

Recitation 3

Note: All the examples from Chapter III are included in this recitation.

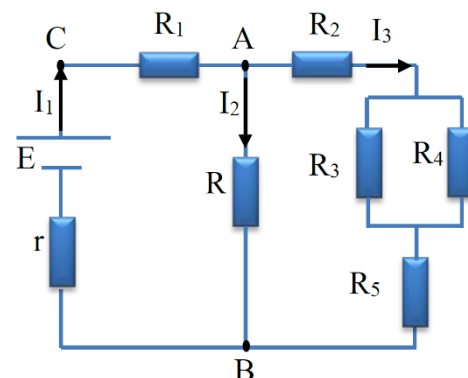
Exercises will be covered in lecture class

Exercise 1

We give the circuit in Figure below with:

$E = 40V$, $r = 1\ \Omega$, $R_1 = R_3 = R_4 = 4\ \Omega$, $R_2 = 3\ \Omega$, $R_5 = 5\ \Omega$, $R = 10\ \Omega$

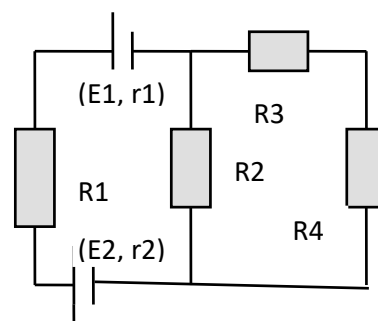
- 1- Simplify the circuit by calculating the equivalent resistance of all the resistors: R , R_2 , R_3 , R_4 and R_5 .
- 2- Calculate the current I_1 delivered by the generator.
- 3- Calculate the voltage $V_A - V_B$ and deduce the currents I_2 (circulating in R) and I_3 (circulating in R_2).
- 4- Calculate $V_C - V_B$ and deduce the efficiency of the generator E .
- 5- Calculate the total power dissipated by Joule effect throughout the circuit.

**Exercise 2**

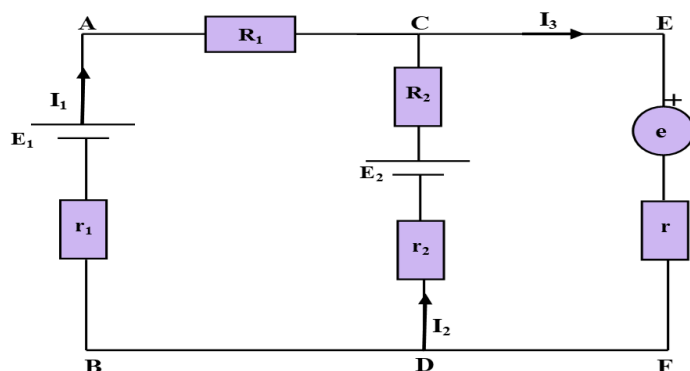
We consider the circuit below, and we are given the following values:

$(E_1 = 8V, r_1 = 0.5\ \Omega)$; $(E_2 = 4V, r_2 = 0.4\ \Omega)$, $R_1 = R_2 = 30\ \Omega$, $R_3 = 50\ \Omega$, and $R_4 = 20\ \Omega$.

- 1- Calculate the current intensities in each branch.
- 2- Calculate the efficiency of the generators.

**Exercise 3**

Consider the following electrical circuit:



as given:
 $(E_1 = 12V, r_1 = 1\ \Omega)$,
 $(E_2 = 6V, r_2 = 2\ \Omega)$,
 $(e = 3V, r = 2\ \Omega)$,
 $R_1 = 5\ \Omega$,
 $R_2 = 4\ \Omega$

- 1- Calculate I_1 , I_2 , and I_3 , the currents flowing through each branch.
- 2- Determine the power dissipated by Joule effect in generator E_2 .
- 3- Calculate the voltage drops: V_{AB} and V_{CA} .
- 4- Calculate the efficiency of generator E_1 and receiver e .

Exercise 4

Given the elements of the electrical circuit below:

$$R_1=5\Omega, R_2=4\Omega, R_3=20\Omega, r_m=r_{g1}=r_{g2}=1\Omega, E_1=20V, E_2=5V, e = 4V$$

- 1- Using the method of fictitious currents (Mesh Current Analysis), calculate i_1 , i_2 , and i_3 and deduce the actual currents flowing in each branch.
- 2- Calculate the voltage differences V_A-V_G , V_H-V_F , V_D-V_E , and V_C-V_D .
- 3- Calculate the energy dissipated in R_3 .
- 4- Calculate the efficiency of each generator and the motor.

