

# **Circuit Simulation (Lab 11)**

*Proteus Simulation Lab*

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## 1.0 PURPOSE

- Using Proteus to simulate circuits.
- Identify (if any) errors in calculations.

## 2.0 EQUIPMENT NEEDED

- (1x) computer for Proteus software.

## 3.0 THEORY

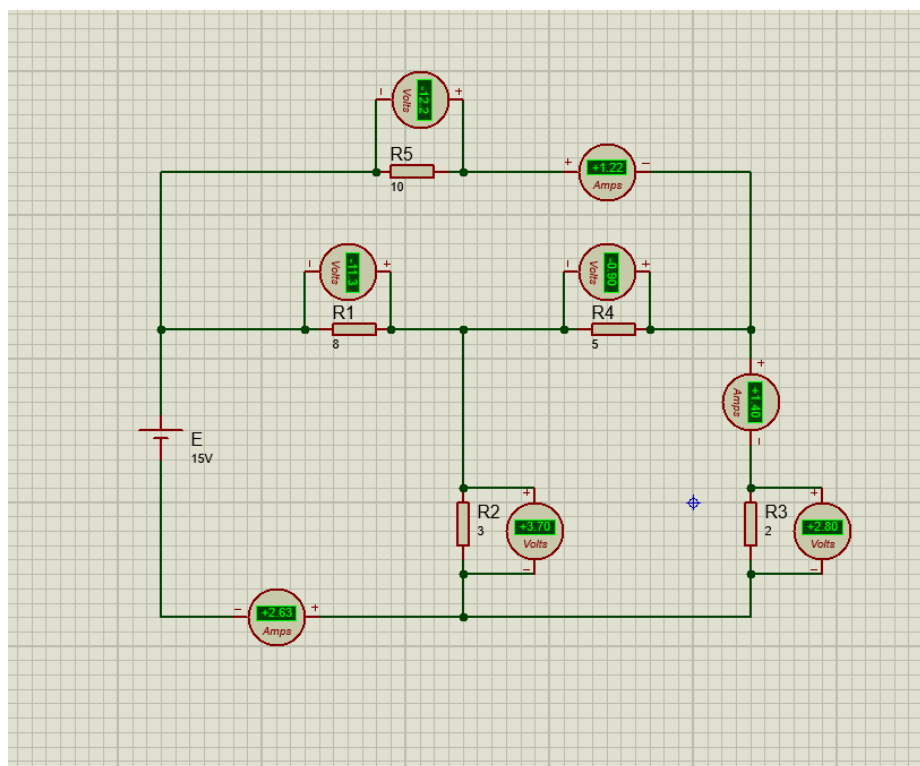
### *Using the Proteus software*

- Referring to various **tutorials** and **videos**, we applied that knowledge to simulate the circuits below.

## 4.0 EXPERIMENTAL RESULTS

### *Results from the Procedure section:*

#### Mesh Circuit:



**Mesh Equation:**

$$\begin{bmatrix} R_{11} & R_{12} & R_{13} \\ R_{21} & R_{22} & R_{23} \\ R_{31} & R_{32} & R_{33} \end{bmatrix} * \begin{bmatrix} I_1 \\ I_2 \\ I_3 \end{bmatrix} = \begin{bmatrix} V_1 \\ V_2 \\ V_3 \end{bmatrix}$$

$$R * I = V$$

(Substituting)

$$\begin{bmatrix} 11 & -3 & -8 \\ -3 & 10 & -5 \\ -8 & -5 & 23 \end{bmatrix} * \begin{bmatrix} I_1 \\ I_2 \\ I_3 \end{bmatrix} = \begin{bmatrix} 15 \\ 0 \\ 0 \end{bmatrix}$$

$$R^{-1} * V = I$$

$$\begin{bmatrix} \frac{205}{1168} & \frac{109}{1168} & \frac{95}{1168} \\ \frac{109}{1168} & \frac{189}{1168} & \frac{79}{1168} \\ \frac{1168}{95} & \frac{1168}{79} & \frac{1168}{101} \end{bmatrix} * \begin{bmatrix} 15 \\ 0 \\ 0 \end{bmatrix} = \begin{bmatrix} I_1 \\ I_2 \\ I_3 \end{bmatrix}$$

$$I_1 = 2.63A$$

$$I_2 = 1.39A$$

$$I_3 = 1.22A$$

**Voltage across resistors:**

$$R_1 : \frac{8\Omega(15V)}{8\Omega+3\Omega} = 11V$$

$$R_2 : \frac{3\Omega(15V)}{3\Omega+8\Omega} = 4V$$

$$R_3 : V = I * R \\ = 1.39A * 2\Omega$$

$$V = 2.78V$$

$$R_4 : V = I_3 * R_4 \\ = 1.22A * 5\Omega \\ = 6.10$$

$$V = I_2 * R_4 \\ = 1.39A * 5\Omega \\ = 6.95$$

$$V = 6.10 - 6.95$$

$$V = -0.85V$$

$$R_5 : V = I * R \\ = 1.22A * 10\Omega$$

$$V = 12.2V$$

## **5.0 CONCLUSION**

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- Purpose of this lab has been achieved.
- Understood the software *Proteus*.
- Understood how to run simulations using *Proteus*.
- Understood how to check for errors.
- Learned some advanced features in *Proteus*.