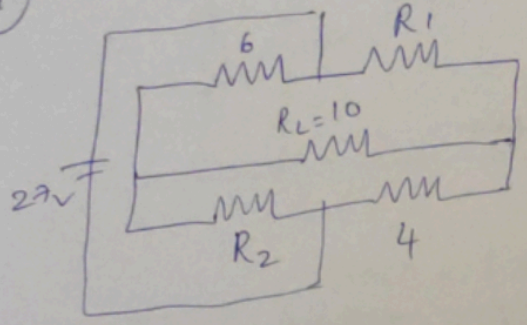
EECE105L

Quiz 2 Solutions

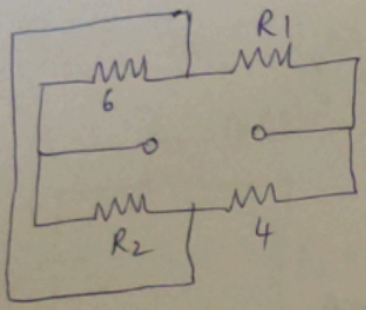
(1)



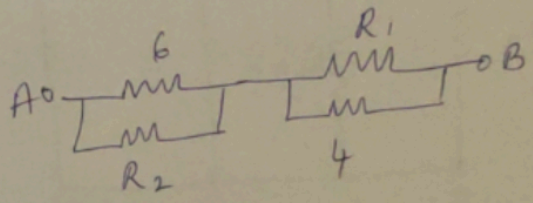
$R_1 = 8.5\Omega$ $R_2 = 4.4\Omega$

$R_{th} = ?$

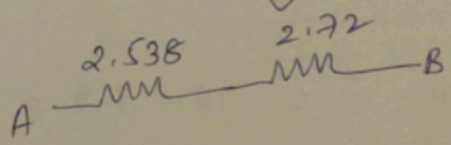
To find R_{th}, open R_L, short Voltage Source



$\Rightarrow$

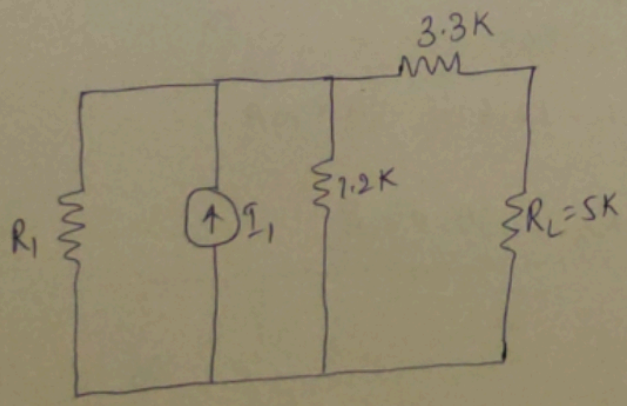


$\Downarrow$



$R_{th} = 5.258\Omega$

(2)

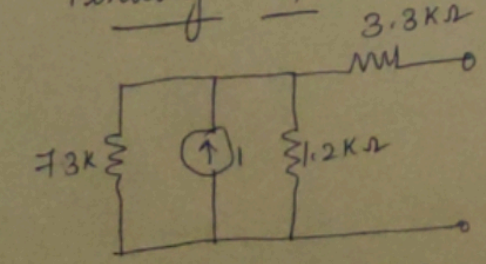


$R_1 = 7.3K\Omega$

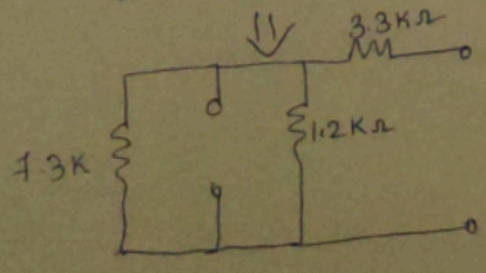
$I_1 = 1mA$

$I_{R_L} = ?$

Finding R_{th}:



Open R_L



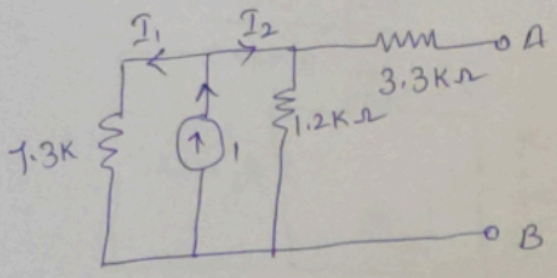
Open Current Source

$R_{th} = 3.3K\Omega + (1.2K \parallel 7.3K)$

$= 3.3K\Omega + 1.03K$

$R_{th} = 4.33K\Omega$

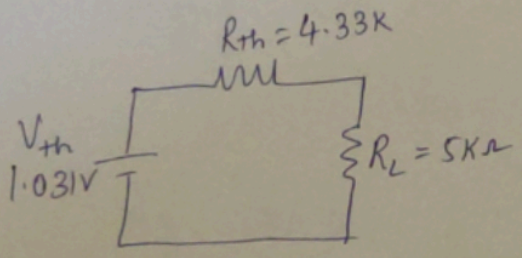
Calculate V_{th}:



