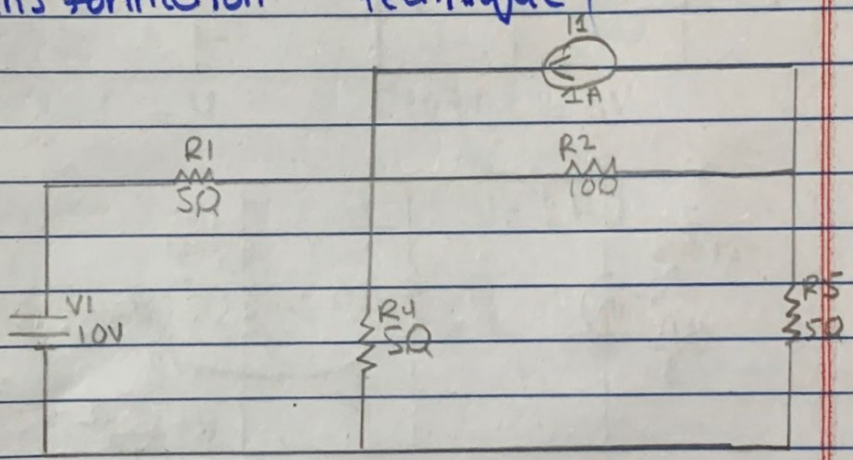
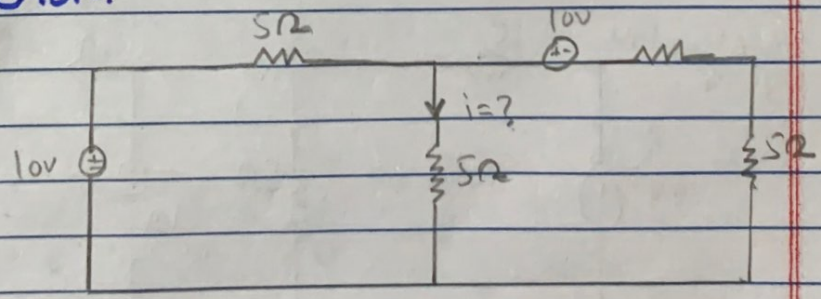
Name Waqas Bangash
Assignment Linear Circuit Analysis
ID 16323
Summer Final Term

Q3 Find the current through the central 5 Ω resistor using source transformation technique.



Solution:



Note that the +ve terminal of the 10V source is placed to the left because the current source ~~was~~ arrow was playing to the left.

