BASIC ELECTRONICS LAB

ASSIGNMENT # 01

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Class ID: 106293.

Instructions for Assignment

- ***Name, Student I.D, Class I.D must be written as mentioned above.***
- ***Assignment should be done by your own.***
- ***Any case of cheating will lead the marks "0" of both or group of students, e.g same mistakes, copy.***
- ***Assignment should be submitted before dead line, after dead line there is not any acceptance of assignment and marked as "0".***
- ***If needed you have to solve the circuit step by step first show all the calculation and fill the table answer sheet page then simulate the circuit on application or on the softwares as you have been told.***
- ***For accurate result you have to take at least 6 digit after decimal point forcalculation purpose.***
- ***Online simulator (https://www.falstad.com/circuit/) or professional software may beused for simulation.***

ASSIGNMENT:

Q no 1: Find the value of resistance with tolerance by using color code of the following resistances, also identify and show the simulation through which resistancecurrent will pass the maximum and minimum if supply voltage is 20 VDC, insert the screen shots of simulations:

R1 = brown,violet,red,gold R2= brown,brown,orange,silver

R3=red,blue,brown,gold R4= violet,green,red,silver

R5=brown,blue, red,gold R6= blue,green,yellow,silver

Answer:

R1= 1700	**R2= 11000**
R3= 260	**R4= 7500**
R5= 1600	**R6= 650000**
R? FOR MIN. CURRENT = R6	**R? FOR MAX. CURRENT = R3**

CALCULATIONS TO QUESTION #1

OBSERVATIONS/CALCULATIONS:

***R1:**

BROWN , VIOLET , RED , GOLD

1 7 x 100 + - 5%

17x100 = 1700

5% of 1700 = (5/100)x1700 = 85

= > 1700 Ohms + - 85 Ohms

OR

Range (1615 – 1785 Ohms)

***R2:**

BROWN , BROWN , ORANGE , SILVER

1 1 x 1000 + - 10%

11x1000 = 11000

10% of 11000 = (10/100)x11000 = 1100

= > 11000 Ohms + - 1100 Ohms

Range (9900 – 12100 Ohms)

***R3:**

RED , BLUE , BROWN , GOLD

2 6 x 10 + - 5%

26 x 10 = 260

5% of 260 = (5/100)x260 = 13

= > 260 Ohms + - 13 Ohms

Range (247 – 273 Ohms)

***R4:**

VIOLET , GREEN , RED , SILVER

7 5 x 100 + - 10%

75 x 100 = 7500

10% of 7500 = (10/100)x7500 = 750

= > 7500 Ohms + - 750 Ohms

Range (6750 – 8250 Ohms)

***R5:**

BROWN , BLUE , RED , GOLD

1 6 x 100 + - 5%

16 x 100 = 1600

5% of 1600 = (5/100)x1600 = 80

= > 1600 Ohms + - 80 Ohms

Range (1520 – 1680 Ohms)

***R6:**

BLUE , GREEN , YELLOW , SILVER

6 5 x 10 000 + - 10%

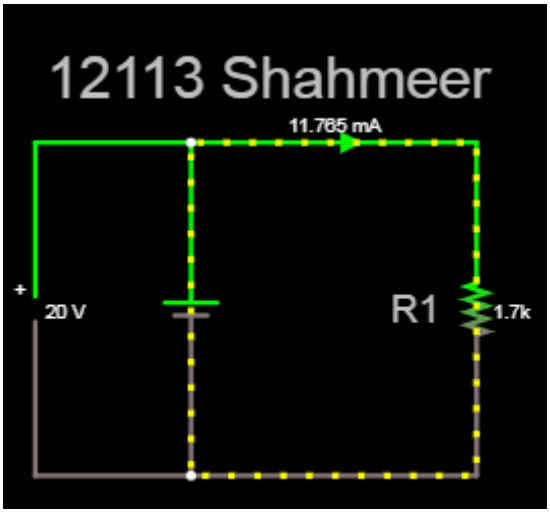
65 x 10 000 = 650000

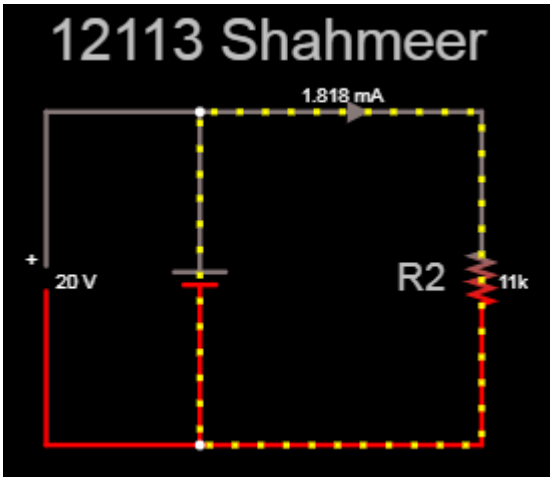
10% of 650000 = (10/100)x650000 = 65000

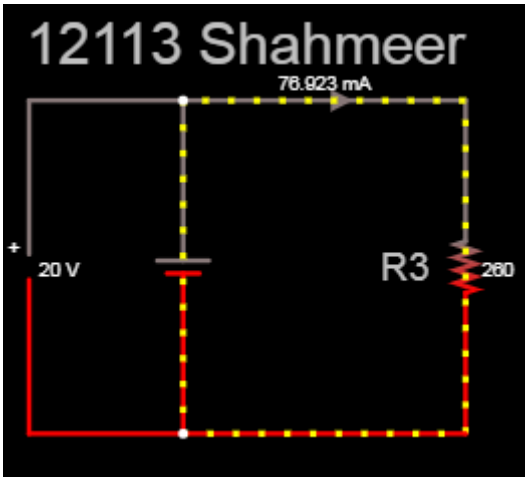
= > 650000 Ohms + - 65000 Ohms

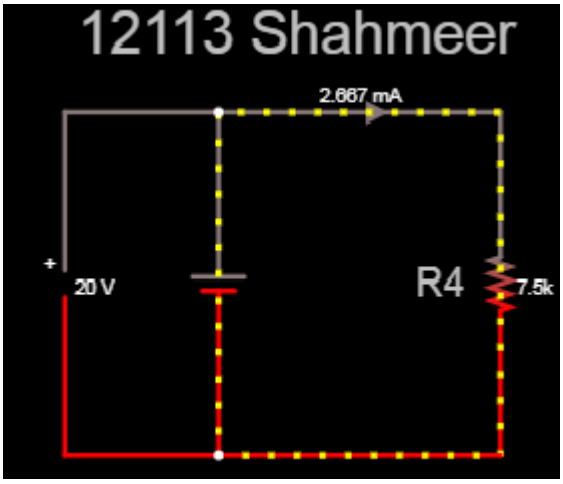
Range (585000 – 715000 Ohms)