$V_{th} = V_{AB}$

$$I_2 = \frac{1mA \times 7.3K}{7.3K + 1.2K} = \frac{7.3}{8.5K\Omega} = 0.859\,mA$$

$$V_{th} = V_{AB} = 0.859mA \times 1.2K\Omega = 1.031V$$

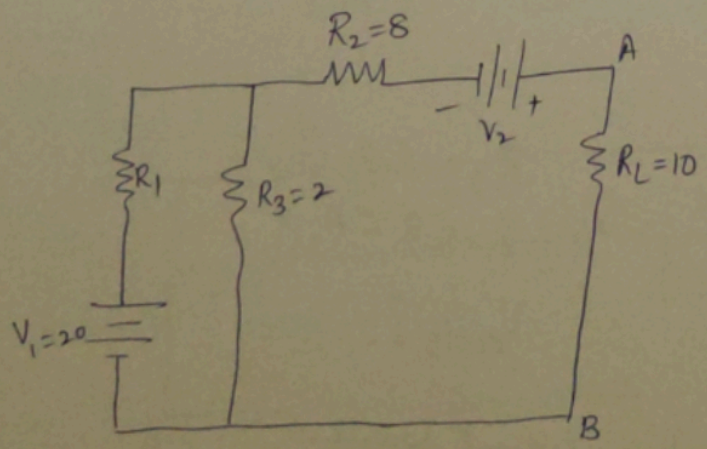


$$V_{R_L} = \frac{1.031 \times 5K}{5K + 4.33K} = \frac{5.155K}{9.33K}$$

$$V_{R_L} = 0.5525\,V$$

$$I_{R_L} = \frac{0.5525\,V}{5K\Omega} = 0.11\,mA$$

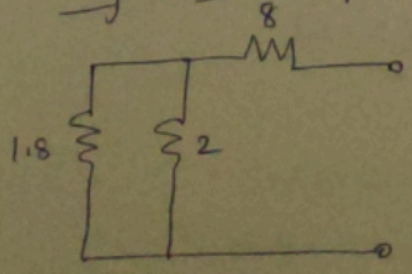
(3)



$R_1 = 1.8\Omega$, $V_2 = 3.9V$

$V_{R_L} = ?$

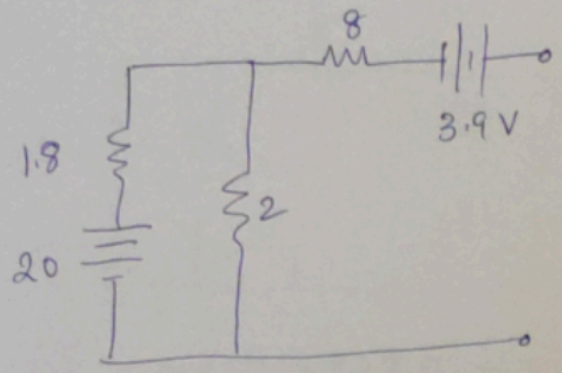
Finding R_{th}: open R_L, short Voltage source



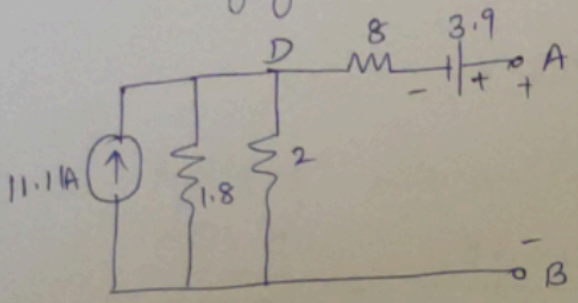
$$R_{th} = 8 + (1.8 \,||\, 2) = 8 + 0.947$$

$$R_{th} = 8.947\Omega$$

Calculate V_{th}.



Applying source transformation



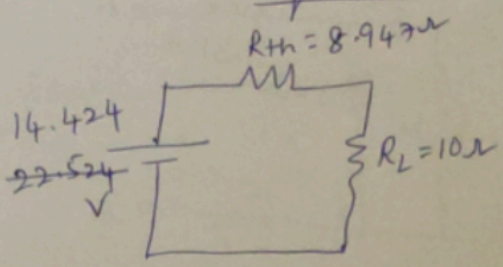
$$I_{2\Omega} = \frac{11.11 \times 1.8}{2+1.8} = 5.262A$$

