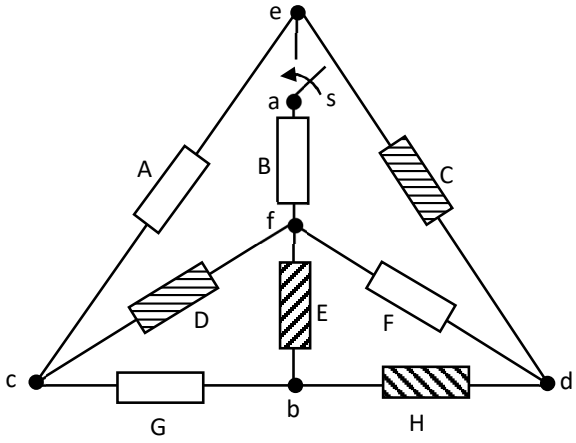
Third Test, Introduction to Electrical Technology, November 28, 2022, Danilo Rairan, Group: _____

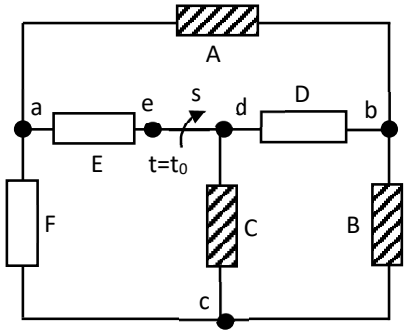
Name: _____ Code: _____

1) Select the polarity of each element in the circuit arbitrarily. If $V_C = -2V_D = 3V_E = -4V_H = 1.5\#$ kV, compute the given $V_?$ ∀t, using stairs-elevator.



2) Define polarities as you wish, if $V_A = \#$ kV, $V_B = 1.3*\#$ kV, $V_C = -0.6V_A$, **a**) Build the **potential diagram** for the circuit ∀t, **b**) Using that diagram compute V_E ∀t. **c**) compute V_s ∀t.

$$Vref = \begin{cases} a, if\ \# = 1,2 \\ b, if\# = 3,4 \\ c, if\# = 5,6,7 \\ d, if\# = 8,9,10 \end{cases}$$



3. La carga eléctrica en un conductor se divide en tres partes y se comporta como el número de estudiantes en una universidad. Primero, decrece a razón de $4k(1 + \#/5)$ por cada año. Luego, por cambios difíciles de explicar, se sabe que si bien el número en cinco años será el mismo de hoy, crecerá 50% dos años más adelante, cuando será $50k(1 + \#/5)$. Por último, y de ahí en adelante, el número es invariante.

a. Haga una gráfica para describir el número de estudiantes.
b. Calcule su ecuación.
c. Calcule y grafique el equivalente a la corriente, $i(t)$.

Nota por punto:

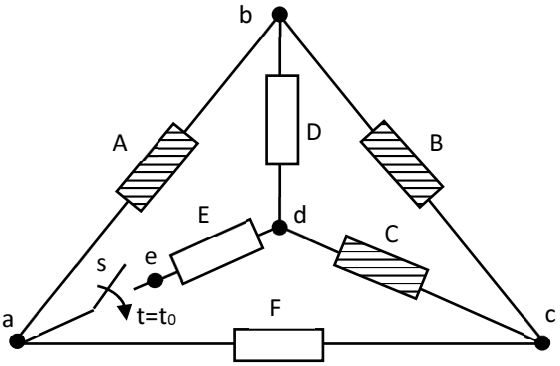
1.	**a**. 1.7	**2.**	**a**. 0.9	**3**.	**a**. 0.4
			b. 0.4		**b**. 0.8
			c. 0.4		**c**. 0.4

Third Test, Introduction to Electricity, February 2, 2021, Danilo Rairán, Group: _____

Name: _____ Code: _____

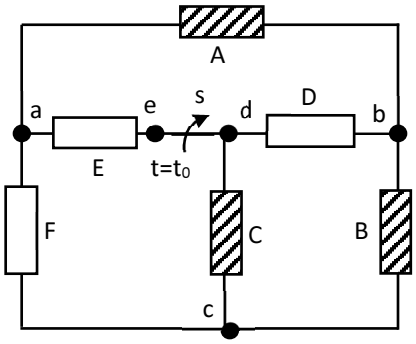
= to be assigned at the beginning of the test

1) Define polarities as you wish, if V_B = -1.5V_C = # kV = 1.5V_A, and **using stairs-elevator** analogy compute:
a) V_E ∀t,
b) V_S ∀t.



