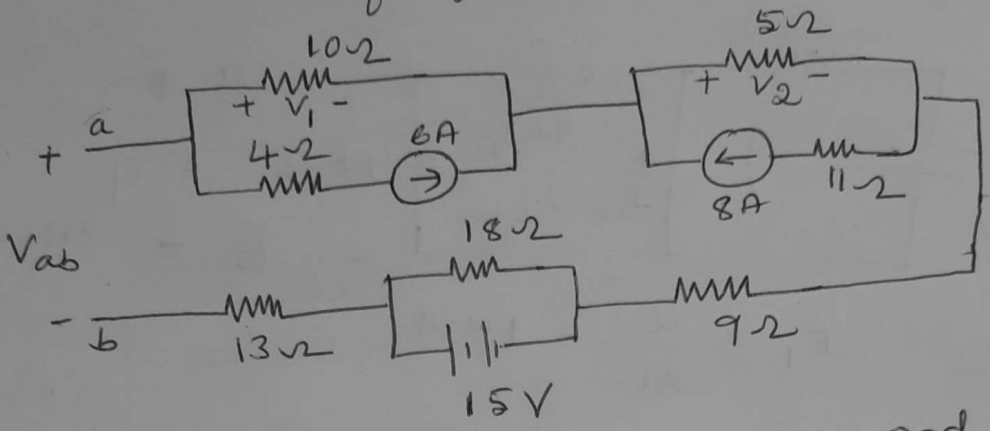
Ex: Determine the v/g drop V_{ab} across the open ckt in the ckt of Fig



Solution: NO current flows in the 9Ω and 13Ω resistors ∴ Zero volts across each of them.

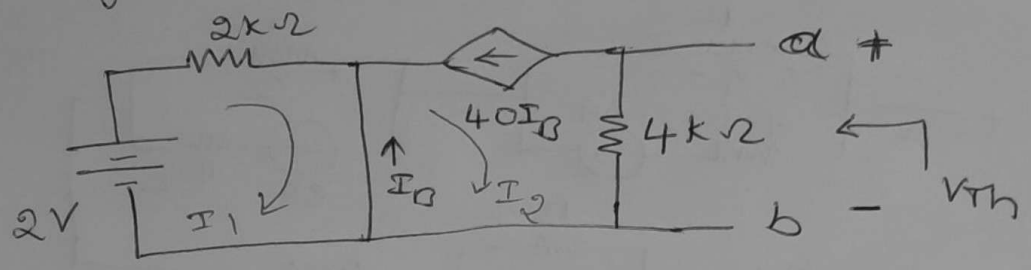
same 6A source current flows through the 10Ω resistor and same 8A current flows through 5Ω resistor.

