Vesion 1

Model Answer

Name:	Application #:	Tutorial:

Consider the circuit in *Figure*, **Using circuit reduction, voltage and current division**, if Req= 70Ω find the value of R and the voltage V_0
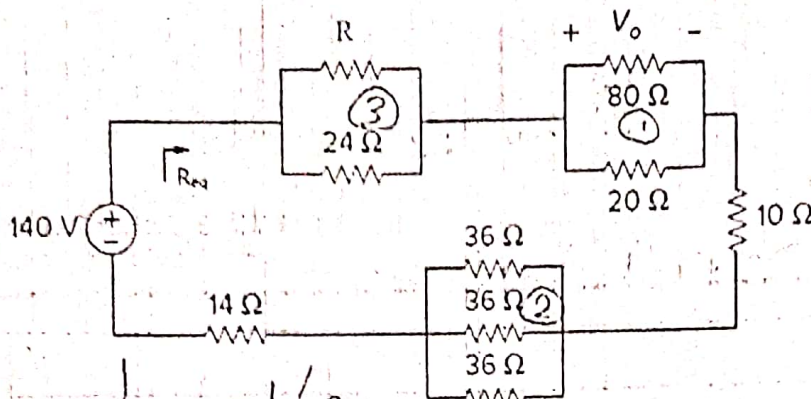
$$\boxed{1} \quad R_1 = \frac{1}{\frac{1}{20} + \frac{1}{80}} = 16\,\Omega$$

$$\boxed{2} \quad R_2 = \frac{1}{\frac{1}{36} + \frac{1}{36} + \frac{1}{36}} = 12\,\Omega$$

$$\boxed{3} \quad R_3 = \frac{1}{\frac{1}{24} + \frac{1}{R}} = \frac{24R}{24+R} \quad ②$$

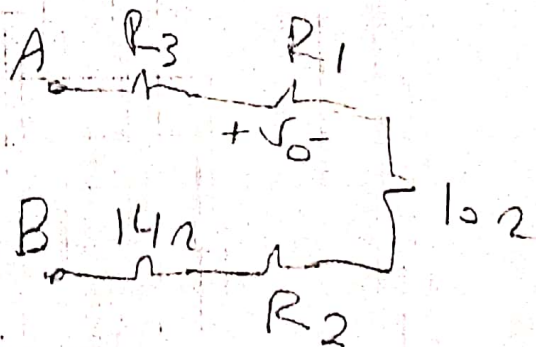$$\boxed{4} \quad R_{eq} = R_3 + R_1 + 15 + R_2 + 14$$

$$R_3 = 18\,\Omega$$

$$\frac{24R}{24+R} = 18\,\Omega \quad \Rightarrow \boxed{R = 72\,\Omega}$$

$$\Rightarrow V_0 = \frac{R_1}{R_{eq}} \cdot 140$$

$$\boxed{V_0 = 32\,v}$$

Name	Application #	Tutorial.

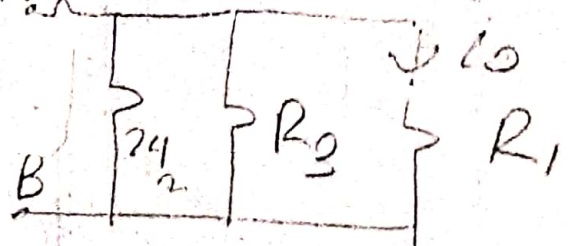For the circuit shown in Figure, <u>Using circuit reduction, voltage and current division</u>, Find R_{eq} and i_o
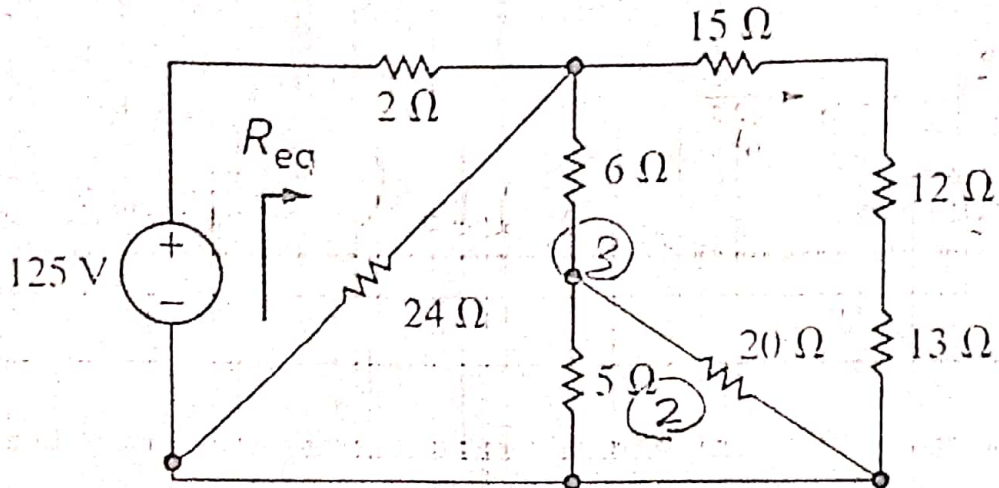
$\boxed{1}$ $R_1 = 15 + 12 + 13 = 40\,\Omega$