2) Define polarities as you wish, if V_A = # kV, V_B = 1.5*# kV, V_C = 0.75V_A, **a**) Build the **potential diagram** for the circuit ∀t, **b**) Using that diagram compute V_E ∀t. **c**) compute V_s ∀t.

$$Vref = \begin{cases} a, if\ \# = 1,2 \\ b, if \# = 3,4 \\ c, if \# = 5,6,7 \\ d, if \# = 8,9,10 \end{cases}$$



3) The counting of electric charge passing through an element in a circuit decreases 0,7 µC/ms until the time equals # ms when the counting was 5,4 µC, then it remains constant for 3 ms and suddenly starts to increase, so that it is 12,4 µC # ms later. **a**) make a model to describe the counting of electric charge; **b**) predict the counting at t = 2# ms, **c**) when is the counting lower than 6,3 µC?

_____

1) a	/0,8	2) a	/1,0	3) a	/0,8
b	/0,8	b	/0,4	b	/0,4
		c	/0.4	c	/0,4

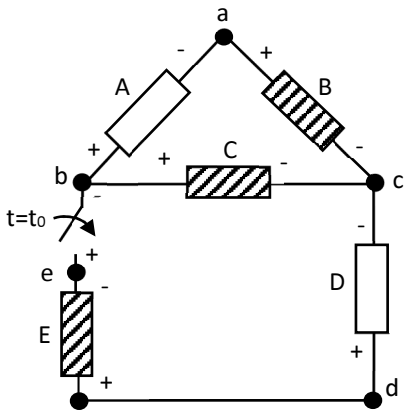
Third Test, Introduction to Electricity, March 10, 2020, Danilo Rairán, Group: _____

Name: _____ Code: _____

= last digit of your code plus one

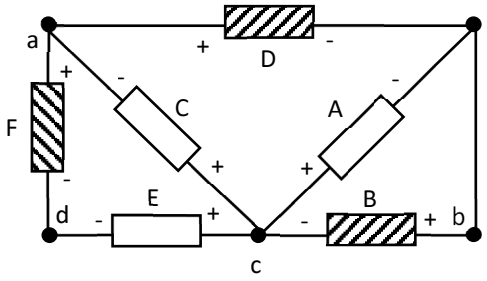
1) Half million cats were devastating the mice population. Nobody knew what was happening until the authorities decided to hire you to make a model. They knew that a year ago there were **#** billion mice, and just two months ago there were **#**/3 billions. Everything changes today because the government decided to call a flautist to take all the cats to another country. If you can predict that the mice population will increase to **#**/4 billions in two months and that they will recover their initial population in six months, **a**) make a model to describe the mice population from Mar/10/2019 to Mar/10/2021; **b**) predict the mice population at May/10/2020, **c**) when is the number of mice lower than #/2 billions? **d**) could an electric current or electric charge behaves like this mice population? Why?

2) if $V_B = -1.25V_C = \#\ kV = 2.5V_E$, and **using stairs-elevator** analogy compute: **a**) V_D $\forall t$, **b**) V_{da} $\forall t$.



3) if $V_F = \#\ kV$, $V_D = 1.5*\#\ kV$, $V_B = 0.75V_F$, **a**) Build the **potential diagram** for the circuit, **b**) Using that diagram compute V_{db}. **c**) V_E.

$$Vref = \begin{cases} a, if\ \# = 1 \\ b, if\# = 2,3,4 \\ c, if\# = 5,6,7 \\ d, if\# = 8,9,10 \end{cases}$$



_____

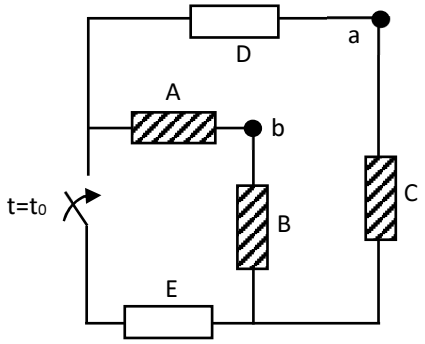
1) a	/0,5	2) a	/0,9	3) a	/0,9
b	/0,4	b	/0,9	b	/0,5
c	/0,4			c	/0,5
d	/0				

Third Test, Introduction to Electricity, July 21, 2020, Danilo Rairán, Group: _____

Name: _____ Code: _____

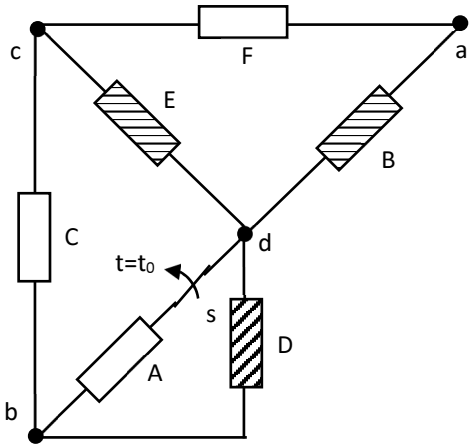
= to be assigned at the beginning of the test

1) Define polarities as you wish, if V_B = -1.5V_C = # kV = 1.5V_A, and **using stairs-elevator** analogy compute: **a**) V_E ∀t, **b**) compute also V_{ab} ∀t.