$V_1 = -6 \times 10 = -60V$, $V_2 = 8 \times 5 = 40V$

$V_{ab} = V_1 + V_2 - 15 = -60 + 40 - 15 = -35V$

$\boxed{V_{ab} = -35V}$

Ex: Find the Thevenin equivalent ckt shown in Fig at the terminal a-b



Solution: $I_1 = \frac{2}{2K} = 1mA$

$I_2 = -40 I_B$

$I_B = I_2 - I_1 = -40 I_B - 1m$

$I_B + 40 I_B = -1m$

$41 I_B = -1m$

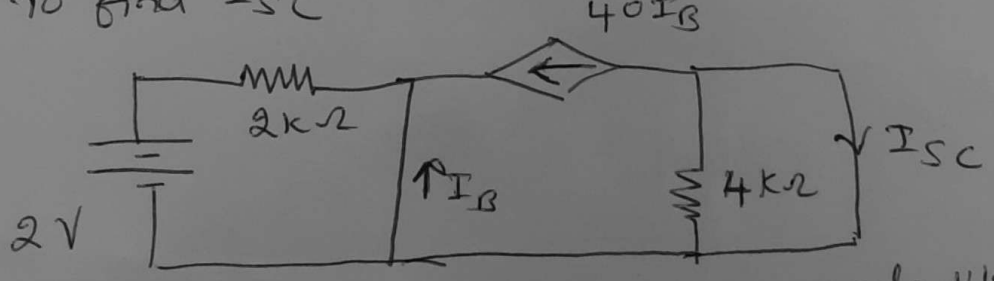
$I_B = \frac{-1m}{41} = -0.0243mA$

$V_{Th} = 4K I_2 = 4K(-40 I_B)$

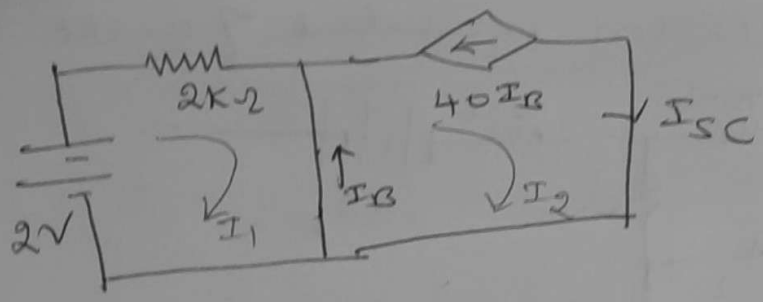
$V_{Th} = (4K)(-40)(-0.0243mA)$

$\boxed{V_{Th} = 3.88V \simeq 3.9V}$

To find I_{SC}



current through 4kΩ = 0 ∵ node v/g v = 0 since of short ckt



$$I_1 = \frac{2}{2K} = 1mA$$

$$I_2 = I_{SC} = -40I_B$$

$$I_B = I_2 - I_1 = -40I_B - 1mA$$

$$41I_B = -1m$$

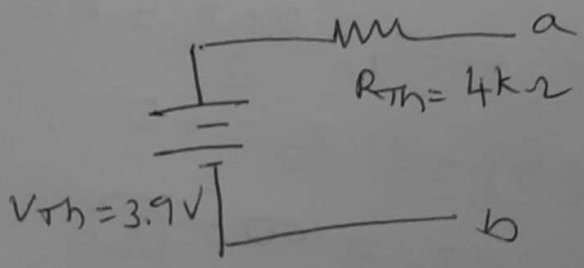
$$I_B = -0.0243mA$$

$$I_2 = I_{SC} = -40(-0.0243mA)$$

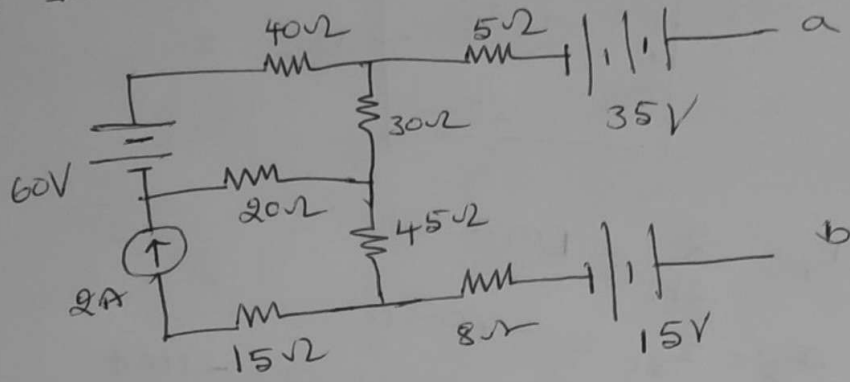
$$I_{SC} = 0.972m$$

$$R_{Th} = \frac{V_{Th}}{I_{SC}} = \frac{3.9}{0.972} \Rightarrow 4K$$

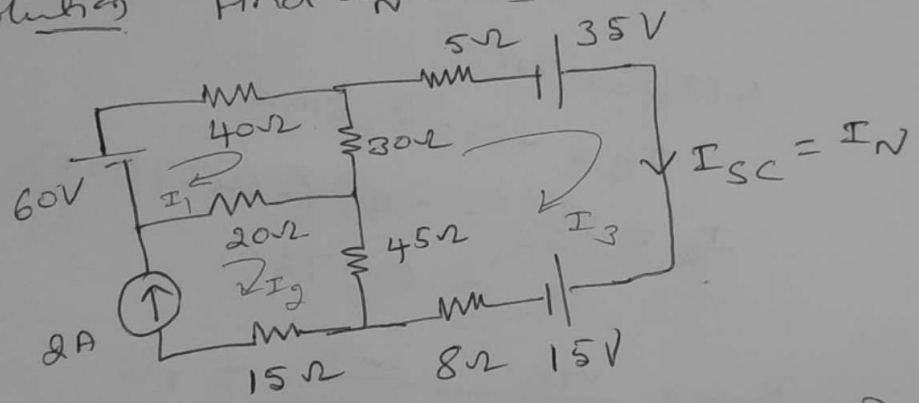
$$\boxed{R_{Th} = 4K}$$



Ex: Determine Norton equivalent of the ckt



Solution: find I_N (I_{SC})



KVL to mesh 1

$$40I_1 + 30(I_1 - I_3) + 20(I_1 - I_2) = 60$$

$$I_2 = 2A$$

$$40I_1 + 30I_1 - 30I_3 + 20I_1 - 20I_2 = 60$$

$$90I_1 - 20(2) - 30I_3 = 60$$

$$90I_1 - 30I_3 = 100 \quad -(1)$$

KVL to mesh 3

$$5I_3 - 35 + 15 + 8I_3 + 45(I_3 - I_2) + 30(I_3 - I_1) = 0$$

$$5I_3 - 20 + 8I_3 + 45I_3 - 90 + 30I_3 - 30I_1 = 0$$

$$-30I_1 + 88I_3 = 110 \quad -(2)$$

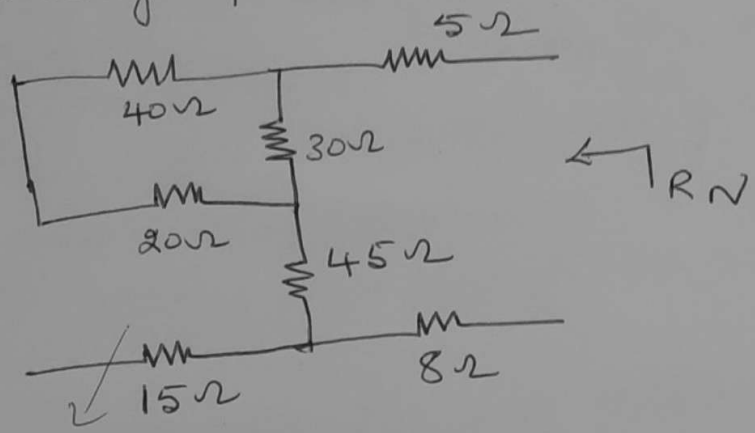
solving eqn ① and ②

$I_1 = 1.72A, \quad I_3 = 1.837A$

$I_N = I_{SC} = I_3 = 1.837A$

To find R_N

Replace Vtg source by short and current source by open circuit



Not to consider.

~~(40+20) + 30 =~~

$(40+20) \parallel 30 = 20\Omega$

$20\Omega + 5 + 45 + 8 = 78\Omega$

$R_N = 78\Omega$