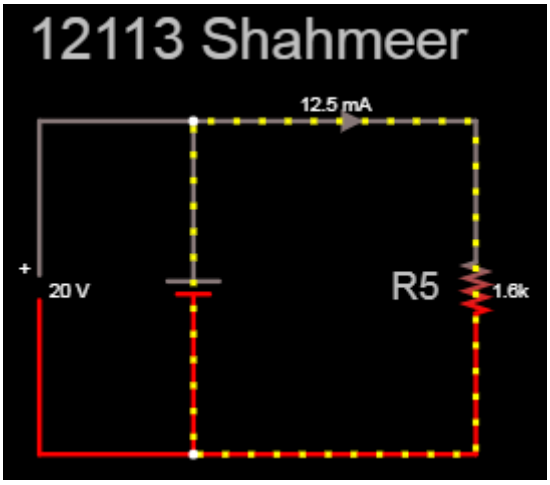
SCREENSHOT OF SIMULATION:

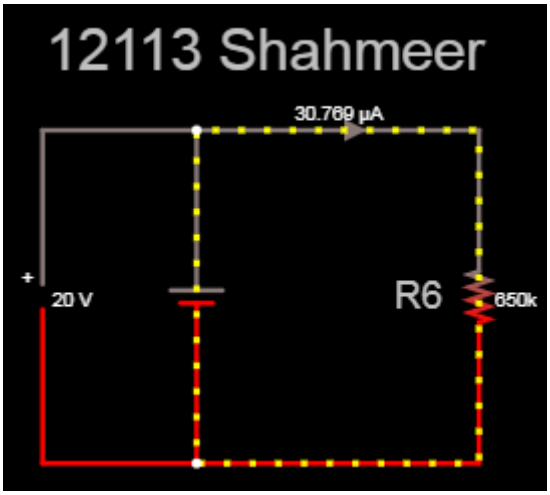


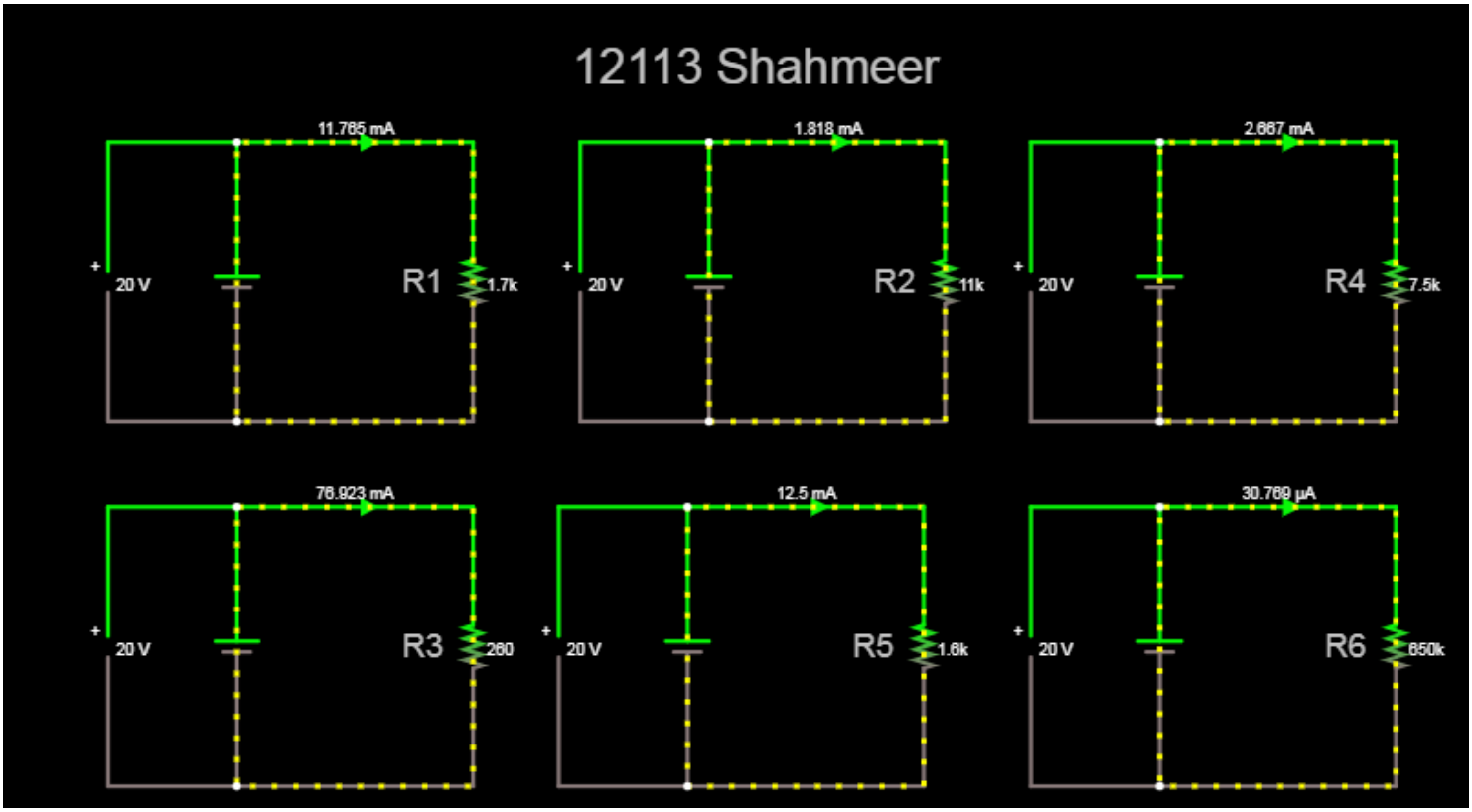



12113 Shahmeer
76.923 mA
+
20 V
R3
260


12113 Shahmeer
2.667 mA
+
20 V
R4
7.5k


12113 Shahmeer
12.5 mA
+
20 V
R5
1.6k


12113 Shahmeer
30.769 µA
+
20 V
R6
650k



Here the simulations above are of the highest current which is passing through R3 and the lowest is passing through R6, so we filled the table above for R? Min. and R? Max. current.