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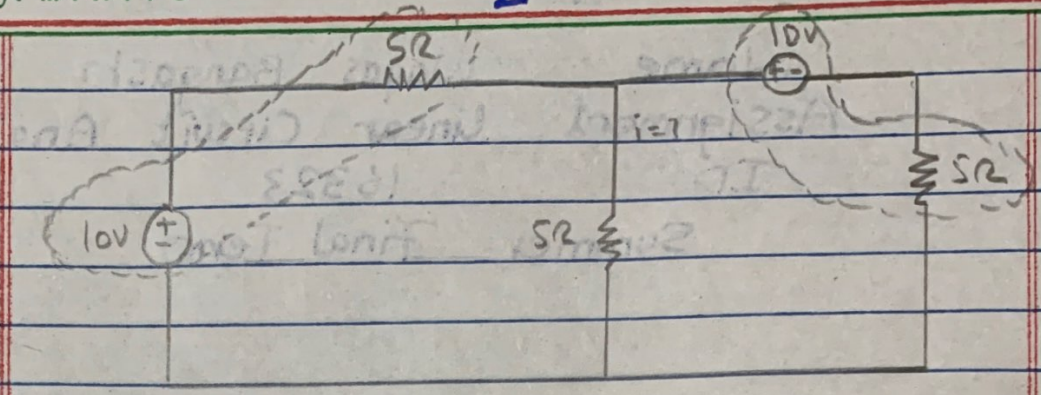
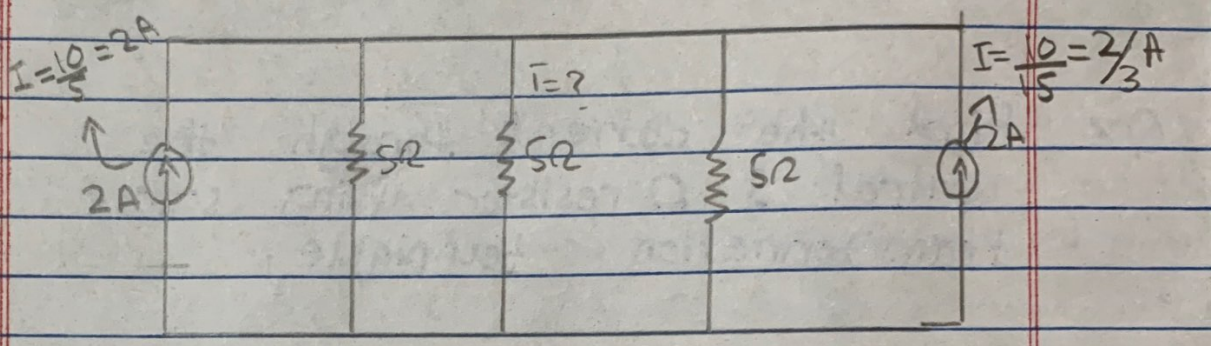
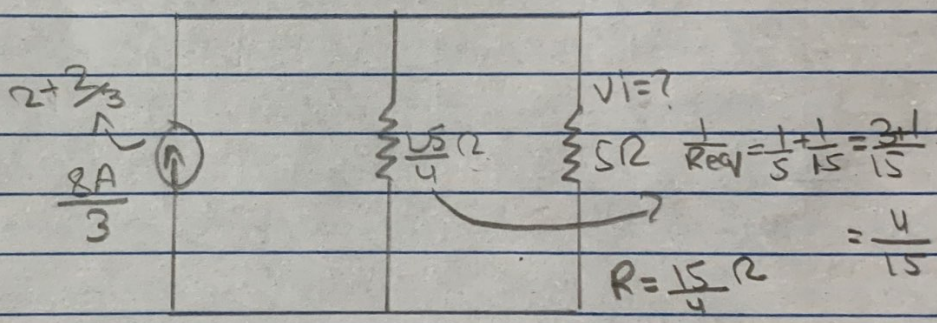
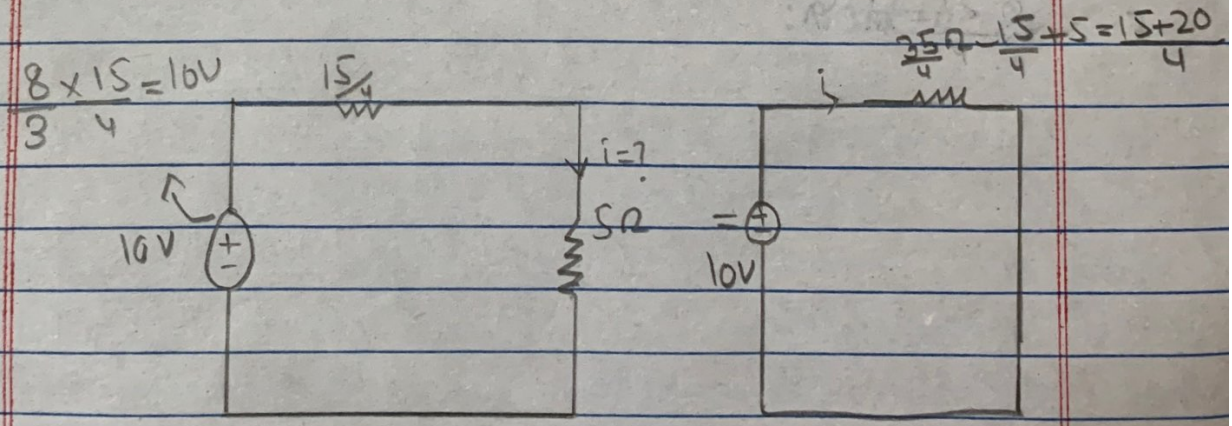


