REPUBLIQUE ALGERIENNE DEMOCRATIQUE ET POPULAIRE MINISTERE
DE L'ENSEIGNEMENT SUPERIEUR ET DE LA RECHERCHE SCIENTIFIQUE
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Faculty of Technology

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Module : Electronique Fondamentale 1

TD 1 : Conti nuo us regime and fundamental theorems

Exercise N°1 : Current divider

From the circuit in Figure 1 opposite, determine
1/ The equivalent resistance seen from points a and b.
2/ The current supplied by source Vf.
3/ the current flowing through each of the resistors R1 and R2.
Data : $V_f = 18V$, $R_1=7\Omega$, $R_2= 2\Omega$

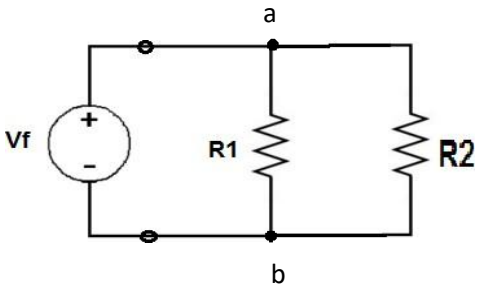


Figure 1

Exercise N°2 : Voltage divider

Determine for the circuit in Figure 2 below, by applying the voltage divider, the current i flowing through resistor R2 and the voltage u across resistor R3:
Data : E= 6 V, $R_1= 100\ \Omega$, $R_2= R_3 = R_4 = 50\ \Omega$

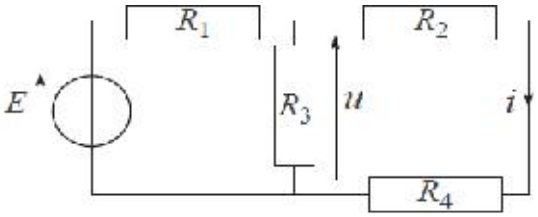


Figure 2

Exercise N°3 : Linear circuit

1) n the circuit in Figure 3 opposite:
2) 1) Calculate UEF,
3) 2) Calculate the intensity I0 flowing in the main branch.
4) 3) Calculate the intensity I' flowing in the branch containing the generator E' (specify its direction);
5) 4) Calculate the intensities i1, i2 and i3.
Data : R = 1Ω, ***E***= 5V et ***E'*** = 3V.

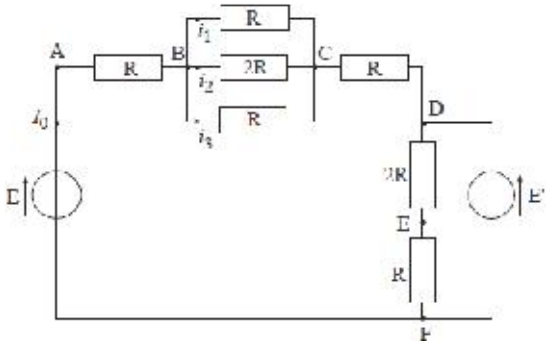


Figure 3

Exercice N°4 : KIRCHHOOF Voltage Law (KVL)

Determine the currents of the meshes i_1 and i_2 in the circuit of the **Figure 4**

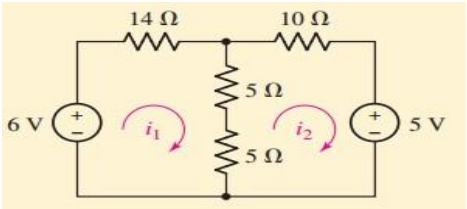
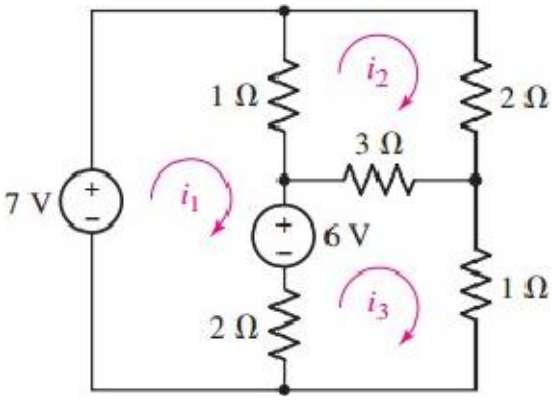