LINK OF THE SIMULATOR FILE:

https://tinyurl.com/ya8zd46p

Q no 2 : Simulate a single circuit of voltage divider for the required voltages V1=3v, V2=5v, V3=7v, V4=9v & V5=10v volts, while the total current is 30 mA and mention the resistance values also fill the table, insert the screen shots of simulation.

Answer:

R1= 100 Ω	**R2= 166.666667 Ω**
R3= 233.333333 Ω	**R4= 300 Ω**
R5= 333.333333 Ω	**Battery V = 34 VOLTS**

ANSWER/CALCULATIONS TO QUESTION#2:

Since, we have to make a voltage Divider circuit, and since we know that in series Circuit, Voltagechanges with each resistance while the current remains the same.
And We also know that to Calculate total voltage flowing through a circuit, we have to calculate the sumof all individual voltages.
Individual Voltages given to us are as follows;

V1 = 3v

V2 = 5v

V3 = 7v

V4 = 9v

V5 = 10v

***Total Voltage:**

Vt = V1 + V2 + V3 +V4 + V5

Vt = 3 + 5 + 7 + 9 + 10

Vt = 34 volts

So, in our Simulator diagram, we set the Voltage Source to 34v.
Now, since we know the total current that will be flowing throughout the circuit, as given in thequestion.

IT = 30 mA.

Or

IT = 0.03 A. (the value which remains constant througout each component in the circuit.
So, now we apply Ohm's Law.

For R1, we use V1 = I R1

V1 = 3v

3 = 0.03 x R1

R1 = 100 Ω

For R2, we use V2 = I R2

V2 = 5v

5 = 0.03 x R2

R2 = 166.666667 Ω

For R3, we use V3 = I R3

V3 = 7v

7 = 0.03 x R3

R3 = 233.333333 Ω

For R4, we use V4 = I R4

V4 = 9v

9 = 0.03 x R4

R4 = 300 Ω

For R5, we use V5 = I R5

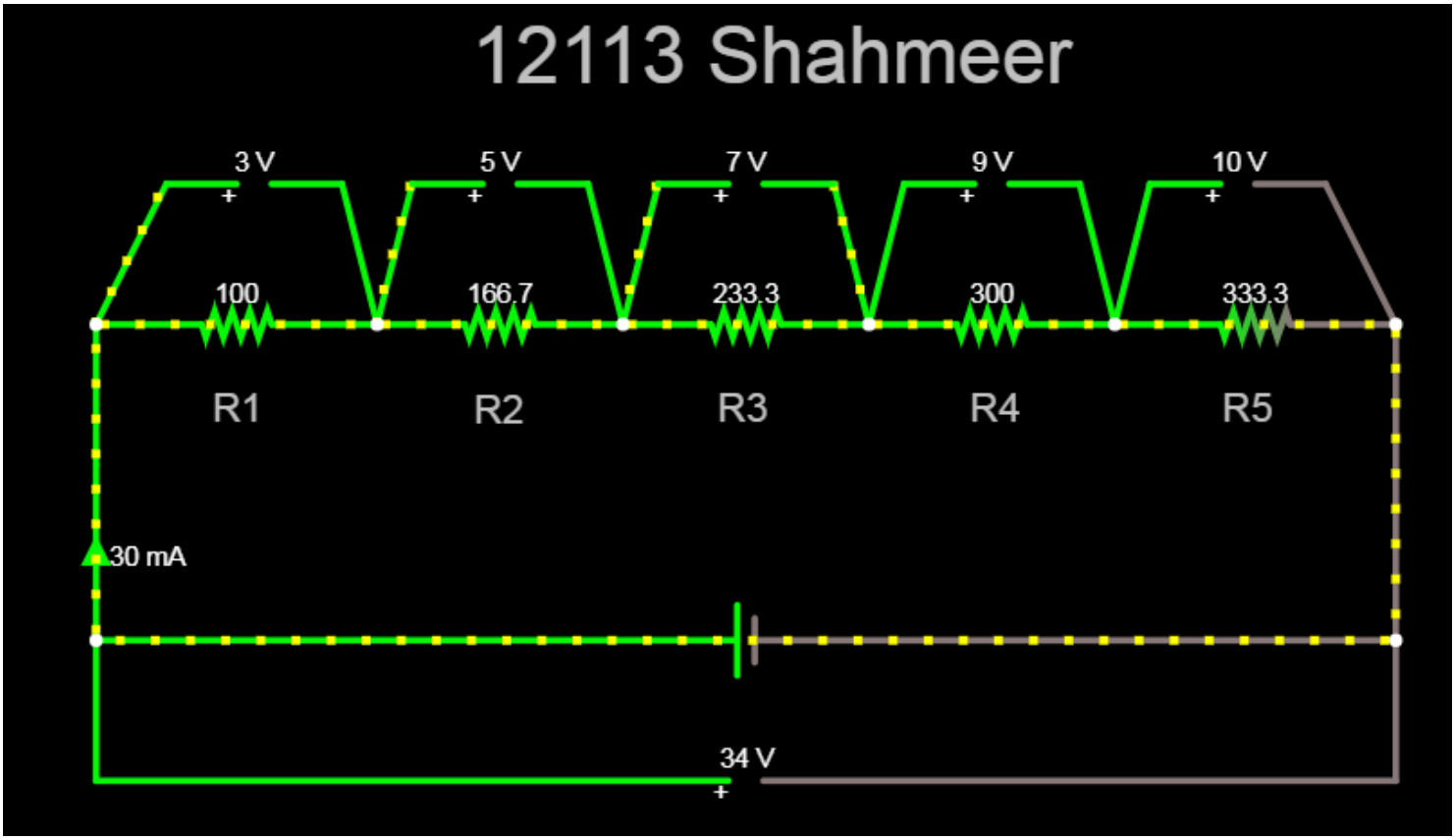
V5 = 10v

10 = 0.03 x R5

R5 = 333.333333 Ω

- **Now we set the above calculated values for Resistance into our Simulatorcircuit to verify.**