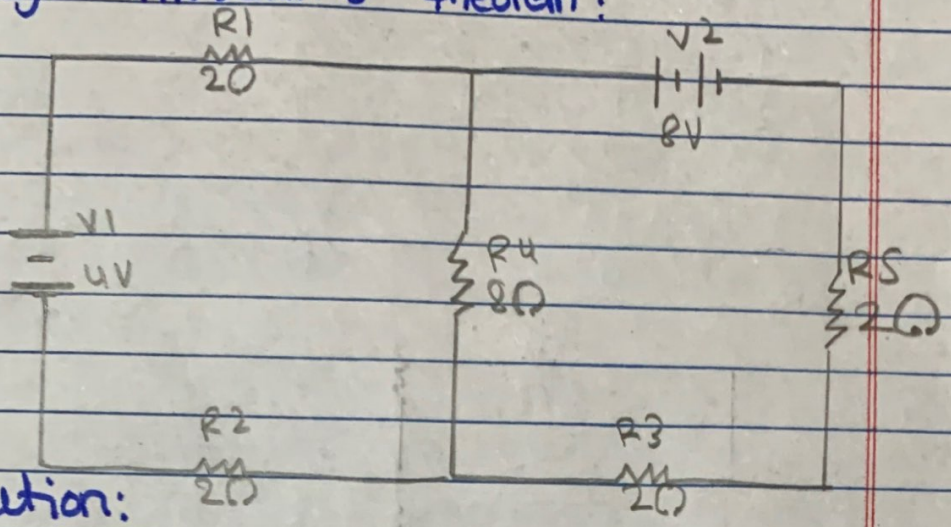






$$i = \frac{10}{\frac{35}{4}} = \frac{10 \times 4}{35} = \boxed{\frac{8A}{7}}$$

Q2 Find the current in 8Ω resistor using Thevenin's theorem:



Solution:

$V_{Total} = 4$ $R_{total} = 8V$

$$I = \frac{V}{R} \quad (\because V = IR)$$

$$I = \frac{4}{8} = 0.5A$$

$V_1 = 1V$
$V_2 = 1V$
$V_3 = 1V$
$V_4 = 1V$

$$\frac{1}{R} = \frac{1}{1} + \frac{1}{4}$$

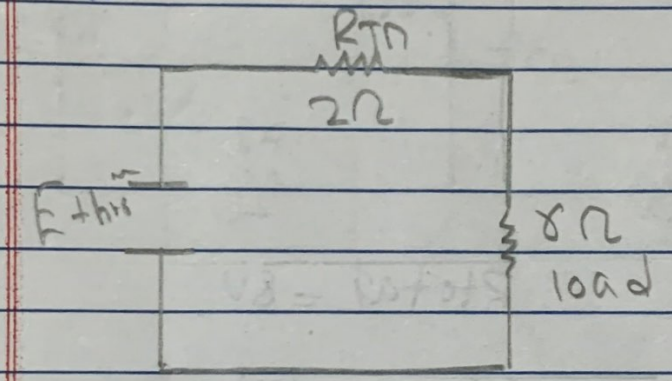
$$\frac{4+1}{4} = \frac{5}{4} = \frac{4}{5}$$