Applying KVL in loop ABDA

$$3.9 + 2 \times 5.262 - V_{AB} = 0$$

$$V_{AB} = 14.424V$$

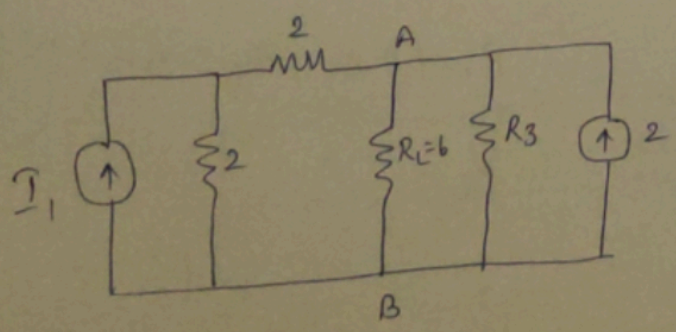
Eq. ckt



$$V_{R_L} = \frac{14.424}{\frac{22.524 \times 10}{10+8.947}}$$

$$V_{R_L} = 7.61V$$

(4)

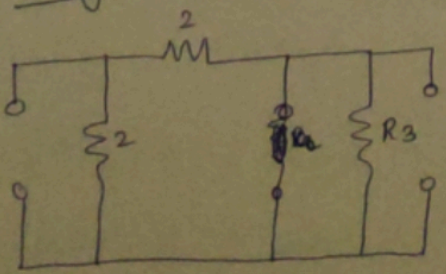


$R_3 = 5\Omega$

$I_1 = 3.5A$.

$V_{R_L} = ?$

Finding R_{th}: open R_L, open Current source



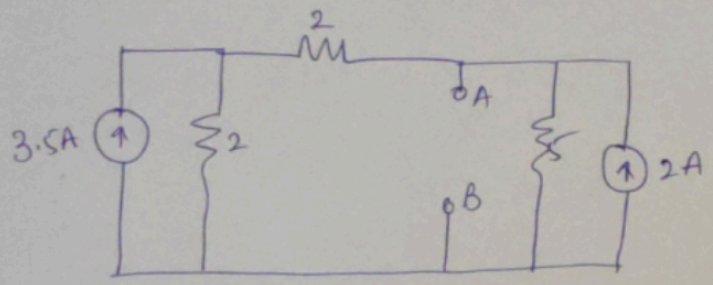
R_3 11 (2+2)

R_3 11 4

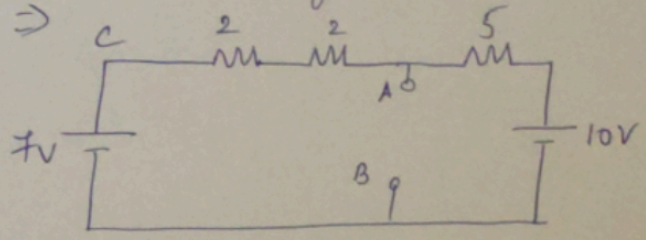
5 11 4 = 2.22Ω

$R_{th} = 2.22\Omega$

Calculating V_{th}.



source transformation ⇒



$V_{S_1} = 3.5 \times 2 = 7V$

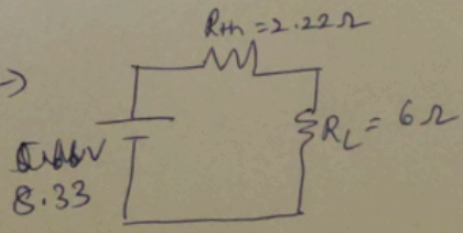
$V_{S_2} = 5 \times 2A = 10V$

$$I = \frac{-10+7}{2+2+5} = \frac{-3}{9} = \frac{-1}{3} A$$

Applying KVL in loop ABCA $\Rightarrow V_{AB} - 7 - \frac{1}{3}(2+2) = 0$

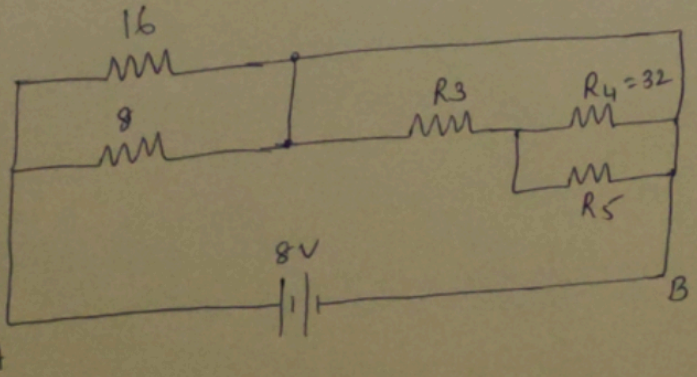
$$V_{AB} = 7 + \frac{4}{3} = 8.33V$$

Eq. Ckt →



$$V_{6\Omega} = \frac{8.33 \times 6}{6+2.22} = 6.08V$$

(5)



$R_5 = 1\Omega$

$R_3 = 4.3\Omega$

$I_{R_3} = ?$

Current through $R_3 = 0$ as there is a short circuit between 8 & 16 Ω resistors.