SCREENSHOT OF SIMULATION:



LINK OF THE SIMULATION:

https://tinyurl.com/ydhcw54y

Q no 3 : Simulate a single circuit of current divider for the required currents of I1=3mA, I2=5mA,I3=7 mA, I4=9 mA and I5=15 mA, while the supply voltage is 20 V and mention the resistance values, also simulate the circuit, insert the screen shots of simulation.

Answer:

R1= 6666.666667 Ω	**R2= 4000 Ω**
R3= 2857.142857 Ω	**R4= 2222.222222 Ω**
R5= 6666.666667 Ω	**IT= 39 mA**

ANSWER/CALCULATIONS TO QUESTION#3

The current Divider circuit here is a parallel circuit, because as we have studied, due to various (more than 1) paths for the current to follow, the current is divided up throughout the Circuitwire.
But since, Current is Divided, the value of Voltage remains constant througout the circuit. The Voltage Source is given in the

question.Power Supply = 20 v.

Now, since we have 1 fixed value of Voltage througout, and varying values of current(s) givento us in the question, we can calculate the Resistances by using Ohm's Law.
Ohm's Law => V = IR

Where V = 20 (constant)

For R1, we use V = I1 R1

I1 = 3 mA

20 = (3/1000) x R1

20 = 0.003 x R1

R1 = 6666.666667 Ω

For R2, we use V = I2 R2

I2 = 5 mA

20 = (5/1000) x R2

20 = 0.005 x R2

R2 = 4000

For R3, we use V = I3 R3

I3 = 7 mA

20 = (7/1000) x R3

20 = 0.007 x R3

R3 = 2857.142857 Ω

For R4, we use V = I4 R4

I4 = 9 mA

20 = (9/1000) x R4

20 = 0.009 x R4

R4 = 2222.222222 Ω

For R5, we use V = I5 R5

I2 = 5 mA

20 = (15/1000) x R5

20 = 0.015 x R5

R5 = 1333.333333 Ω

So as we have calculated all the resistance values, we fill them into the table above. Now, to calculate Total current, we simply have to apply

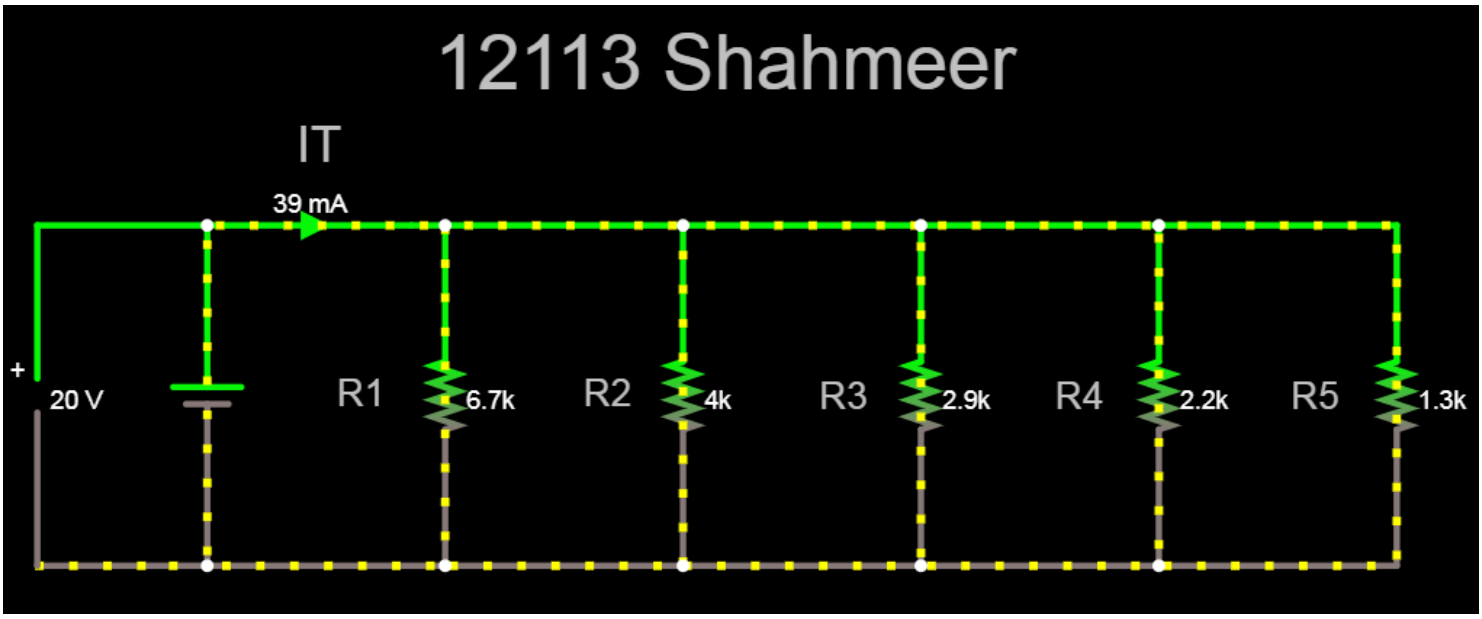
IT = I1 + I2 + I3 + I4 + I5

IT = 3 + 5 + 7 + 9 + 15 =>

IT = 39 mA

We can also verify this value using the simulator.