$V_{th} = 6V$

$R_{Th} = 2 \cdot \Omega$

$$\frac{1}{R} = \frac{1}{4} + \frac{1}{4}$$

$$\frac{1}{R} = \frac{1+1}{4} = \frac{2}{4} = \frac{1}{R} = \frac{1}{2}$$



$V = IR$

$$I_{ID} = \frac{V}{R} = \frac{6}{10} = 0.6A$$

$\boxed{I = 0.6\,A}$

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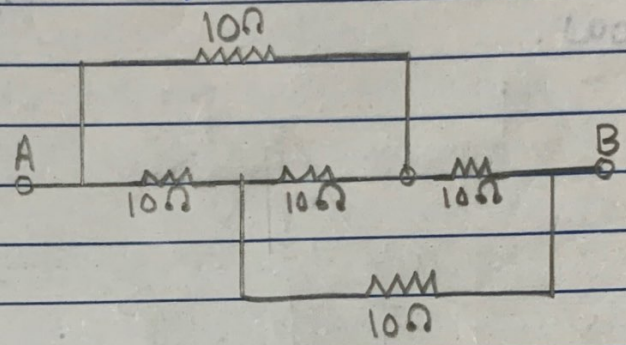
Question (4) Part (a)

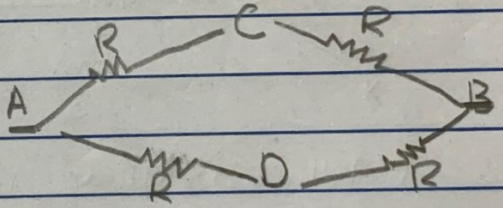
Part (a)

Calculate the resistance between terminal A and B for the circuit show below:

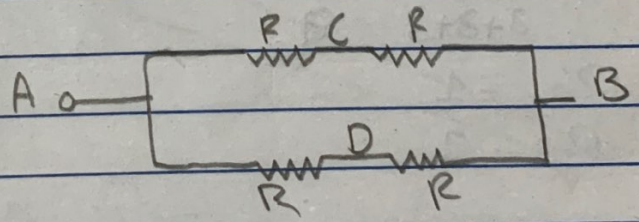


A = VA

B = VB



all have same value



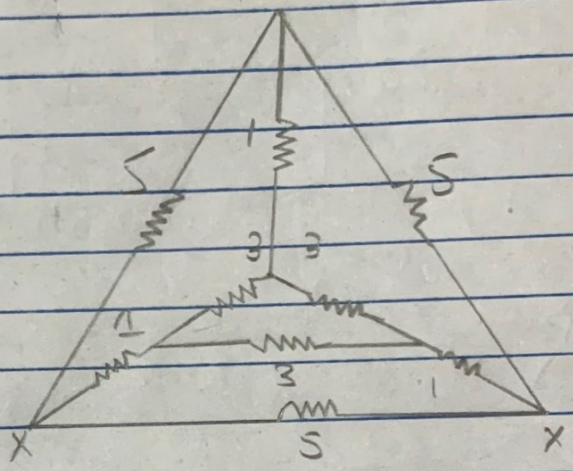
$$Req = \frac{2R \times RR}{2R + 2R} \Rightarrow \frac{2(10) \times 2(10)}{2(10) + 2(10)}$$

$$\boxed{Req = R}$$

Question (4)

part (B)

Determine the resistance b/w terminal X and Y for the circuit shown in the figure below.

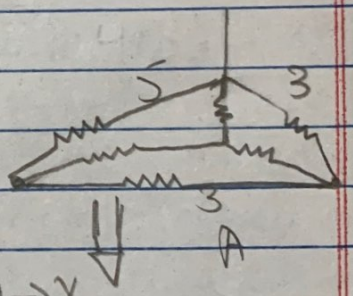


(All resistance in ohm)

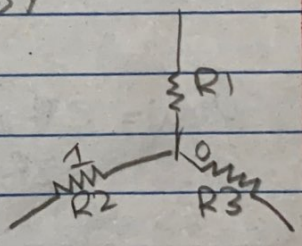
$R_1 = \frac{3 \times 3}{3+3+3} = \frac{9}{9} = 1$

