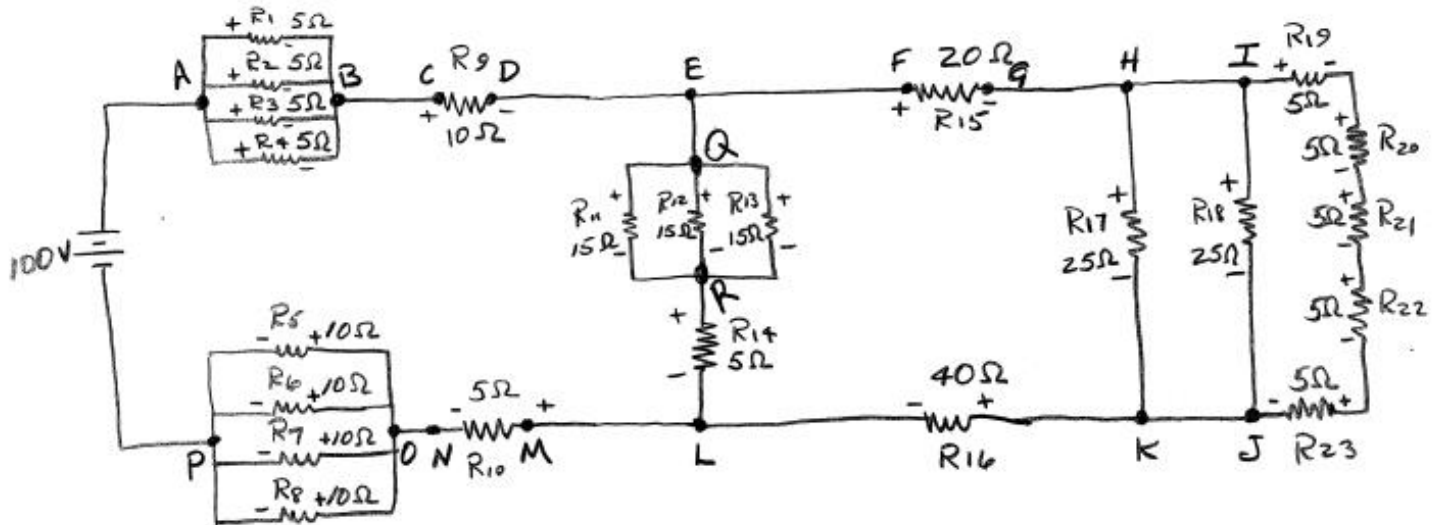




## Basic Electricity – Unit 6: Other Basic Circuit Fundamentals

### Lab 3

Instructions: Solve the following circuit.