SCREENSHOT OF SIMULATION:

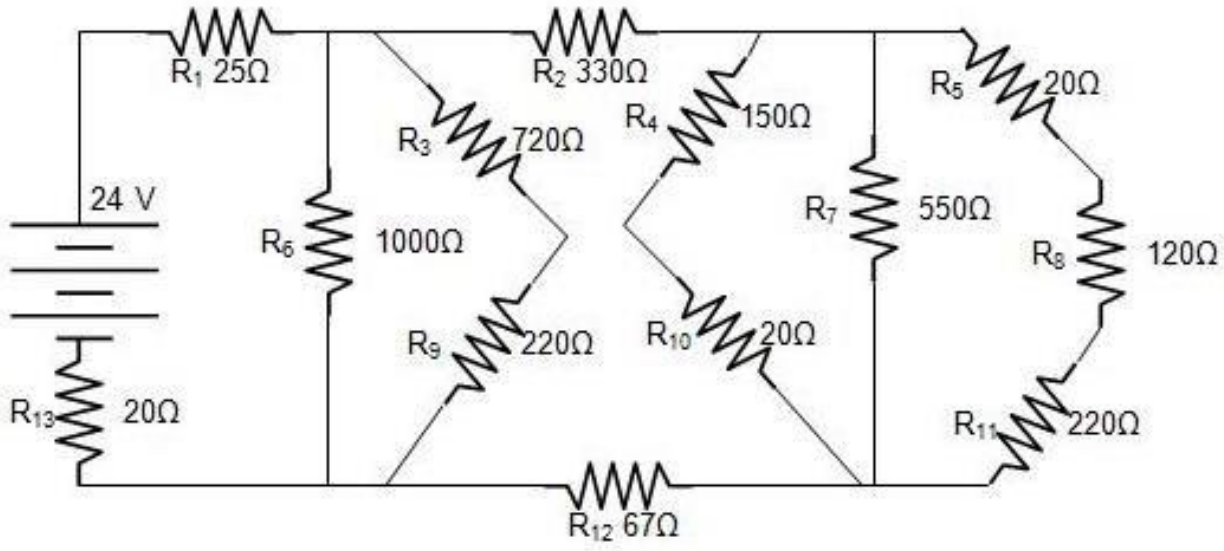


LINK OF THE SIMULATOR FILE:

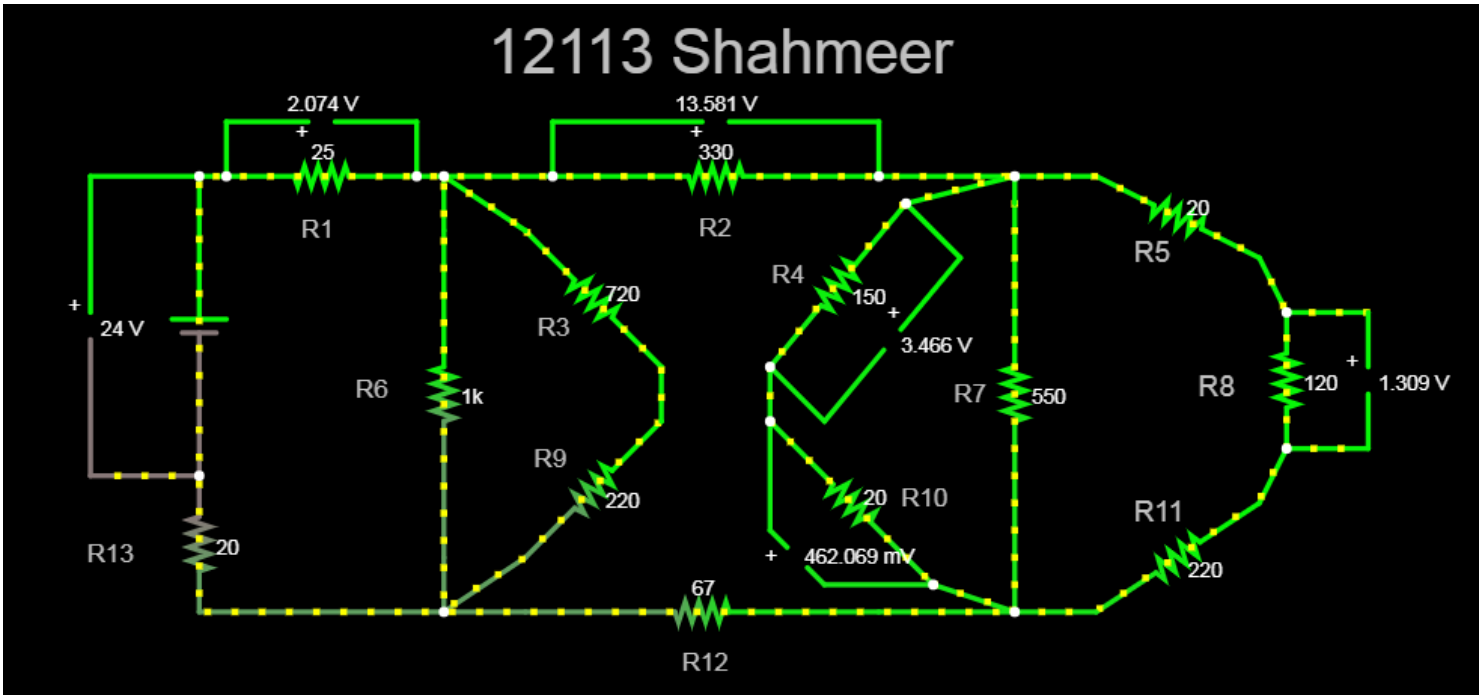
https://tinyurl.com/y7puwv2l

Q no 4 : Insert the volt meter on the circuits drawn below in simulation, insert the screenshots of simulation:

1) Find voltage drop for resistance R1, R2, R4, R8 and R10.