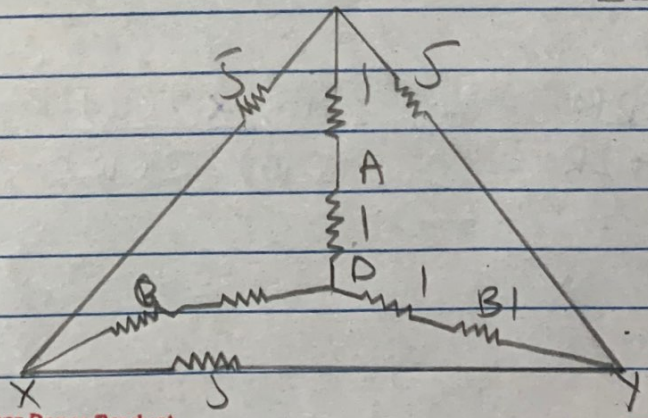
$R_2 = 1$

$R_3 = 1$



$\Delta \rightarrow Y$





Put in CRT (A)

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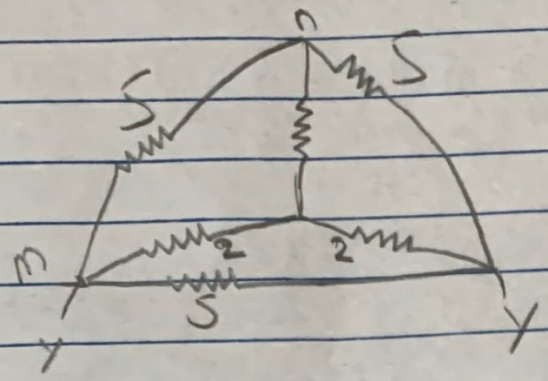


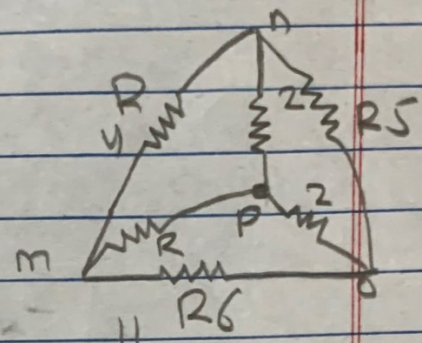
→ (B)

$R_4 = 2+2+\frac{2\times2}{2}$

$R_4 = 4+2 = 6\Omega$

$R_5 = 4+2 = 6\Omega$

$R_6 = 6\Omega$



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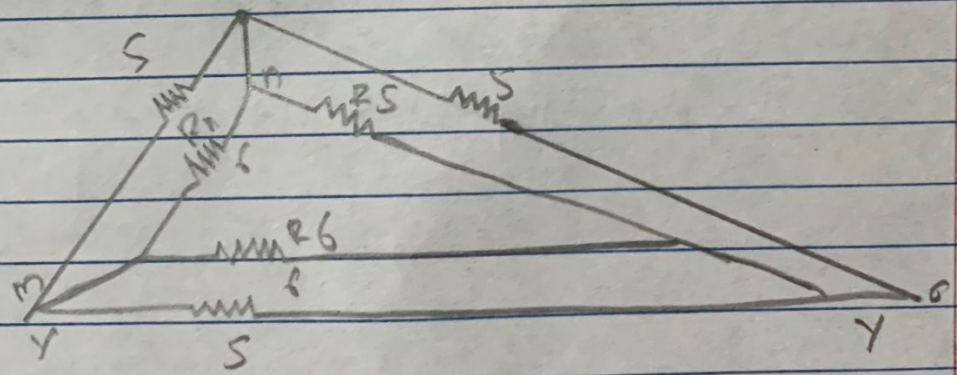
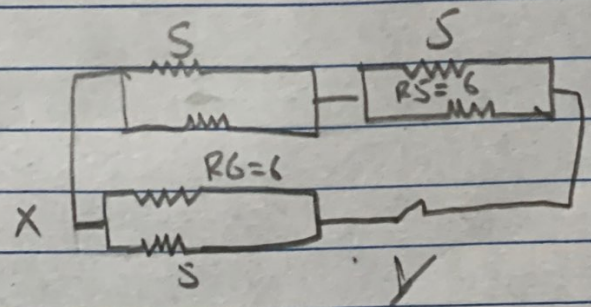
Put in (B)