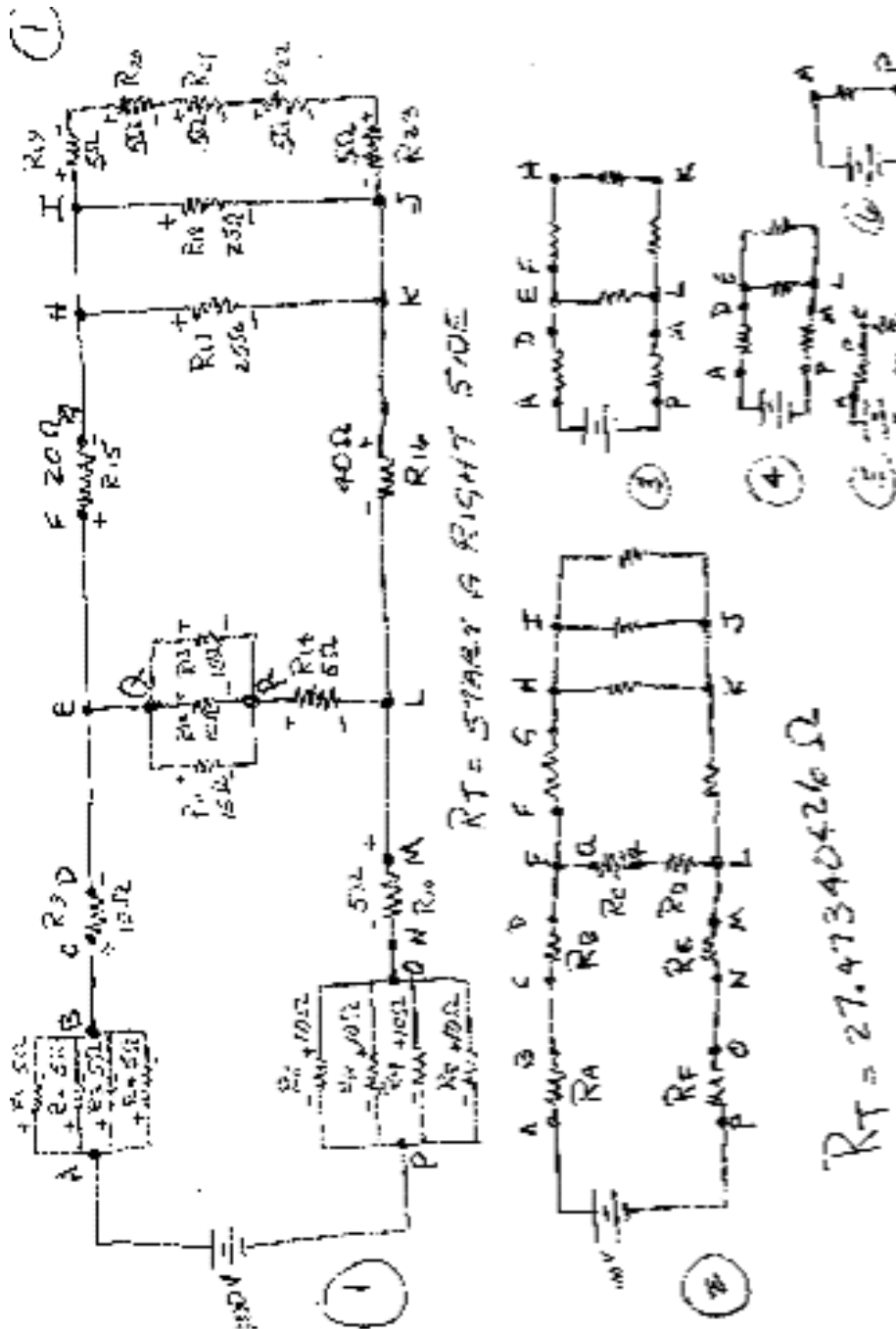




## Basic Electricity – Unit 6: Other Basic Circuit Fundamentals

### Lab 3

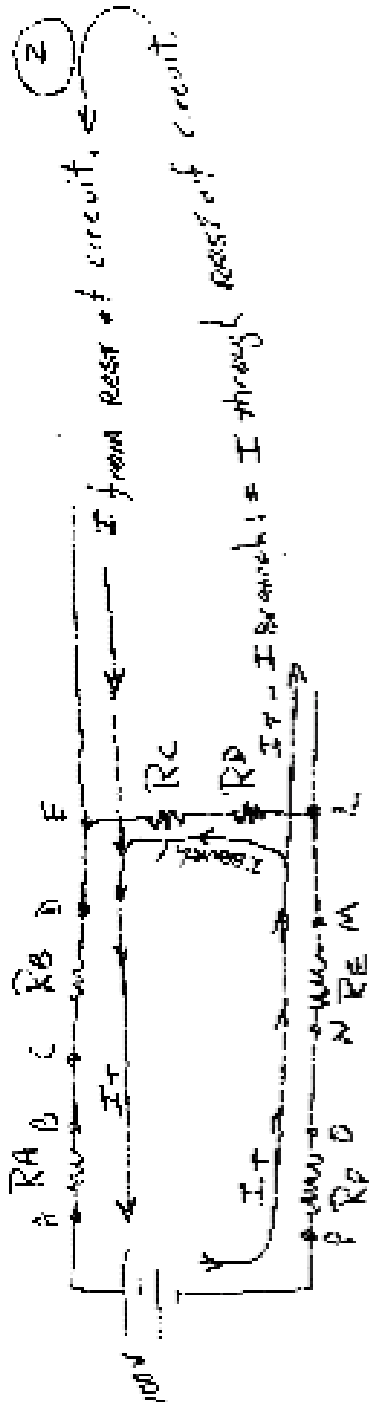
Solution:





## Basic Electricity – Unit 6: Other Basic Circuit Fundamentals

### Lab 3



Since  $I_T$  flows through  $R_A$ ,  $R_B$ ,  $R_C$ , and  $R_E$

CALC  $I_T$ .

$$I_T = \frac{V_T}{R_T} = \frac{100V}{24,973.0926\Omega} = 4.004259851 A$$

therefore...

$$I_T \times R_A = V_A = (4.004259851 A) \times (1.5\Omega)$$

$$I_T \times R_B = V_B = (4.004259851 A) \times (0.1\Omega)$$

$$I_T \times R_C = V_C = (4.004259851 A) \times (2.5\Omega)$$

$$I_T \times R_E = V_E = (4.004259851 A) \times (5.0\Omega)$$





## Basic Electricity – Unit 6: Other Basic Circuit Fundamentals

### Lab 3

3

$V_A = 5,005324819 \text{ V}$   
 $V_B = 40,04253851 \text{ V}$   
 $V_F = 10,01064963 \text{ V}$   
 $V_E = 20,02129925 \text{ V}$

$V_A = V_1 = V_2 = V_3 = V_4$  . . . Since these resistors are in parallel.

