University of Tlemcen
Faculty of Sciences
Department of Mathematics

A.Y: 2024/2025
1st year LMD-M and MI

Série de TD N° 4
ELECTROCINETIQUE

Exercise 1

Consider the circuit shown in the figure below:

1- Calculate the equivalent resistance of the circuit.

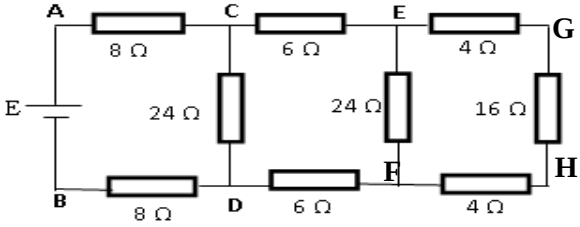
2- Given the generator voltage E=56V, calculate the current I delivered by the generator, specifying the direction of flow.

3- Calculate the voltage V_{AC} between points A and C, and deduce the current in branch CD.

4- Calculate the voltage V_{EF} between points E and F, and deduce the current in the EF branch.

5- Calculate the current in branch GH, and deduce the voltage V_{GH} between points G and H.

6- Calculate the power P supplied by source E.



Exercise 2

Consider the circuit shown in Figure 3:

1- Calculate the currents flowing through the three resistors and the current generated by the generator.

2- Put the three resistors and the generator together, as shown in figure 4.

- Calculate I_1, I_2 and I_3.
- Find the current I_1 using the equivalent circuit resistance.

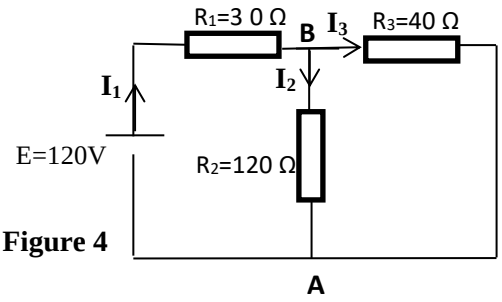


Figure 4

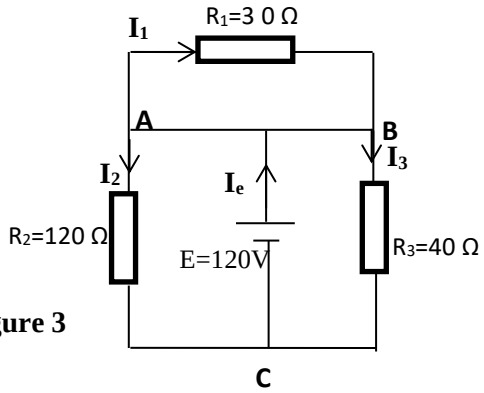
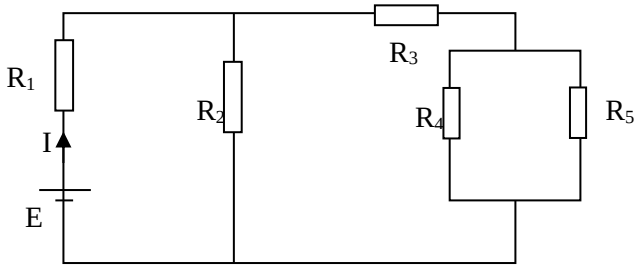


Figure 3

Exercise 3

Consider the circuit shown in the following diagram:



1- Calculate the value of the current I delivered by the generator, using Kirchhoff's two laws.

2- Find the value of the current I, using the equivalent resistance of the circuit.

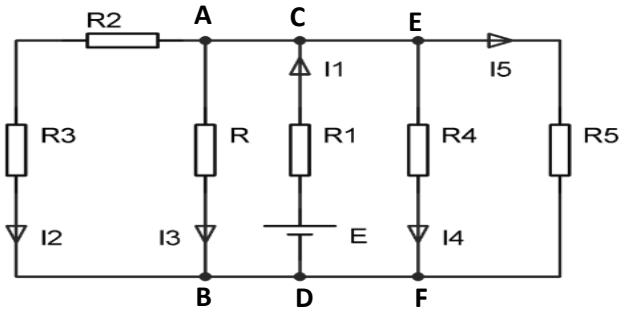
3- Determine the potential difference (p.d.d) across R_2 and deduce the power generated by this resistor (R_2).

4- Find the currents flowing through resistors R_4 and R_5.

We give: E=12V, R_1=2Ω, R_2=20Ω, R_3=16Ω, R_4=6Ω, R_5=12Ω

Exrcise 4

Consider the following circuit:



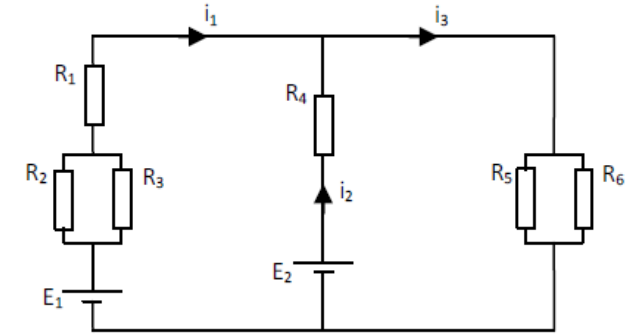
We give : R_1= 1kΩ ,R_2= 2kΩ ,R_3= 4kΩ ,R_4=R_5=3kΩ ;
The voltage across the resistance R_2 is,U_{R2}= 8v ,and the current I_3= 2mA .

Calculate E et R.

Exercise 5

The following circuit has six resistors (R_1=10Ω, R_2=20Ω, R_3=20Ω, R_4=5Ω, R_5=6Ω, R_6=3Ω) and two generators (E_1=20v, E_2=10v).

1- Simplify the electrical circuit by calculating the equivalent resistances.
2- Calculate the currents I_1, I_2 and I_3 using Kirchoff's laws.



Supplementary exercise

Consider the circuit shown in the following figure:
We give E_1=12V, E_2=8V, r_1= r_2=1Ω, R_1=4 Ω, R_2=3 Ω, R_3=5 Ω and C=2μF.
1- Assuming the capacitor is fully charged, calculate the currents I_1, I_2 and I_3 using Kirchoff's laws.
2- Calculate the potential difference between points A and B.
3- Calculate the capacitor charge Q. What energy is stored in the capacitor?
4- What is the power released by resistance R_3?