Figure 4

Figure 5

Exercise N°5 : Kramer's method

Use mesh analysis to determine the mesh currents of the circuit **Figure 5**



Exercise N°6 : Kirchhoff / Superposition / Millman

Calculate the current intensity in branch AB of Figure 6 by applying:
1) Kirchhoff's laws.
2) The superposition theorem.
3) Millman's theorem

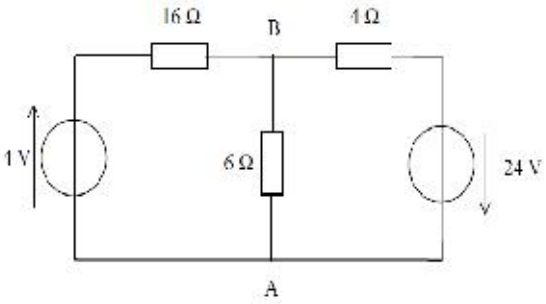
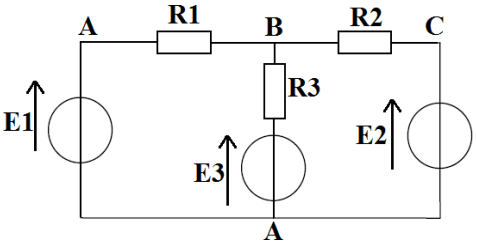


Figure 7

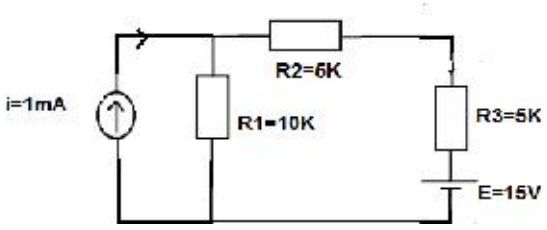
Exercise N°7: Superposition

The circuit includes two generators (E1 = 20 V, R1 = 3 Ω, E2 = 15 V, R2 = 4Ω) supplying a motor (E3 = 8 V R3 = 5 Ω) Figure 7.
Determine the value of the current intensity in R3 by applying the superposition theorem.



Exercice N°8 : Superposition

Using the superposition theorem, determine the voltage across resistor R1 in Figure 8.



Exercise N°9 : Voltage source – current source transformation

Consider the assembly in Figure 9 below.
Calculate the electric current I flowing through the operating resistance RU.

Data : I_1 = 2 mA, I_2 = 5 mA , R_1 = 10 kΩ et R_2 = 5 kΩ.

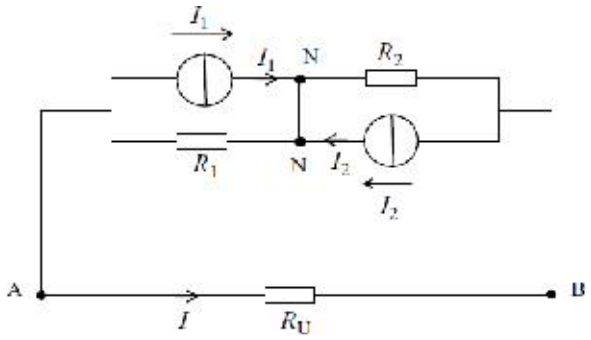


Figure 9

Exercice N°10 : Voltage source – current source transformation

1- Reduce the circuit of Figure 10 to an equivalent dipole comprising a voltage source Veq in series with a resistor Req (dipole "equivalent voltage source").
2. If we connect to port 11' a load resistor RL = 10 Ω, calculate the power absorbed by RL.

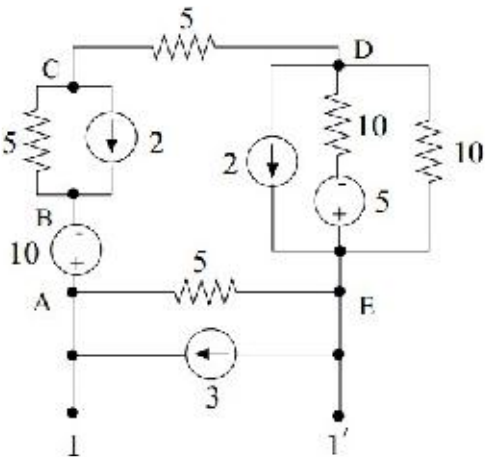


Figure 10

Exercise N°11 : THEVENIN

Determine the Thevenin generator of the following Figure 11, without taking into account the resistance R.