$V_B = V_9$  . . . . . from Diagram

$V_F = V_5 = V_6 = V_7 = V_8$  . . . Since these resistors are in parallel.

$V_E = V_{10}$  . . . . . from Diagram

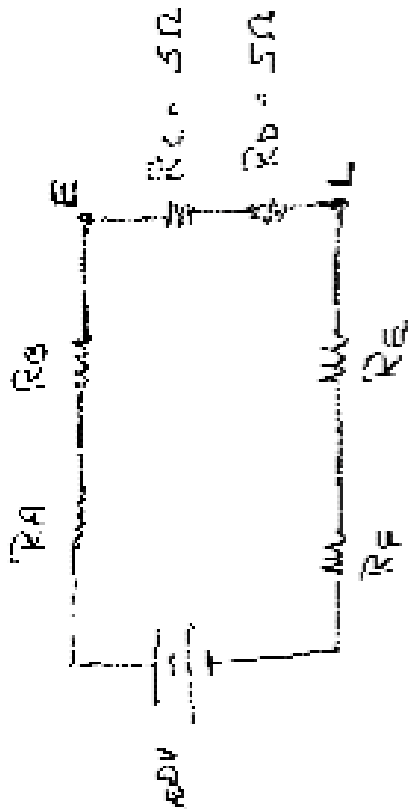




## Basic Electricity – Unit 6: Other Basic Circuit Fundamentals

### Lab 3

4



$$E_T - V_A - V_B - V_C - V_D - V_E = (V_L + V_0)$$

$$100V - 5.005224P19V - 40.64259857V - 10.01064963V - 20.02129V$$

$$(V_L + V_0) = 24.92012779V$$

**STEP 2**

this is voltage across point E to L.  
To find  $V_L$  and  $V_0$  find current through them

$$I_L = I_D = \frac{V_{EHL}}{R_{EHL}} = \frac{24.92012779V}{10\Omega} = 2.492012779A$$





## Basic Electricity – Unit 6: Other Basic Circuit Fundamentals

### Lab 3

To Find  $V_C$  and  $V_D$  ( )

$$V_C = I_C \times R_C = (2.4602012779 \text{ A}) \times (5\Omega) = 12.4600639 \text{ V}$$

$$V_D = I_D \times R_D = (2.4602012779 \text{ A}) \times (5\Omega) = 12.4600639 \text{ V}$$

As per answer sheet for finding  $V_C$  and  $V_D$

$$\text{Since } V_C = V_D \text{ so } \boxed{5799 \text{ V}}$$

$$V_C + V_D = 24.92012779 \text{ V}$$

Since both resistors are 5Ω. Divide

$$(V_C + V_D) \text{ by } 2 = 12.4600639 \text{ V.}$$

This also implies that  $V_1 = V_2 = V_3 = V_C$  since parallel

and  $V_D = V_4$  from diagram





## Basic Electricity – Unit 6: Other Basic Circuit Fundamentals

### Lab 3

So far what has been determined is ...

$E_T = 100V$ $R_T = 27,473,409.26 \Omega$ $I_T = 4,007,257.851 A$	$R_4 = 5 \Omega$ $V_4 = 5,005,324.814 V$ $I_4 = ?$	$R_8 = 10 \Omega$ $V_8 = 10,010,649.63 V$ $I_8 = ?$	$R_9 = 10 \Omega$ $V_9 = 10,010,649.63 V$ $I_9 = ?$	$R_{10} = 5 \Omega$ $V_{10} = 20,021,299.26 V$ $I_{10} = I_T = 4,007,257.851 A$
$R_1 = 5 \Omega$ $V_1 = 5,005,324.814 V$ $I_1 = ?$	$R_5 = 10 \Omega$ $V_5 = 10,010,649.63 V$ $I_5 = ?$	$R_6 = 10 \Omega$ $V_6 = 10,010,649.63 V$ $I_6 = ?$	$R_7 = 10 \Omega$ $V_7 = 10,010,649.63 V$ $I_7 = ?$	$R_{11} = 15 \Omega$ $V_{11} = 12,005,653.5 V$ $I_{11} = ?$





## Basic Electricity – Unit 6: Other Basic Circuit Fundamentals

### Lab 3

⑦

$$R_{12} = 15\Omega \quad R_{14} = 5\Omega$$

$$V_{12} = 12,4600639\text{V} \quad V_{14} = 12,4600639\text{V}$$

$$I_{12} = ? \quad I_{14} = 2,492012775\text{A}$$

$\therefore I_1, I_2, I_3, I_4, I_5, I_6, I_7, I_8, I_9, I_{10}, I_{11}, I_{12}$   
NEED TO BE FOUND

