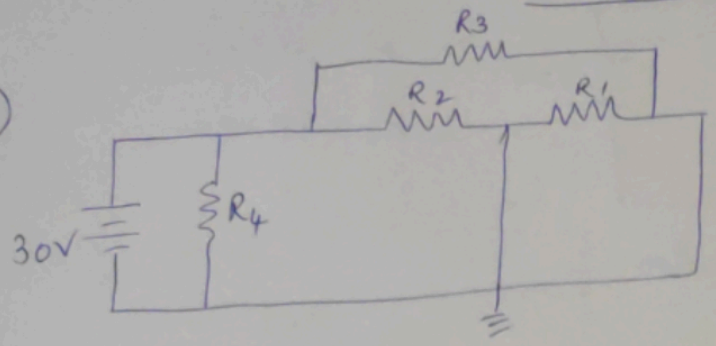
EECE105L - Quiz-1 Solutions

(1)



$R_1 = 27\Omega$ $R_2 = 25\Omega$

$R_3 = 43\Omega$ $R_4 = 33\Omega$

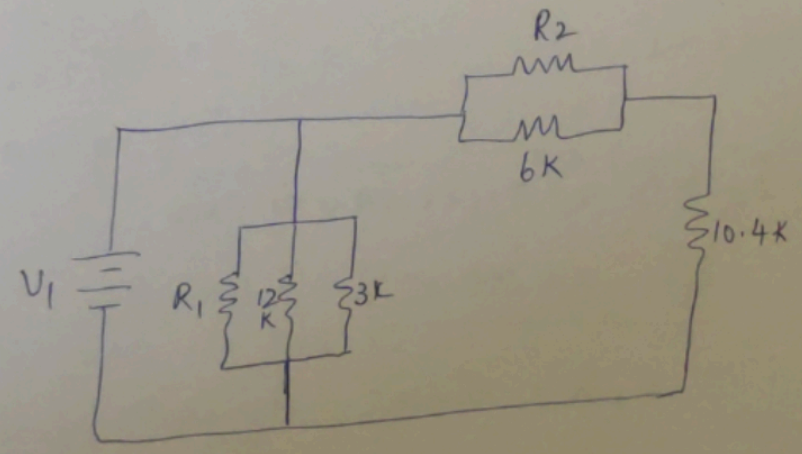
$R_{eq} = R_4 \parallel R_2 \parallel R_3$ (R_1 not considered due to short circuit)

$= 33 \parallel 25 \parallel 43$

$= 33 \parallel 15.8$

$R_{eq} = 10.68\Omega$

(2)



$V_1 = 5.6V$

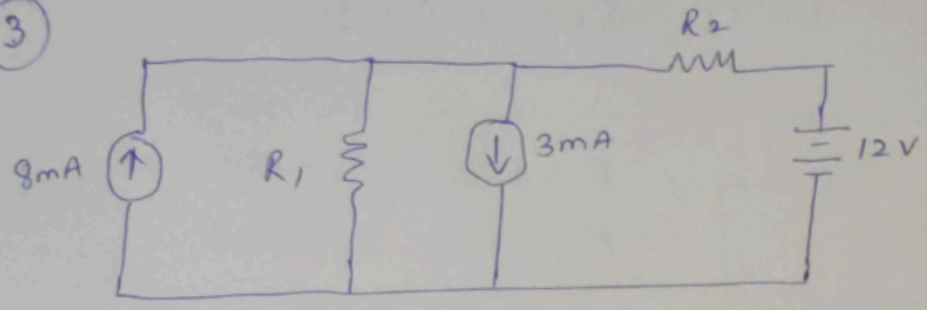
$R_1 = 3.3K\Omega$

$R_2 = 14.6K\Omega$

Voltage across $3K\Omega$ resistor $= V_1$ ($\because$ $3K \parallel 12K \parallel R_1$ in parallel to voltage source)

$\therefore V_{3K\Omega} = V_1 = 5.6V$

(3)

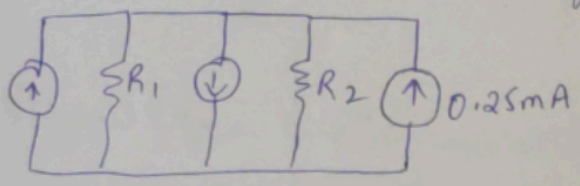


$R_1 = 31.5\,K\Omega$

$R_2 = 48.2\,K\Omega$

$V_{R_1} = ?$

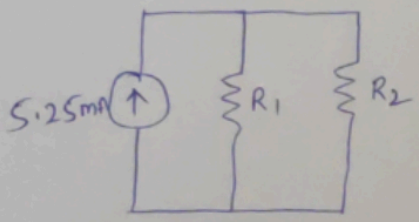
⇓ Eq source transformation



$$I = \frac{V}{R_2} = \frac{12}{48.2\,K\Omega} \simeq 0.25\,mA$$

⇓

Total Current = $8 - 3 + 0.25 = 5.25\,mA$



$$I_{R_1} = \frac{5.25 \times R_2}{R_1 + R_2} = \frac{5.25\,mA \times 48.2\,K\Omega}{79.7\,K\Omega}$$