$\boxed{2}$ $R_2 = \dfrac{1}{\frac{1}{5} + \frac{1}{20}} = 4\,\Omega$
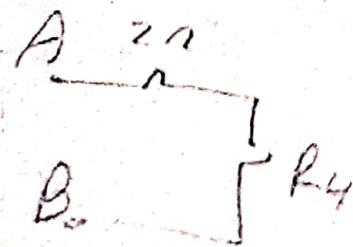
$\boxed{3}$ $R_3 : 6 + 4 = 10\,\Omega$

$\boxed{4}$ $R_4 = \dfrac{1}{\frac{1}{10} + \frac{1}{24} + \frac{1}{40}} = 6\,\Omega$

$R_{eq} = 2 + R_4 = 8\,\Omega$

$I = \dfrac{V}{R_{eq}} = 15.625$

$i_o = \dfrac{(24 // 10)}{40 + (24 // 10)} (15.625) = 2.34\ A$

Electric Circuits I (ELCT 301)
Time allowed: 20 minutes

Model Answer

Quiz # 1
Winter 2022

Name.	Application #	Tutorial

Consider the circuit in *Figure*, __Using circuit reduction, voltage and current division__, find the value of
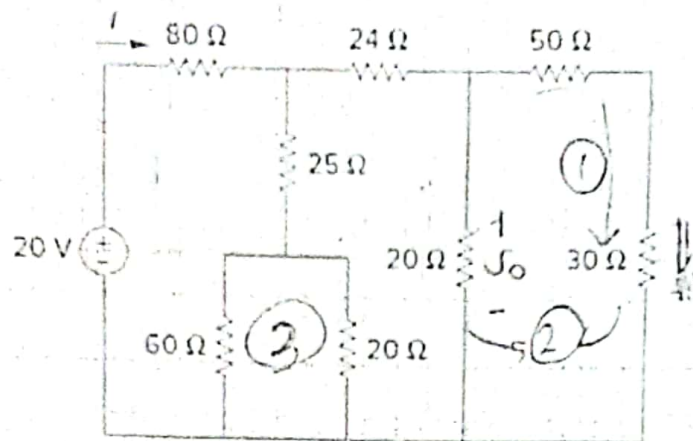*i* and the voltage V_0

Figure 2

I $R_1 = 50 + 30 = 80\Omega$

2 $R_2 = \dfrac{1}{\frac{1}{80} + \frac{1}{20}} = 16\Omega$

3 $R_3 = \dfrac{1}{\frac{1}{60} + \frac{1}{20}} = 15\Omega$
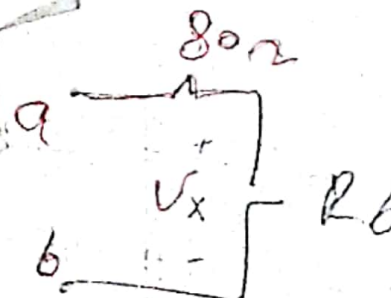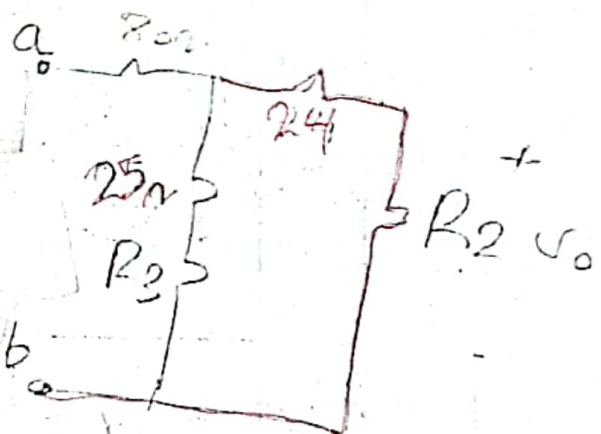
4 $R_4 = 24 + 16 \cdot 40\Omega$

