Electronics exam

DC circuit bases: Definitions, Laws and Theorems [2526_I_INF_FISE_S01_CN_OAC]

Calculators and documents are forbidden. Scoring scale is given as a guide

Answers exclusively on the subject. If you need more space, you can use the back of the pages.

Exercise 1 : Questions on the lecture (3 points – no negative score for the MCQ)

For each question, choose the right answer:

Q1. What is an orderly movement of electrical charges?

a- A current

b- A voltage

c- A resistance

d- None of the answers above

Q2. A potential difference between 2 points is:

a- A current

b- A voltage

c- A resistance

d- None of the answers above

Q3. The intensity of a current exiting a generator is equal to the intensity of the current entering it

a- TRUE

b- FALSE

Q4. If two dipoles are crossed by the same current, they can be associated:

a- In series

b- In parallel

Q5. If two dipoles are in the same loop, they can be associated:

a- In series

b- In parallel

c- None of these

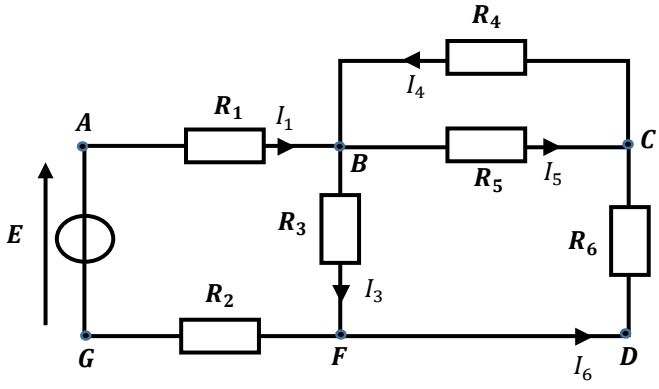
Q6. Consider the electrical circuit on the opposite. Choose the right sentence:

a- R_1 and R_2 are in series

b- R_2 and R_3 are in parallel

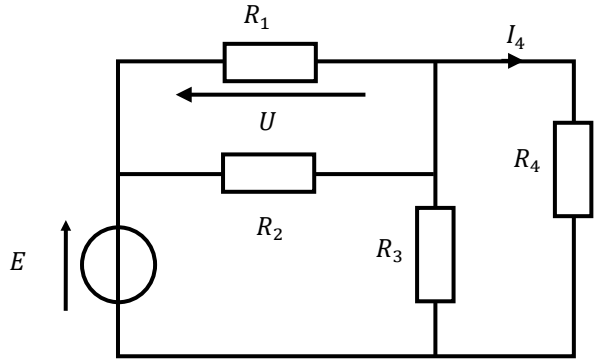
c- R_3 and R_6 are in parallel

d- R_5 and R_2 are in parallel



Exercise 2 : Associations of resistors and voltage dividers (9 points)

Consider the electrical circuit on the opposite.



in this circuit, how many there are:

a. Nodes?

b. Branches?

c. Loops?

1. Can we associate R_1 and R_2 ? if yes, give the expression of the resistance R_{12} equivalent to this association. Redraw the scheme.

2. Can we associate R_3 and R_4 ? if yes, give the expression if the resistance R_{34} equivalent to this association. Redraw the scheme.

3. Can we associate R_{12} and R_{34} ? if yes, give the expression of the resistor R_{eq} equivalent to this association. Redraw the scheme.

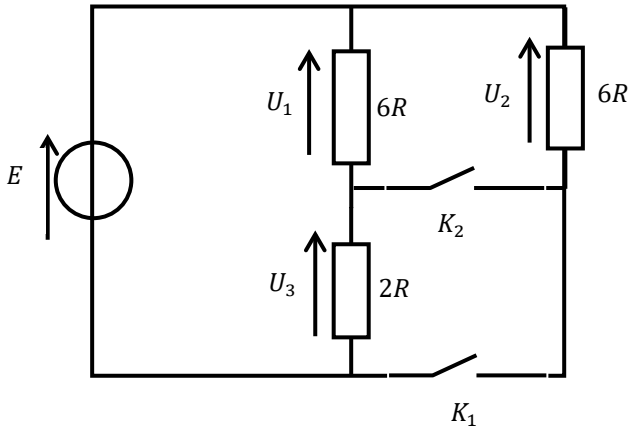
4. Determine the expression of the voltage U in terms of E, R_{12} and R_{34}, then in terms of E, R_1, R_2, R_3 and R_4.

5. Determine the expression of the intensity of the current I_4 crossing the resistor R_4 in terms of E, R_1, R_2, R_3 and R_4.

6. Numerical application: We set $R_1 = R_2 = 2k\Omega$, $R_3 = R_4 = 1k\Omega$ and $E = 15V$. What is the value of U ? What is the value of I_4 ?

Exercise 3 : Kirchoff laws (9 points)

Consider the following circuit:



Preliminary note: the expected responses depend on the positions of the switches and are independent of each other: it is therefore not a 'large' exercise but 4 'small exercises' from the same diagram. Redraw the circuits on your draft to be able to correctly answer the questions, and, ***start with the cases that seem the simplest to you!***

The voltage E and the resistance R are supposed known.

Fill in the following table (result only, not details of calculations). The requested voltages should **ONLY depend on E and/or the resistances R** (unless a result is equal to zero!). **The requested voltages do NOT depend on each other!!**

Ask yourself the right questions ... you will have the right answers!!

K_1	K_2	U_1	U_2	U_3
O	*O*			
O	*C*			
C	*O*			
C	*C*			

NB : O = Open

C = Closed