SCREENSHOT OF SIMULATION:



LINK OF THE SIMULATOR FILE:

https://tinyurl.com/ya5hhqw9

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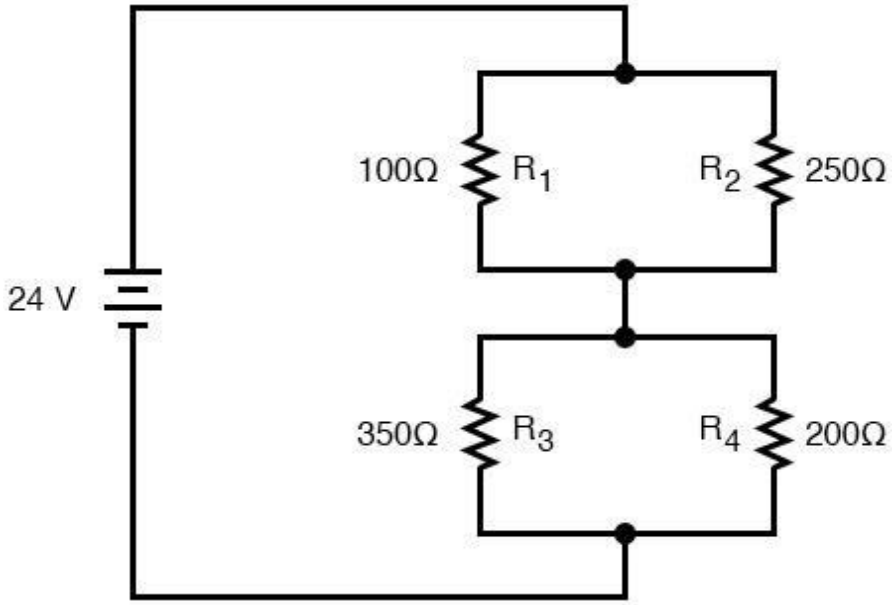
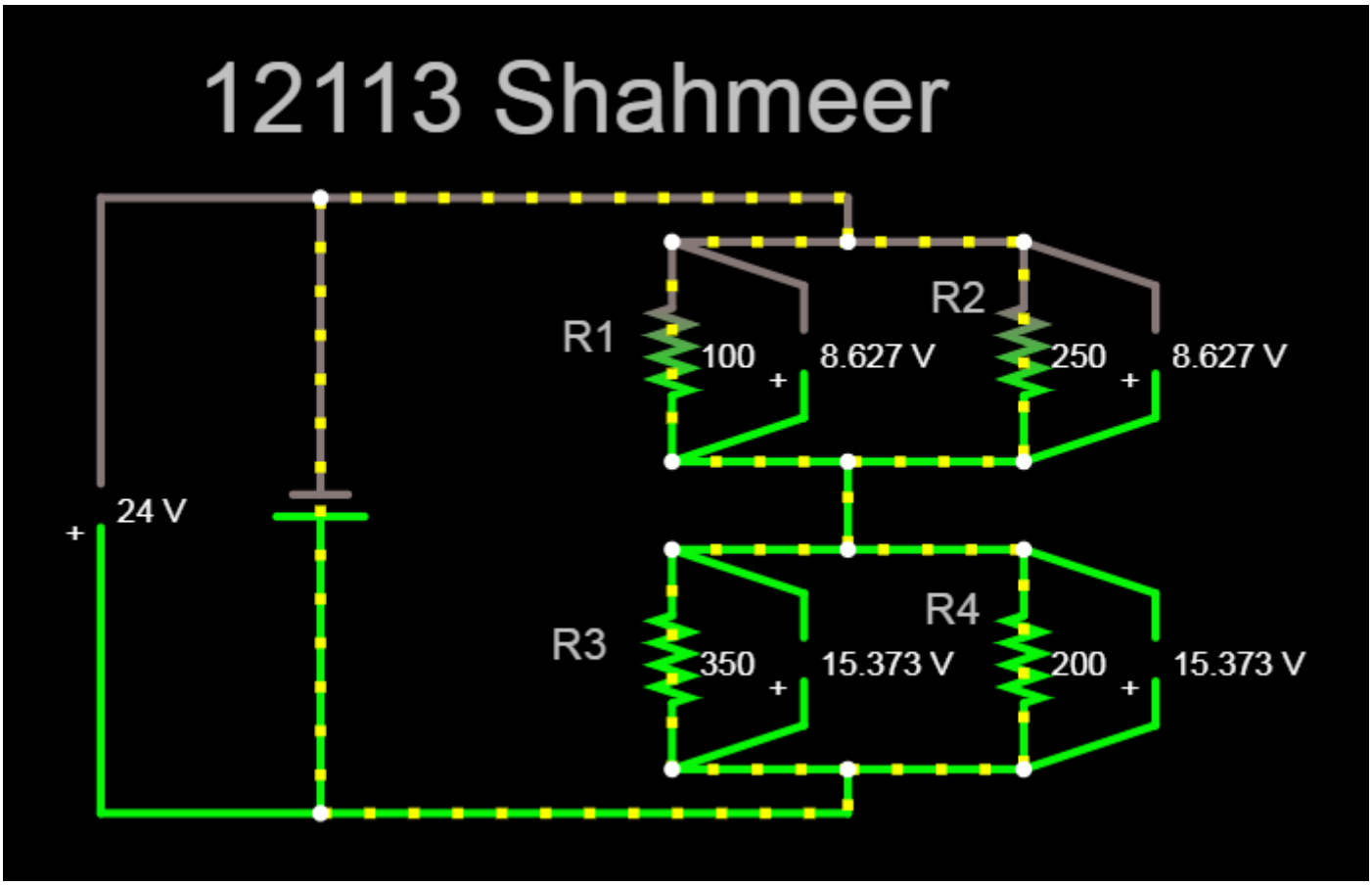
2) Find voltage drop for all resistance .