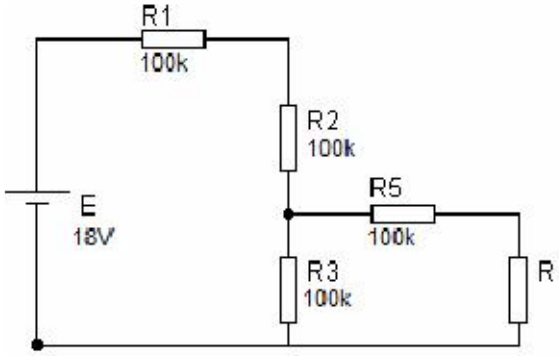
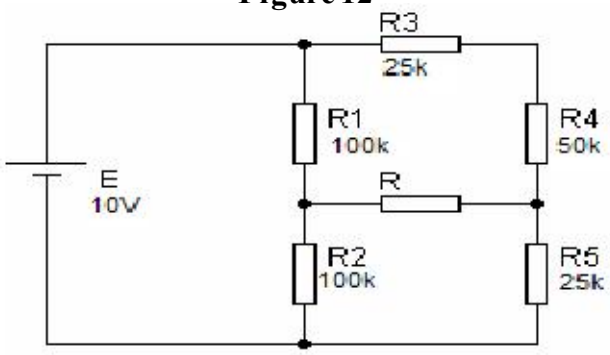


Figure 11

Exercise N°12 : THEVENIN

In the assembly of Figure 12 below, determine the current I flowing in the resistor R= 100k. R= 100k.

Figure 12



Exercise N°13 : THEVENIN

Give the Thevenin generator of Figure 13 below, without taking into account the resistance R.

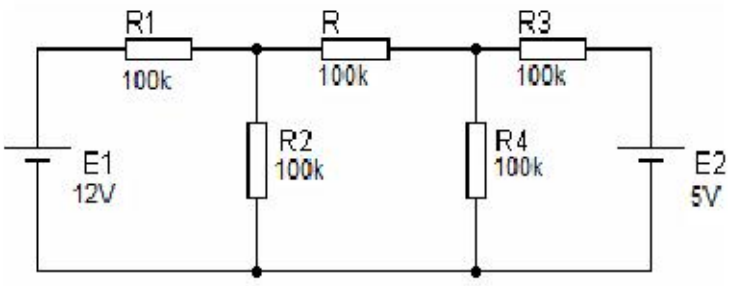


Figure 13

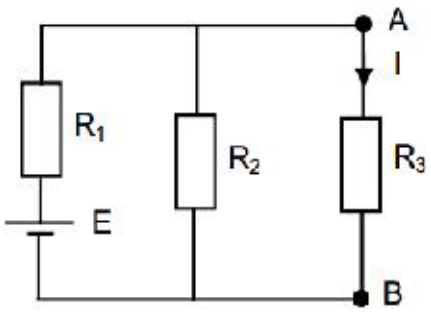
Exercise N°14 : NORTON

Consider the electrical circuit given by Figure 14 below:

We give: E = 8 V; R1= 4 Ω; R2= 12 Ω; R3= 9 Ω

Calculate the current I which crosses the resistor R3 by applying Norton's theorem.