2) Define polarities as you wish, if V_E = # kV, V_D = 1.5*# kV, V_B = 0.75V_E, **a**) Build the **potential diagram** for the circuit ∀t, **b**) Using that diagram compute V_{ab} for t<t_0. **c**) compute also V_s for t>t_0.

$$Vref = \begin{cases} a, if\ \# = 1,2 \\ b, if \# = 3,4 \\ c, if \# = 5,6,7 \\ d, if \# = 8,9,10 \end{cases}$$



3) Half million cats were devastating the mice population. Nobody knew what was happening until the authorities decided to hire you to make a model. They knew that a year ago there were **#** billion mice, and just two months ago there were **#**/3 billions. Everything changes today because the government decided to call a flautist to take all the cats to another country. If you can predict that the mice population will increase to **#**/4 billions in two months and that they will recover their initial population in six months, **a**) make a model to describe the mice population from Jul/21/2019 to Jul/21/2021; **b**) predict the mice population at Aug/21/2020, **c**) when is the number of mice lower than #/2 billions? **d**) could an electric current or electric charge behave like this mice population? Why?

_____

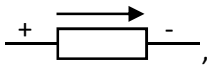
1) a	/0,9	2) a	/0,9	3) a	/0,5
b	/0,9	b	/0,5	b	/0,4
		c	/0,5	c	/0,4
				d	/0

Third Test. Introduction to Technology in Electricity. Code: _____ Group: _____

Danilo Rairán, May/22/2018

Note: # is equal to the last digit of your code plus one.

*The points in each item will be assigned **if and only if** the answer and the process are perfect.*

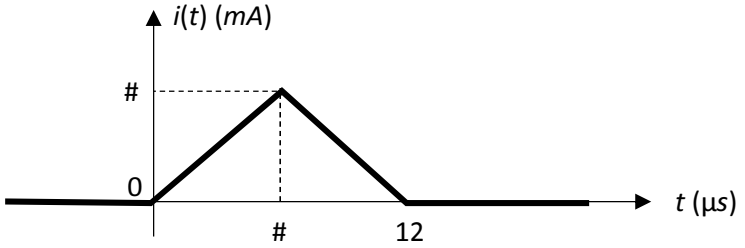
1. Given an electrical element: 

, where $i(t) = \#\frac{dv(t)}{dt}$ compute the equation and plot the graph in each case, as follows:

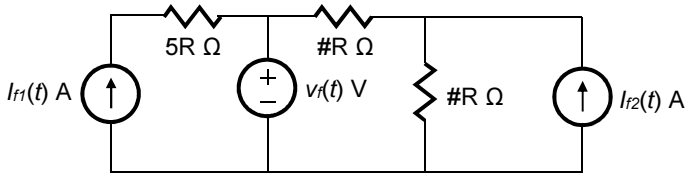
a. *q*(*t*) (0.6 *points*)

b. *v*(*t*) (0.6 *points*)

c. *p*(*t*) (0.6 *points*)



2. Compute the current that passes through the voltage source. (1.7 *points*)

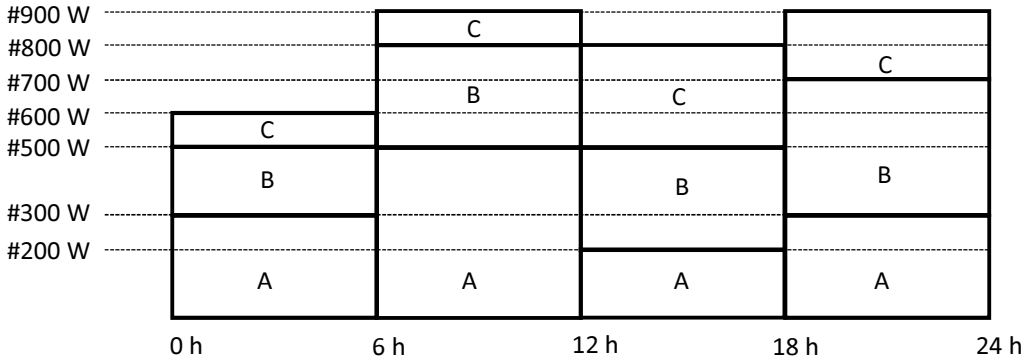


3. Given the power consumption in a factory as shown in the graph, answer each question.

a. Energy consumption for machine B in a day. (0.5 *points*)

b. Total energy cost per month if 1 kWh = $ 600. (0.5 *points*)