SCREENSHOT OF SIMULATION:

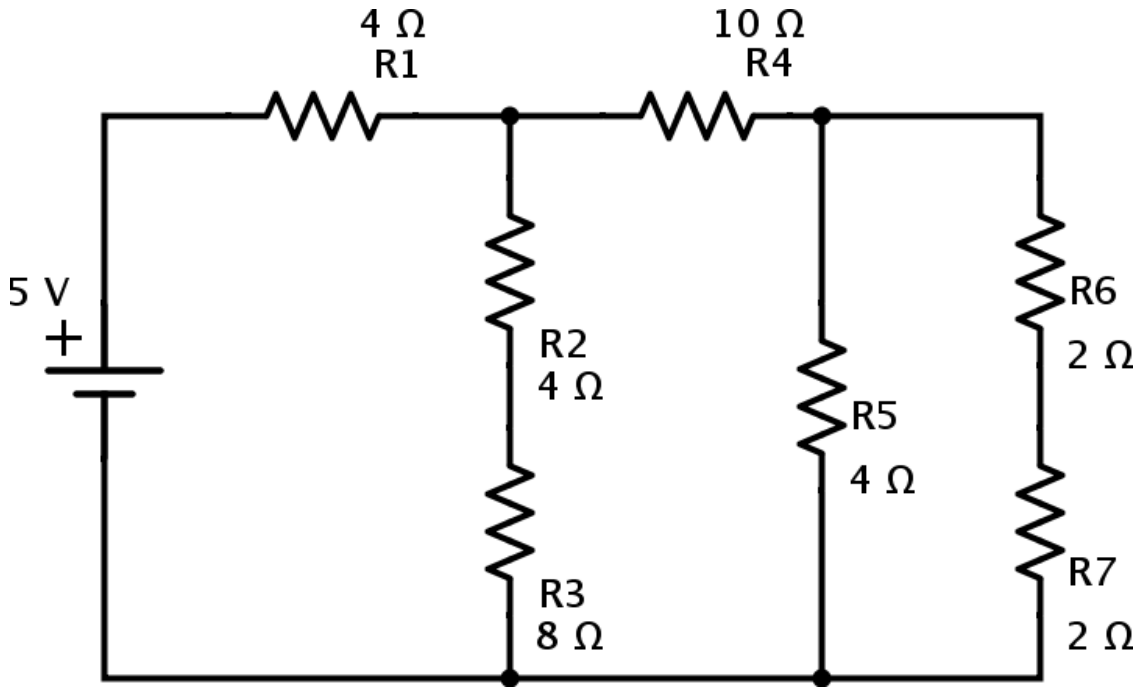


LINK OF THE SIMULATOR FILE:

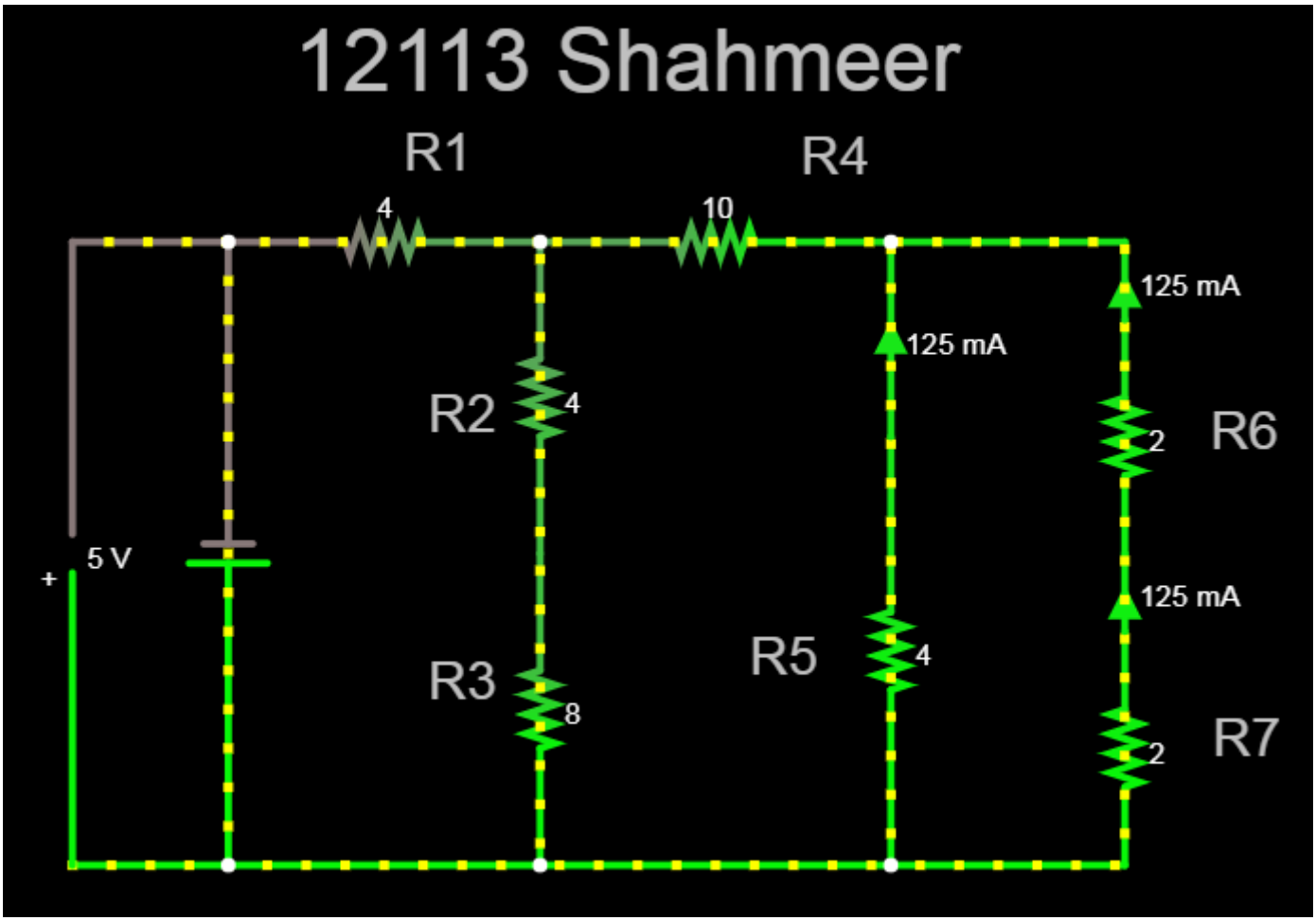
https://tinyurl.com/yc5kfhye

Q no 5 : Insert the ammeter on the circuits drawn below in simulation,insert the screen shots of simulation:

1) Find the current flowing through R5, R7, and R6.



SCREENSHOT OF SIMULATION:



As we can see in the simulator diagram above, the current flowing through R5, R6 and R7 is the same i.e. 125 mA or 125x10^{-3} A.