Figure 14



Exercise N°15 : NORTON

Consider the electrical circuit given by Figure 15 below: We give: E1= 10V; E2= 5V; R1= R3= R4= 100 Ω; R2= 50 Ω. Calculate the current I by applying Norton's theorem,

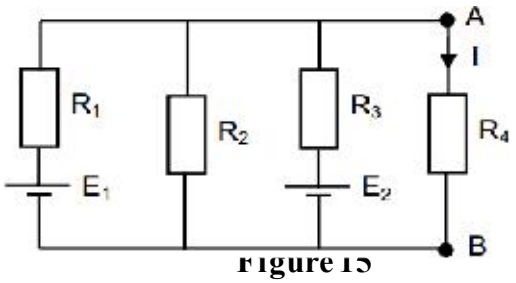


Figure 15

Exercice N°16 NORTON

Consider the electrical circuit given by Figure 16 below: We give: E1= 10V; E2= 2V; R1= 60 Ω; R3= 120 Ω; R4= 180 Ω; R2= 240 Ω; R5 = 90 Ω. Calculate the current I by applying Norton's theorem,

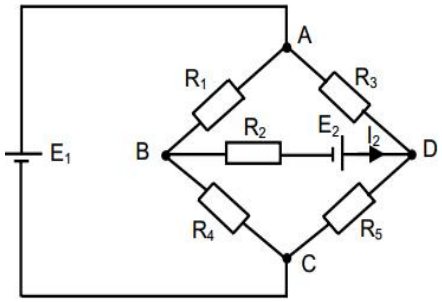


Figure 16

Exercise N°17 KENNELY

Determine the equivalent resistance RT of the dipole AD of the following network using the network conversion rules. R1 = 2Ω, R2 = 4Ω, R3 = 6Ω, R4 = 5Ω, R5 = 4Ω. Figure 17.

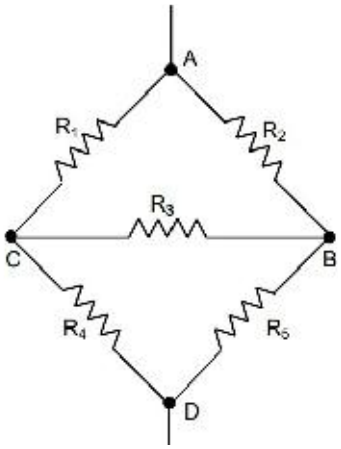


Figure 17

Exercise N°18 Controlled source

Calculate the value of the voltage source Vs in Figure 18 if the current Iφ is equal to 5 A.

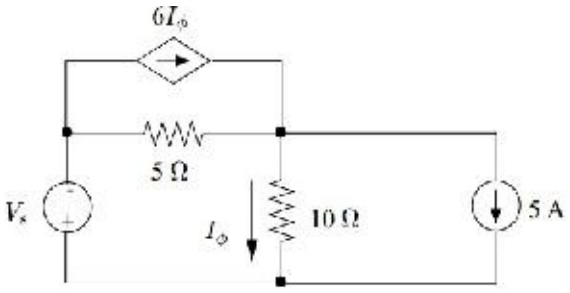


Figure 18

Exercise N°19 Controlled source

Determine the current i_1 in the circuit of the **Figure 19**

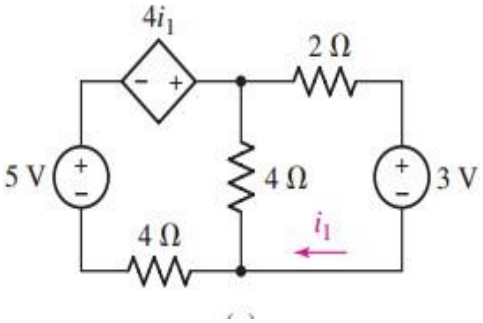


Figure 19

Exercise N°20 Controlled source

Applying the superposition theorem, determine the current i_x in Figure 20

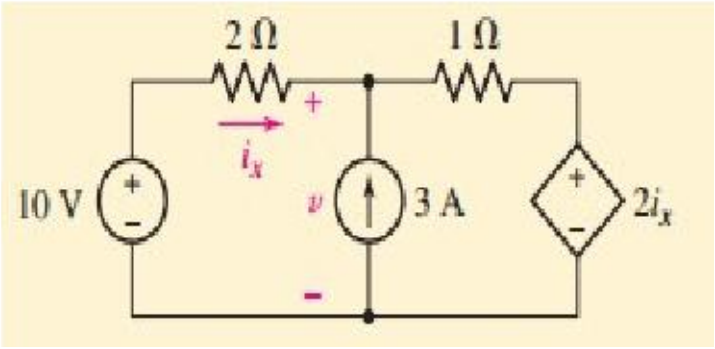


Figure 20