5 $R_5 = 25 + 15 \cdot 40\Omega$

6 $R_6 = \dfrac{1}{\frac{1}{40} + \frac{1}{40}} = 20\Omega$
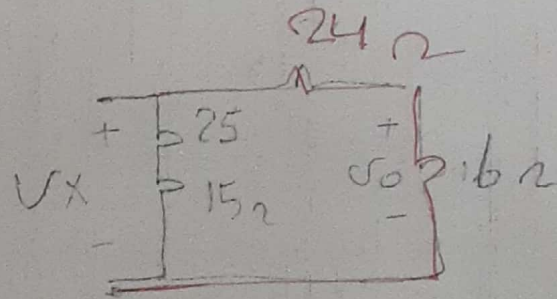
7 $R_{eq} = 80 + 20 = 100\Omega$

$I = \dfrac{20V}{R_{eq}} = ? A$

$$V_x = \frac{20}{20+80} \cdot 20 = 4V$$
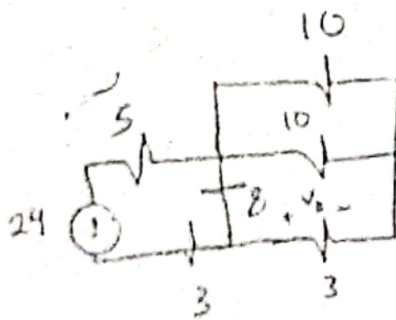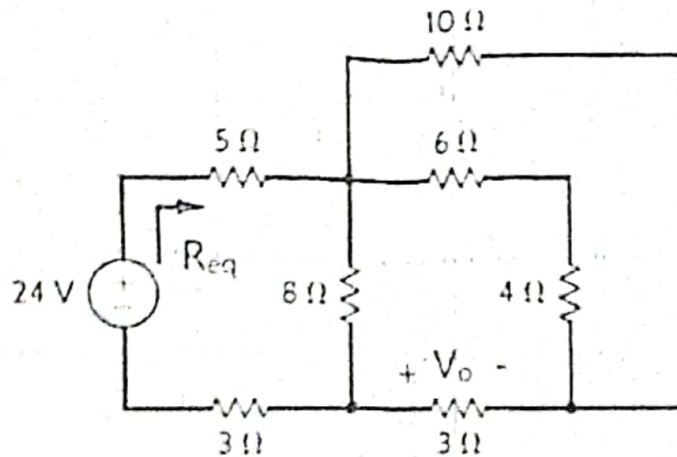
$$V_0 = \frac{16}{16+24} \cdot 4$$

$$= 1.6V \;\#$$

Model answer

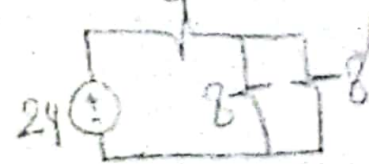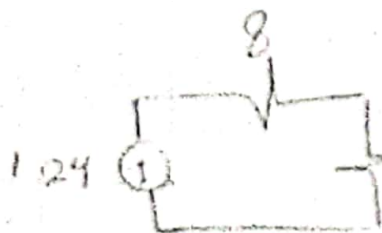| Name.	Application #	Tutorial

