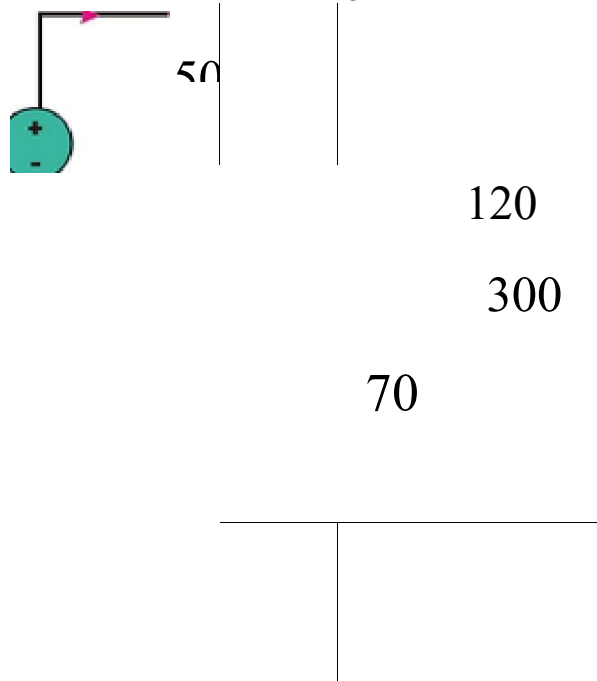


For the circuit network given below, the power absorbed by the 7Ω resistance is 252 Watts. Find out the value of source voltage V_s and value of current I_s , I_B and I_A .



Solution:

Let $R_1 = 5\Omega$, $R_2 = 70\Omega$
 $R_3 = 120\Omega$, $R_4 = 300\Omega$ and R_{eq} equivalent

Of R_3 and R_4 are in series imply

$$R_{eq} = R_3 + R_4 = 420\Omega$$

Current on R_1 (5 ohm) Resistance by formula

$$252 = I^2 (5)$$

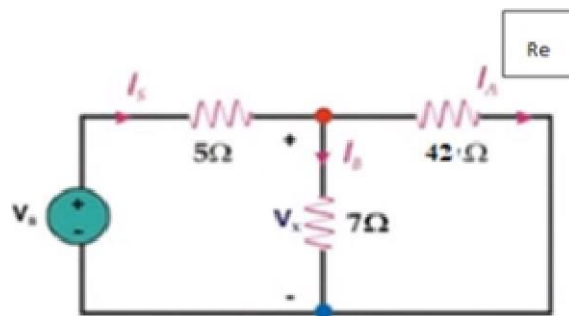
$$I^2 = 252 / (5) = 36 \text{ A here } I = I_B = 6 \text{ A}$$

Voltage on R_1 (5 ohm) Resistance by OHM formula

By OHM's Law voltage on 5 ohm resistance = IR

$$6 \times 5 = 30 \text{ volts}$$

Resistance on R_{eq} (420 ohm)



00V 42 volt

Current on R_{eq} (420 ohm) Resistance by formula

By Ohm's Law Current on 8.57 ohm resistance $V_R = IR$ $I = V_R/R = 42/42 = 1A$

$I = I_A = 1A$

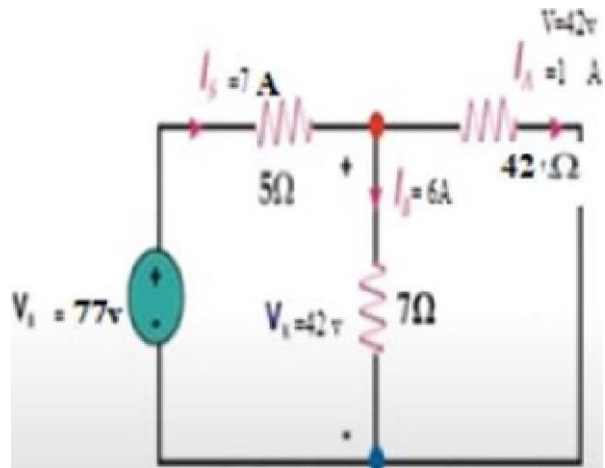
Now find source Current $i = I_A + I_R = 6 + 1A = 7A$