LINK OF THE SIMULATOR FILE:

https://tinyurl.com/y9n5p5f2

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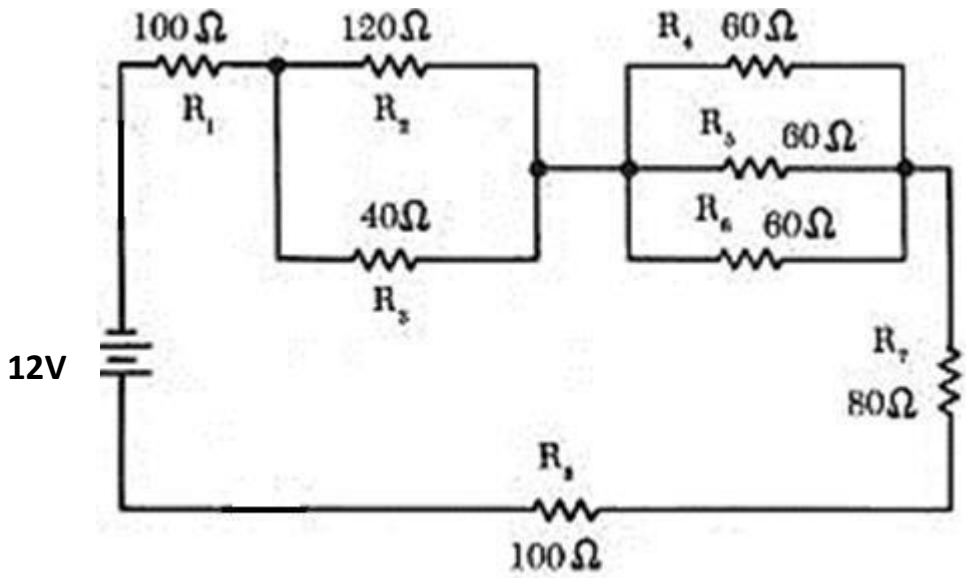
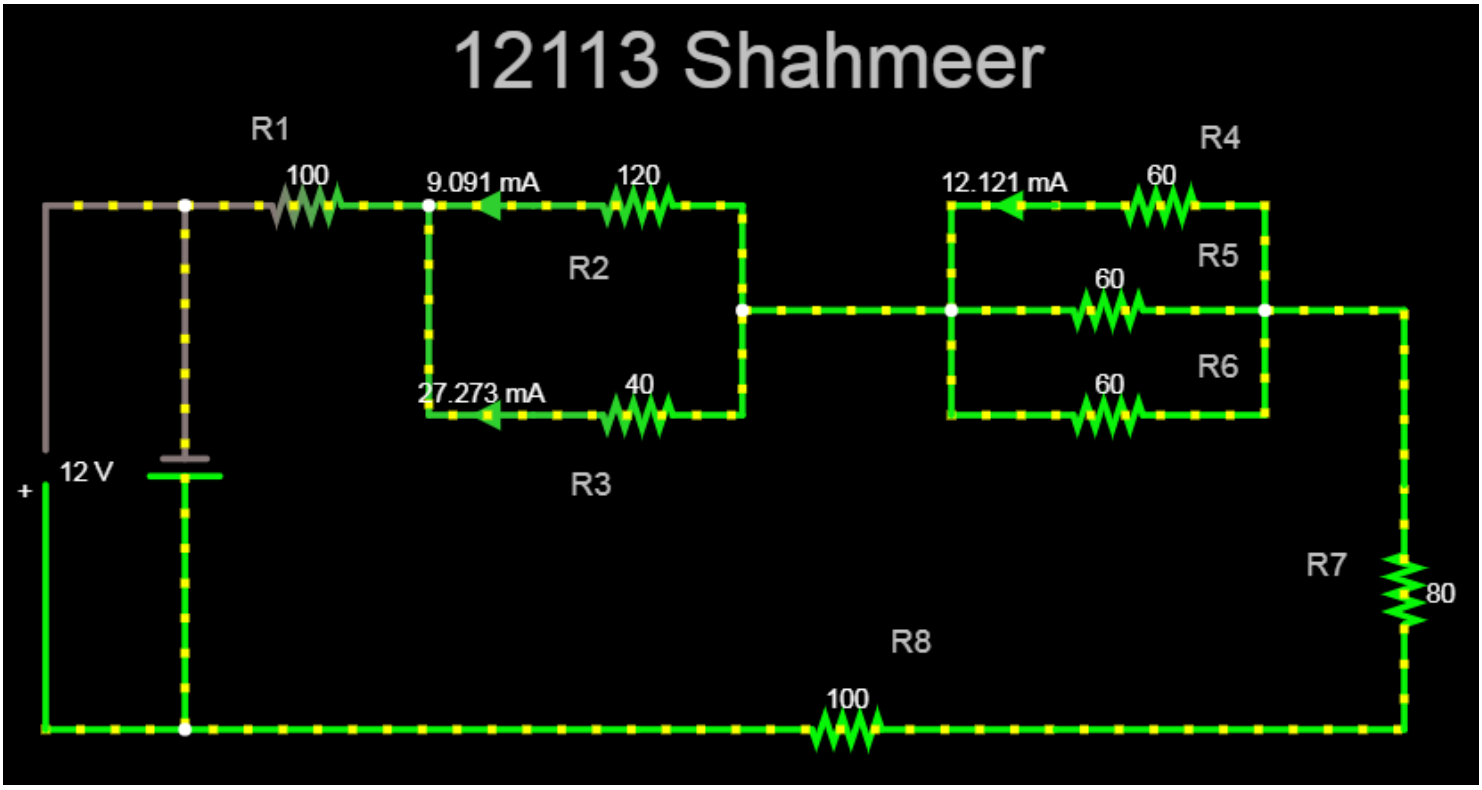
2) Find the current flowing through R2, R3, R4.



SCREENSHOT OF SIMULATION:



As we can see in the simulator file above,

the current through R2 = 9.091 mA or 0.009091 A.

the current through R3 = 27.273 mA or 0.027273 A.

the current through R4 = 12.121 mA or 0.012121 A.

LINK OF THE SIMULATOR FILE:

https://tinyurl.com/ybfb7auw