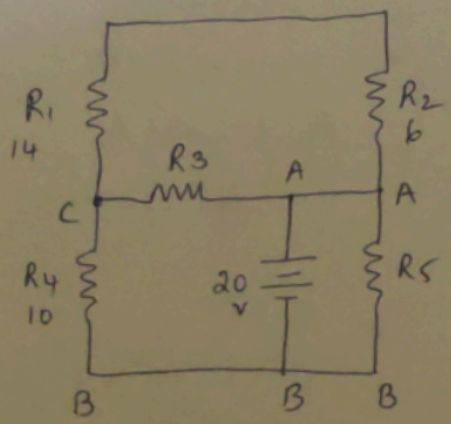
$$= \frac{253.05}{79.7\,K\Omega}$$

$$= 3.175\,mA$$

$$V_{R_1} = I_{R_1} \times R_1 = 3.175\,mA \times 31.5\,K\Omega$$

$$V_{R_1} = 100.01\,V$$

(4)

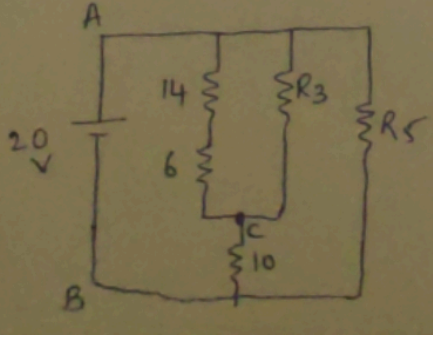


$R_3 = 9.3\,\Omega$

$R_5 = 8.5\,\Omega$

$R_{AB} = ?$

⇓



14Ω series 6Ω = 20Ω

$20\,\Omega \,||\, R_3 = 20 \,||\, 9.3 = 6.348\,\Omega$

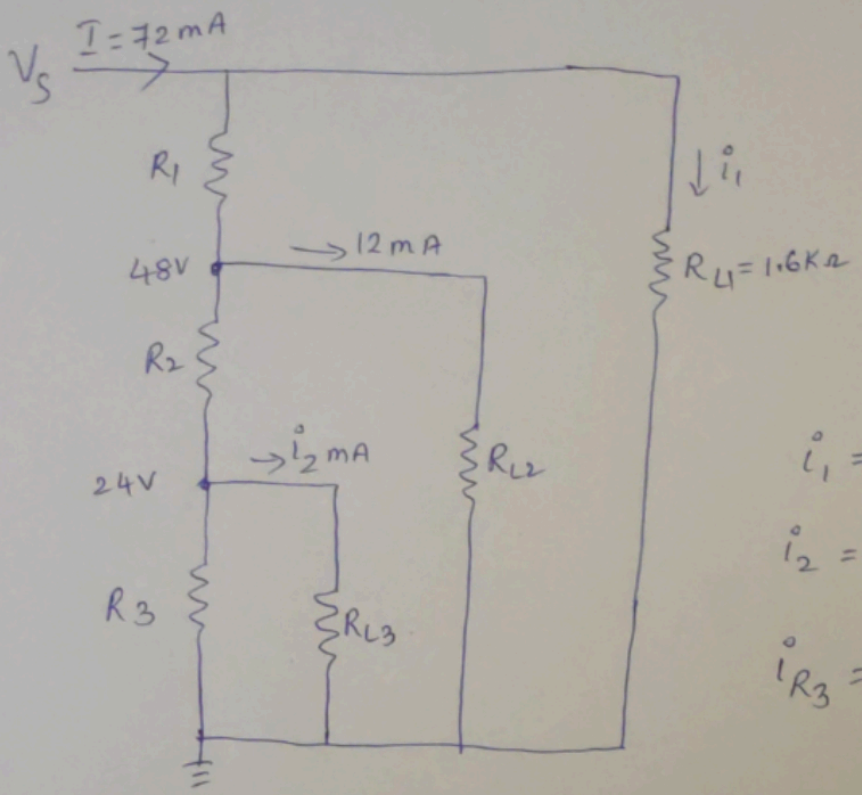
$6.348\,\Omega$ series $10\,\Omega = 16.348\,\Omega$

$16.348\,\Omega$ parallel $R_5 = 16.348 \,||\, 8.5$

$= 5.59\,\Omega$

$R_{AB} = 5.59\,\Omega$

(5)



$i_1 = 7.9\,mA$

$i_2 = 12.6\,mA$

$i_{R_3} = ?$

$i_{R_1} = 72\,mA - i_1 = 72 - 7.9 = 64.1\,mA$

$i_{R_2} = 64.1\,mA - 12\,mA = 52.1\,mA$

$i_{R_3} = 52.1\,mA - i_2 = 52.1 - 12.6 = 39.5\,mA.$

Current through resistor $R_3 = \underline{\underline{39.5\,mA}}$.