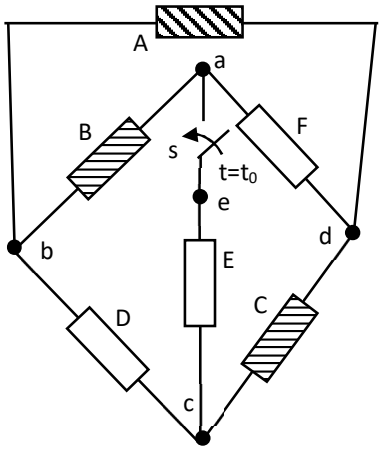
c. if *v* = 110 *V*, plot *i*(*t*) in the machine A for a day. (0.5 *points*)



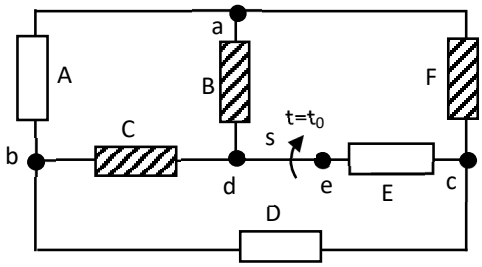
Third Test, Introduction to Electrical Technology, February 24, 2022, Danilo Rairan, Group: _____

Name: _____ Code: _____

1) If $1.1V_A = -2.3V_B = 3.4V_C = \#$ kV, compute the voltage in all the elements of variable voltage, $\forall t$, using stairs-elevator analogy. Polarities will be assigned by the professor during the test.



2) If $V_C = -3V_B = 2V_F = \#$ kV, **a**) plot the potential diagram for the circuit $\forall t$. **b**) Using the potential diagram compute V_{be}. Polarities and reference node will be assigned by the professor during the test.

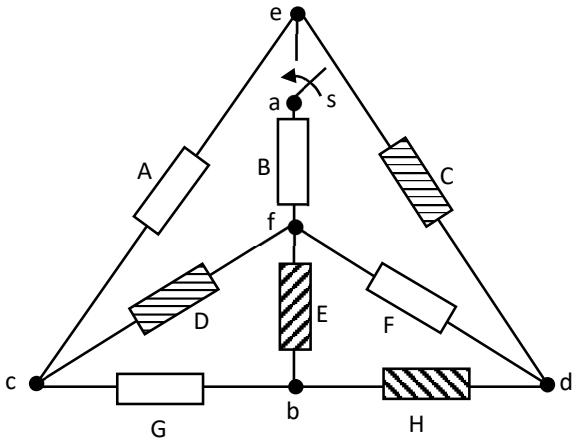


3) The measure of the electric charge passing through a wire changes from 5.4# µC to 12.4# µC to 6.3# µC, at # ms, 2# ms, 3# ms, respectively. Then it decreases at 3.5# µC/ms. **a**) make a model to describe the counting of electric charge; **b**) predict the counting at t = 1.5# ms, **c**) when is the counting lower than 5# µC? **d**) Compute and plot the electric current.

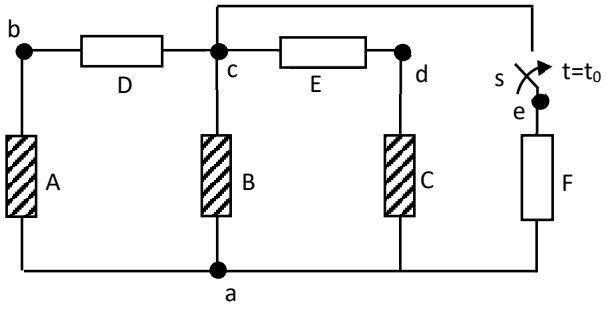
1) /1.6 **2**) /1.3 /0.4 **3**) /0.8 /0.2 /0.3 /0.4

Third Test, Introduction to Electrical Technology, August 31, 2021, Danilo Rairan, Group: _____
Name: _____ Code: _____

1) Select the polarity of each element in the circuit arbitrarily. If $V_C = -2V_D = 3V_E = -4V_H = \#$ kV, compute the given $V_?$ ∀t, using the given method. If you need a reference node, use the node given to you.



2) Select the polarity of each element in the circuit arbitrarily. If $V_A = -2V_B = 3V_C = \#$ kV, compute the given $V_?$ ∀t, using the given method. If you need a reference node, use the node given to you.



=
Methods: Stairs-Elevator or Potential diagram
Question: 1) Vab ∀t or Vad ∀t, 2) Veb ∀t or Vde ∀t
Vref = all possible nodes

1) /2.5 2) /2.5