Module name: **Electrical Circuits 1**
Module ID: **IS-FEE-10070W**
Module type: **Class**
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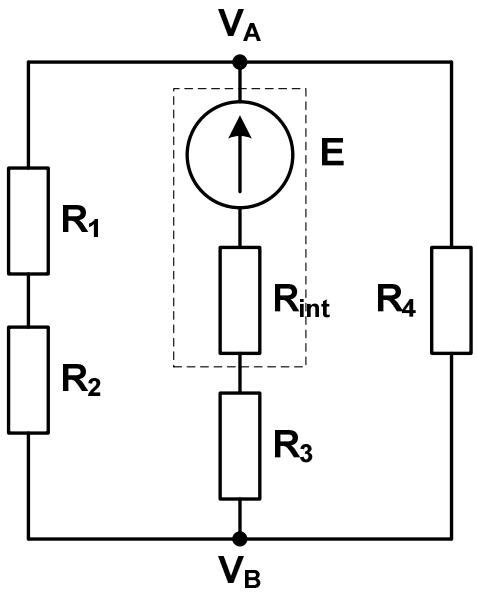
Class 06 (18.11.2024)

1. Measure the internal resistance of a **9V** battery using the following method:
   - **Step 1:** Use a multimeter to measure the battery's voltage, **E**.
   - **Step 2:** Measure the actual resistance of a **R = 220 Ω** resistor with a multimeter. Connect this resistor in series with the battery and then measure the voltage **U** across the resistor.
   - **Step 3:** Calculate the battery's internal resistance, $\mathbf{R_{int}}$, using the following formula:

$$R_{int} = R \cdot \frac{E - U}{U}$$

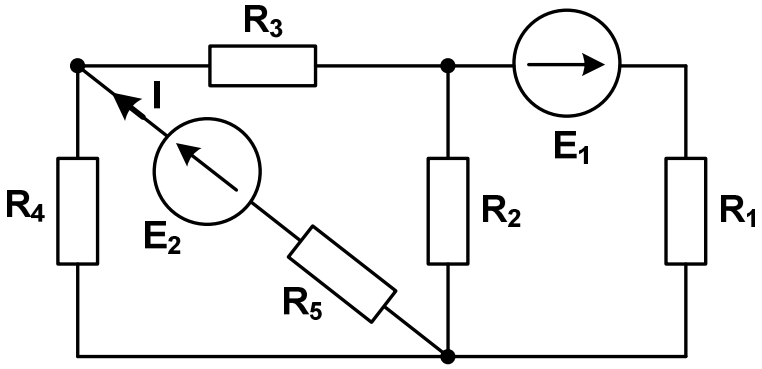
2. Measure the actual resistances of the resistors: R_1 = 220 Ω, R_2 = 100 Ω, R_3 = 470 Ω, R_4 = 470 Ω. Using these measured values and **9V** battery, calculate the potential $\mathbf{V_A}$ with the **Node-Voltage Method**. Consider two cases: a) R_{int} = 0 Ω, and b) R_{int} as the value calculated in problem no. 1.

   Build the circuit shown in the figure. Using a multimeter, measure the voltage between points $\mathbf{V_A}$ and $\mathbf{V_B}$, and compare the measured results with the calculated values.



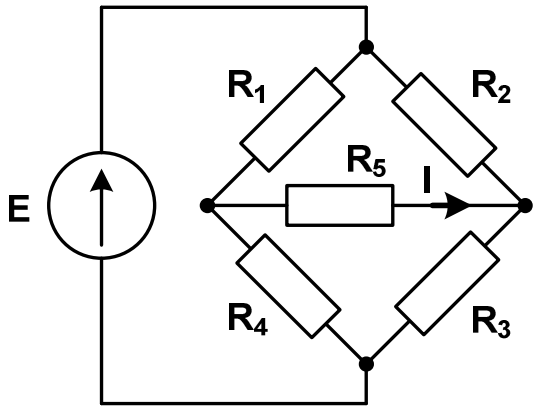
3. Calculate the power dissipated in resistor R_5 using **Thevenin's theorem**.

$R_1 = 2\ \Omega$, $R_2 = 3\ \Omega$, $R_3 = 4\ \Omega$,
$R_4 = 2\ \Omega$, $R_5 = 6\ \Omega$,
$E_1 = 14$ V, $E_2 = 20$ V.



4. What should be the minimum power rating of resistor **R_5** in the circuit shown in the figure?
Use **Thevenin's theorem**.

$R_1 = 4\ \Omega$, $R_2 = 12\ \Omega$, $R_3 = 4\ \Omega$,
$R_4 = 4\ \Omega$, $R_5 = 1\ \Omega$, $E = 12$ V



5. Use **Thevenin's theorem** to determine the voltage source **E_5** that will make the current through **R_3** equal to **0 A**.

$R_1 = R_4 = 1\ \Omega$, $R_2 = R_3 = 2\ \Omega$,
$J_4 = 1$ A, $E_1 = 3$ V