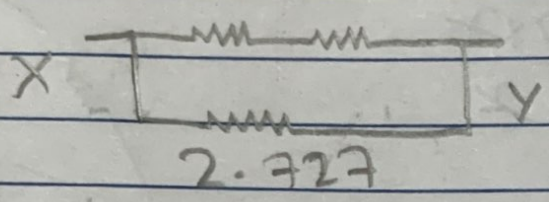


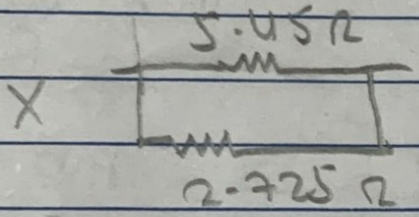
So

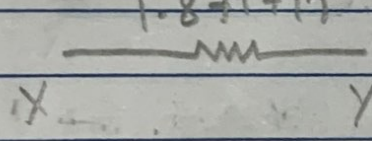
$$Req = 5 \parallel R_L = 5 \parallel 6 = \frac{5 \times 6}{5 + 6} = \frac{30}{11}$$

$$Req = \frac{30}{11} = 2.727\ \Omega$$

$2.727 + 2.727$



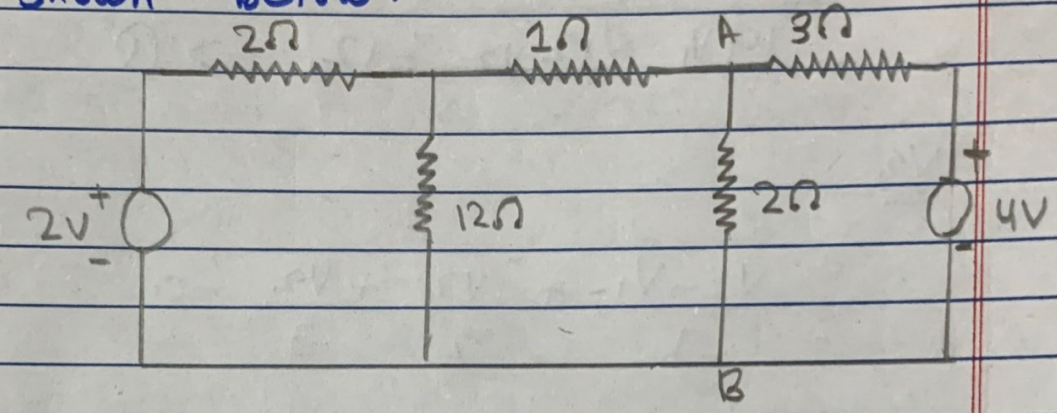




$$= \frac{5.45 \times 2.725}{5.45 + 2.725}$$

$$Z_{eq} = Z_{xy} = 1.81717\ \Omega$$

Q1 Using superposition principle, determine the correct through 2Ω resistor connected b/w terminal A and B in the circuit shown below.

