(A)

NAME: NEPTUN:

MEASURE AND DATA PROCESSING EXAM 28.11.2023

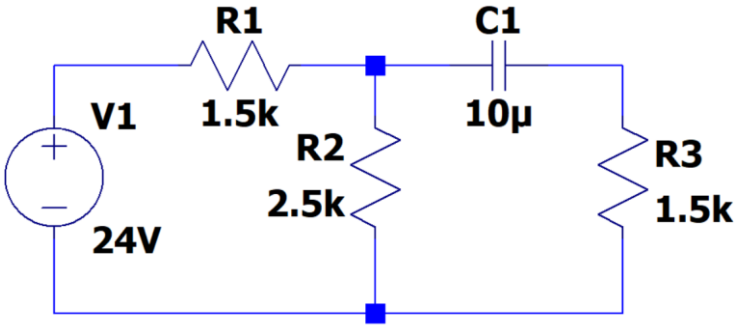
1. The table gives the current and voltage of a resistor. Find the value of the resistor and complete the table! Calculation required!

I [mA]	1.27	2.98	4.04	4.68
U [V]				22

2. Complete the table!

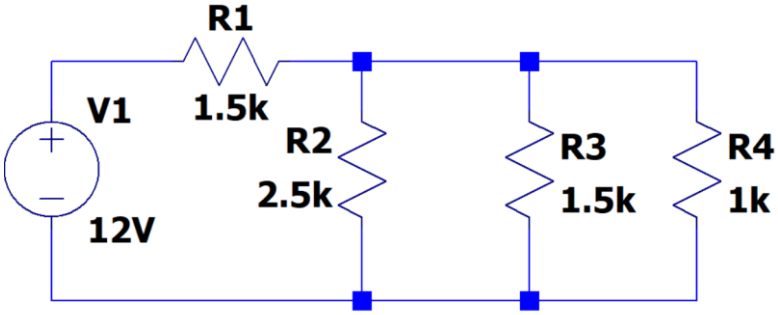
Sign	U	I	R	C	t	Q
Unit	V					

3. Calculate the voltage and current of all the resistors, after the transient of the circuit. Only the values are not enough!



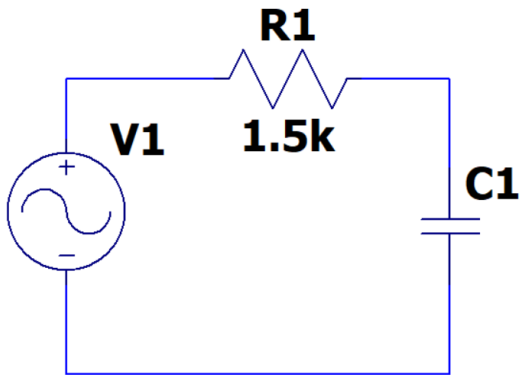
UR1=
IR1=
UR2=
IR2=
UR3=
IR3=

4. Calculate the voltage and current of all the resistors. Only the values are not enough!



UR1=
IR1=
UR2=
IR2=
UR3=
IR3=
UR4=
IR4=

5. What value of capacitor is needed in the following circuit to have a time constant of 150us?



C=

(B)

NAME: NEPTUN:

MEASURE AND DATA PROCESSING EXAM 28.11.2023

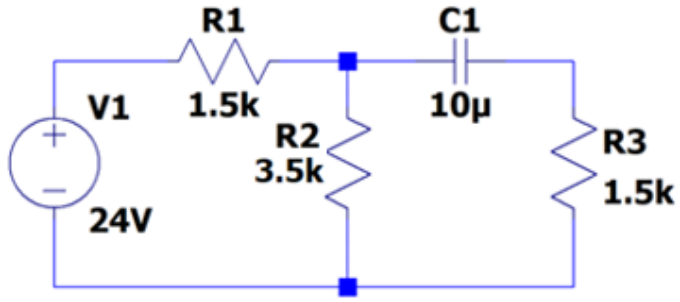
1. The table gives the current and voltage of a resistor. Find the value of the resistor and complete the table! Calculation required!