USING OHM'S LAW

$$I_1 = \frac{V_1}{R_1} \quad I_2 = \frac{V_2}{R_2} \quad I_3 = \frac{V_3}{R_3} \quad I_4 = \frac{V_4}{R_4} \quad I_5 = \frac{V_5}{R_5} \quad I_6 = \frac{V_6}{R_6}$$

$$I_7 = \frac{V_7}{R_7} \quad I_8 = \frac{V_8}{R_8} \quad I_9 = \frac{V_9}{R_9} \quad I_{10} = \frac{V_{10}}{R_{10}} \quad I_{11} = \frac{V_{11}}{R_{11}} \quad I_{12} = \frac{V_{12}}{R_{12}}$$

AFTER CALCULATIONS:

$$I_1 = 1,001064963\text{A} \quad I_7 = 1,001064963\text{A}$$

$$I_2 = 1,001064963\text{A} \quad I_8 = 1,001064963\text{A}$$

$$I_3 = 1,001064963\text{A} \quad I_9 = 1,001064963\text{A}$$







## Basic Electricity – Unit 6: Other Basic Circuit Fundamentals

### Lab 3

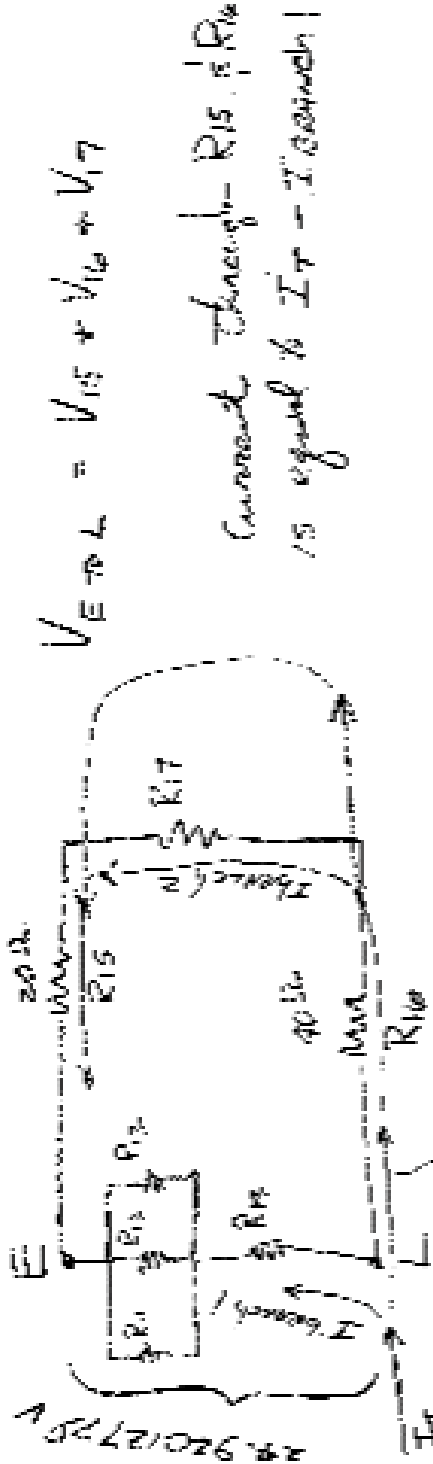
8

$$I_1 = .850670526 \text{ A}$$

$$I_{12} = .830672526 \text{ A}$$

$$I_{13} = .830672526 \text{ A}$$

Loop #2



$$V_{E-TO-L} = V_{15} + V_{16} + V_{17}$$

Current through  $R_{15}$  is  $R_{16}$   
is equal to  $I_{17} - I_{18}$

$$I_{17} - I_{18} = \text{I rest of current (A)}$$





## Basic Electricity – Unit 6: Other Basic Circuit Fundamentals

### Lab 3

②

$$I_T = I_{R_{15}} = I_{R_{16}} = I_{R_{17}}$$

$$4.00 \times 259.51 \text{ A} = 2.492012779 \text{ A} \\ = 1.512247072 \text{ A}$$

$$= I_{R_{15}} = I_{R_{16}}$$

then from ohm's law

$$(I_{R_{15}}) \times (R_{15}) = V_{R_{15}} = 30.29994144 \text{ V}$$

$$(I_{R_{16}}) \times (R_{16}) = V_{R_{16}} = 60.48988288 \text{ V}$$

$$V_{R_{15}} + V_{R_{16}} = 90.78982432 \text{ V}$$

$$\text{then } V_{R_{17}} = V_{R_{15}} + V_{R_{16}}$$





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## **Basic Electricity – Unit 6: Other Basic Circuit Fundamentals**

### *Lab 3*

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