Voltage on 5 ohm Resistance by formula

By Ohm's Law voltage on 5 ohm resistance $V_{R1} = IR = 7 * 5 = 35$ volts

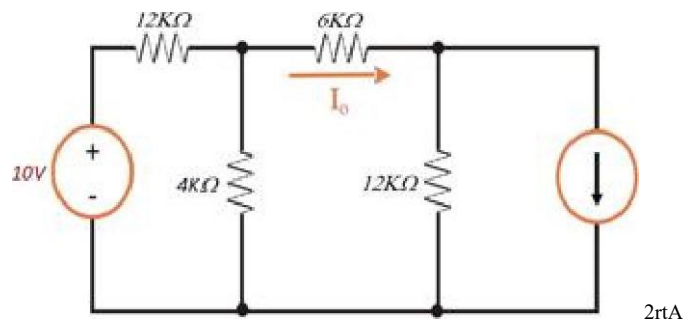
Voltage Source $V_s = 35 + 42 = 77$ Volt

$V_s = 77$ Volt

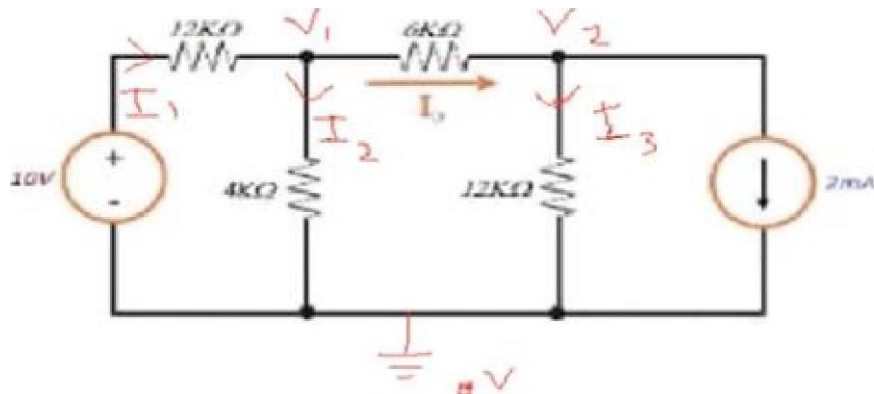


Question 2

Identify and label each node and using the Nodal analysis, find out Voltage value at each node and Current for 6kΩ in circuit given below. [Marks-JD]



Solution 2:



KCL Equation at Node V1 will be

$$-11+12+10=0$$

$$12+10=11$$

$$-(10-V1)/12 + V1/4 + (V1-V2)/6 = 0 \quad (V1/4) + (V1-V2)/6 = (10-V1)/12$$

Taking LCM 12 and multiply on both sides

$$12(V1/4) + 12(V1-V2)/6 = 12(10-V1)/12$$

$$3V1 + 2V1 - 2V2 = 10 - V1 \rightarrow 6V1 - 2V2 = 10 \dots\dots(A)$$

KCL Equation at Node V2 will be

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$$I_3 + I_4 + I_5 = 0 \rightarrow I_3 + I_4 = I_5$$

$$(V2/12) + 2 = (V1-V2)/6$$

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Taking LCM of 12 and Multiply Both side

$$12(V2/12) + 24 = (V1-V2)/6 \cdot 12$$

$$2V1 - 3V2 = 24 \dots\dots(B)$$

Multiplying (B) by 3 and subtracting by A Solving leads to

$$6V1 - 18V2 = 72 \dots\dots$$

$$6V1 - 2V2 = 24 \dots\dots$$

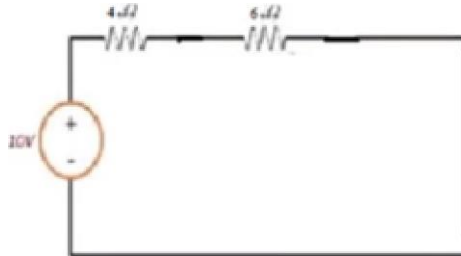
$$-16V2 = 48 \rightarrow V2 = -48/16 \text{ volt}$$

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Putting in A $6V1 - 2(-48/16) = 10$ $V1 = 71/6 \text{ A}$

Solution



Power diss = 6.00e

(B) Is it possible that current does not flow through a circuit even if circuit is closed?

Sol:

Basically: it is infinite resistance; consider Ohm's law

I-VIR if you let R get arbitrarily large, then the current goes to zero.