Consider the circuit in Figure. Using circuit reduction, voltage and current division, find the value of R_{eq} and the voltage V_0
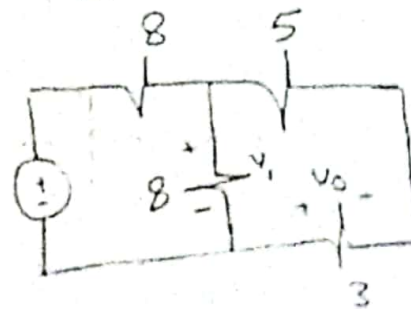
$$V_1 = \frac{4}{4+8} * 24 = 8 \ \textcircled{v}$$

$$V_0 = \frac{3}{3+5} * V_1 = \frac{3}{8} * 8 = 3 \ \textcircled{v}$$
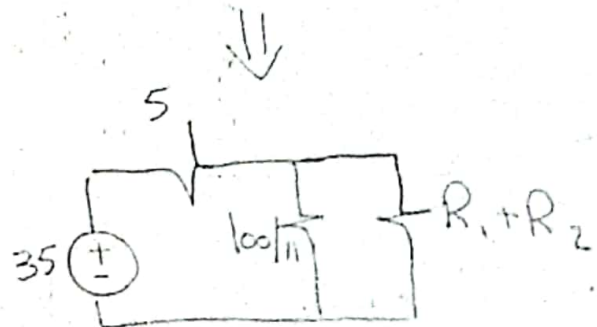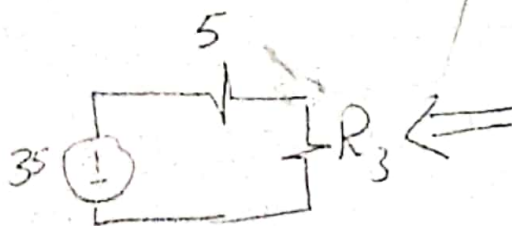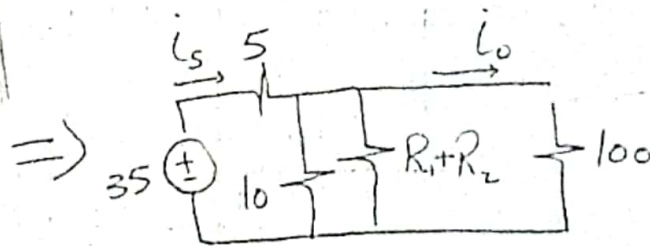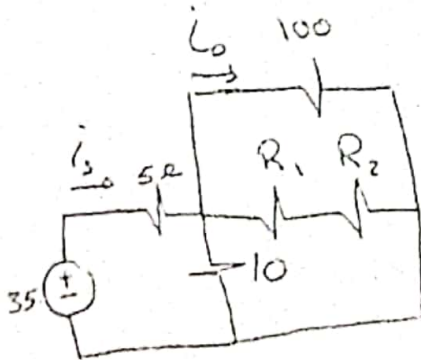
$$R_{eq} = 8 + 4 = 12 \ \Omega$$

Model answer

Name:	Application #:	Tutorial:

Consider the circuit in *Figure*, __Using circuit reduction, voltage and current division__, if $R_{eq}=11\ \Omega$ Calculate R and i_o

1. $R_1 = \dfrac{24 \times 12}{24 + 12} = 8\ \Omega$

$R_2 = \dfrac{20R}{20+R}$, $\qquad R_1 + R_2 = 8 + \dfrac{20R}{20+R} = \dfrac{28R + 160}{20+R}$

$i_s = \dfrac{35}{R_{eq}} = \dfrac{35}{11}$ (A)

$R_3 = (100/11)\ //\ (R_1 + R_2)$

$\dfrac{1}{R_3} = \dfrac{11}{100} + \dfrac{1}{R_1 + R_2} = \dfrac{11}{100} + \dfrac{20+R}{28R + 160}$

$\qquad = \dfrac{308R + 1760 + 2000 + 100R}{2800R + 16000}$

$\qquad = \dfrac{408R + 3760}{2800R + 16000} = \dfrac{1}{R_3}$

$R_3 = \dfrac{2800R + 16000}{408R + 3760}$, $\qquad R_{eq} = R_3 + 5 = 11$

$R_3 = 6 = \dfrac{2800R + 16000}{408R + 3760}$

$2448R + 22560 = 2800R + 16000$

$6560 = 352R$

$\qquad R = 18.63636\ \Omega$

$R_1 + R_2 = \dfrac{28 \times 18.63636 + 160}{20 + 18.63636} = 17.65$

$i_6 = \dfrac{6.38}{100 + 6.38} \times i_s$

$\qquad = 0.0599 \times \dfrac{35}{11} = 0.191$ (A)