_3 \,||\, (R_2 + R_L))$$

$$= 140\Omega$$



$$R_{AB} = \left[R_1 \,||\, \left[R_2 + (R_3 \,||\, R_L)\right]\right]$$

=



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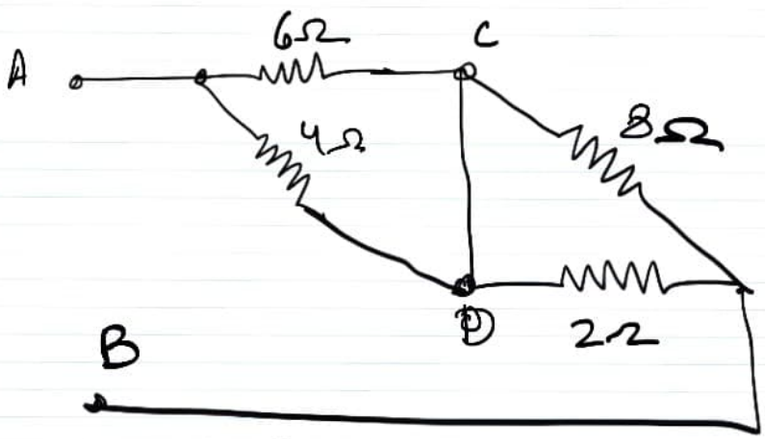
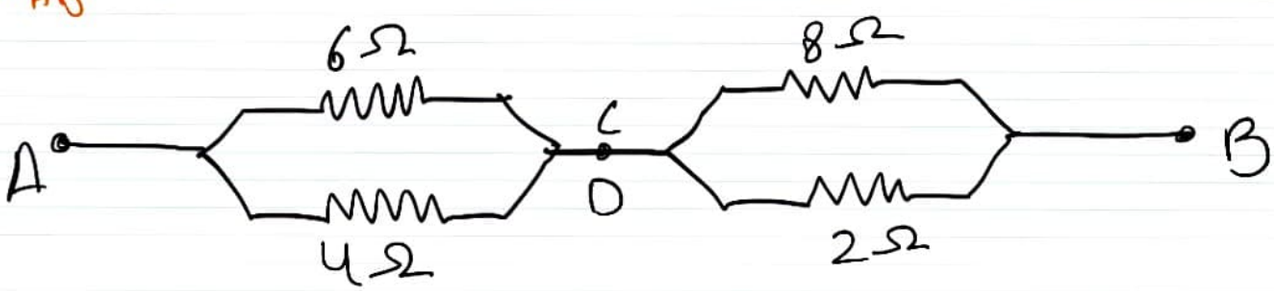


R_{AB} =



Minimum