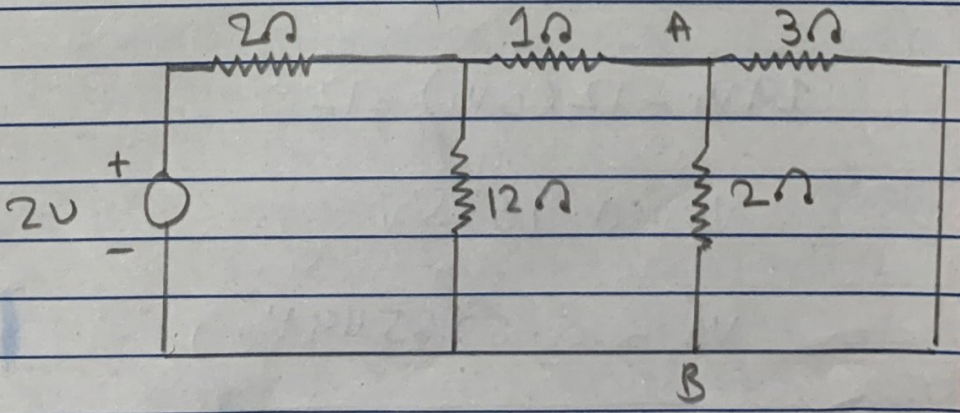


Required V_{AB} =?

Solution:-

Using superposition theorem.

Suppose to use 2V source & short circuit



V_{AB} =?

using Nodel Analysis.

$$\frac{V_1 - 2}{2} + \frac{V_1}{12} + \frac{V_1 - V_2}{1} = 0$$

$$6V_1 - 12 + V_1 + 12V_1 - 12V_2 = 0$$

$$19V_1 - 12V_2 = 12 \rightarrow (1)$$

V_2

$$\frac{V_2 - V_1}{1} + \frac{V_2}{2} + \frac{V_2}{3} = 0$$

$$6V_2 - 6V_1 + 3V_2 + 2V_2 = 0$$

$$-6V_1 + 11V_2 = 0$$

$$V_2 = \frac{6V_1}{11} \rightarrow (2) \text{ put in } (1)$$

$$19V_1 - 12(6V_1) = 12$$

$$V_1 = 0.9635\,V$$

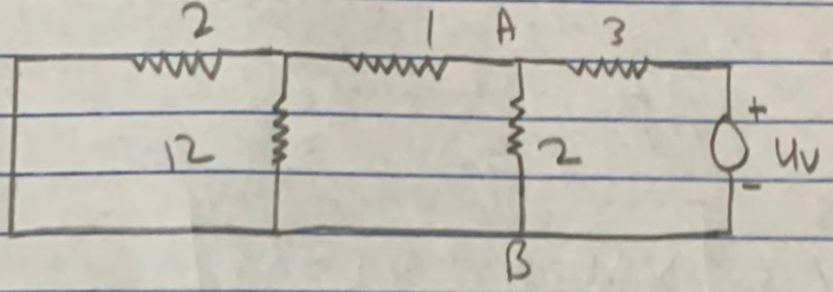
$$V_2 = 0.525549\,V.$$

$$\boxed{V_{AB} = V_2 - 0 = 0.5255\,V}$$

Now

2V is short uct

and 4V act as source



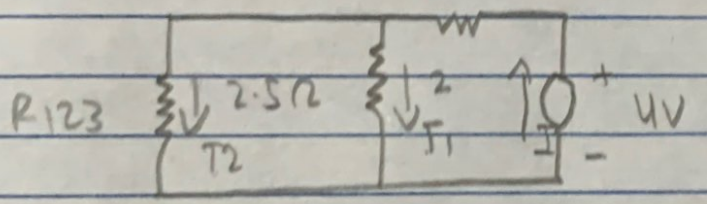
after parallel Eq Sources simplifactor =

$= 2 \parallel 12$

R_{12}

$R_{123} = 2 \parallel 12 + 1$

$R_{123} = 1.5 + 1 = 2.5\ \Omega$



$V''_{AB} = I_1 (2) \rightarrow (A)$

$I = \frac{4}{2.5 \parallel 2 + 3} = \frac{4}{4.11} = 0.9724\ A$

using Current division method

$I_1 = \left(\frac{2.5}{2+2.5}\right) I = 0.5405\ \Omega$

$V''_{AB} = I_1 (2) = (0.5405)(2) = 1.081V.$

So

Not voltage

$V_{AB} = V'_{AB} + V''_{AB} = 0.5225 + 1.081V$

$V_{AB} = 1.6035\ V$

$\boxed{V_{AB} = 1.6035V}$