U [V]	4	10	12	19
I [mA]	5.88			

2. Complete the table!

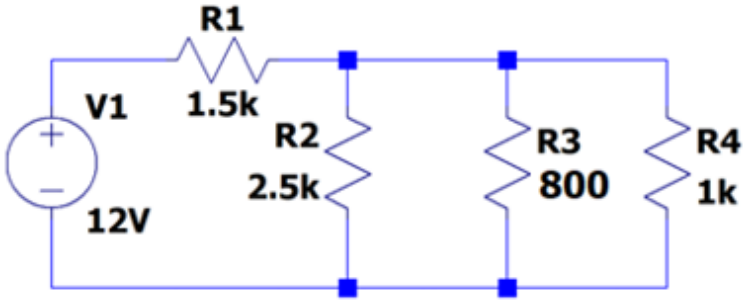
Sign	U	Q	R	I	t	C
Unit	V					

3. Calculate the voltage and current of all the resistors, after the transient of the circuit. Only the values are not enough!



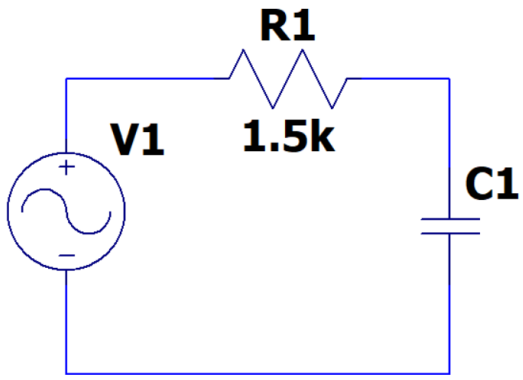
UR1=
IR1=
UR2=
IR2=
UR3=
IR3=

4. Calculate the voltage and current of all the resistors. Only the values are not enough!



UR1=
IR1=
UR2=
IR2=
UR3=
IR3=
UR4=
IR4=

5. What value of capacitor is needed in the following circuit to have a time constant of 100us?



C=

B) $I = U/R = 4V / 5.88\,mA \approx 680\,\Omega$

1)

U [V]	4	10	12	19
I [mA]	5.88	14.7	17.64	27.94

2)

U	Q	R	I	t	C
V	C/As	Ω	A	s	F

3) $U_{R3} = I_{R3} = 0$ because of C1

$R_{sum} = R_1 + R_2 = 1{,}5k\Omega + 3{,}51\Omega = 5k\Omega$

$I_{sum} = U / R_{sum} = 24V / 5k\Omega = 4{,}8mA = I_{R1} = I_{R2}$

$U_{R1} = I_{sum} \cdot R_1 = 7{,}2V$

$U_{R2} = I_{sum} \cdot R_2 = 16{,}8V$

4)

$R_{sum} = (R_2 \times R_3 \times R_4) + R_1 = 377\Omega + 1{,}5k\Omega = 1877\Omega$

$I_{sum} = U / R_{sum} = 12V / 1{,}877k = 6{,}39\,mA = I_{R1}$

$U_{R1} = I_{sum} \cdot R_1 = 6{,}39\,mA \cdot 1{,}5k = 9{,}58V$

$U_{R2} = U_{R3} = U_{R4} = U - U_{R1} = 12V - 9{,}58V = 2{,}42V$

$I_{R2} = U / R_2 = 2{,}42V / 2{,}5k = 0{,}968\,mA$

$I_{R3} = U / R_3 = 2{,}42V / 98k = 3{,}025\,mA$

$I_{R4} = U / R_4 = 2{,}42V / 1k = 2{,}42\,mA$

5) $\tau = RC \Rightarrow C = \frac{\tau}{R} = \frac{100\mu s}{1{,}5k\Omega} = 66{,}67nF$

A) 1, $R = U/I = 22V / 4.68mA = 4,7 k\Omega$

I [mA]	1,27	2,98	4,04	4,68
U [V]	~6	14	~19	22

2,

U	I	R	C	t	Q
V	A	Ω	F	s	C/As

3, $U_{R3} = I_{R3} = \varnothing$, because of C1

$R_{tot} = R_1 + R_2 = 1,5k + 2,5k = 4k\Omega$

$I_c = U/R = 24V / 4k\Omega = 6mA \Rightarrow I_{R1} = I_{R2} = \underline{6mA}$

$U_{R1} = I_{tot} R_1 = 6mA \cdot 1,5k\Omega = \underline{9V}$

$U_{R2} = I_{tot} \cdot R_2 = 6mA \cdot 2,5k\Omega = \underline{15V}$

4, $R_{tot} = (R_2 \times R_3 \times R_4) + R_1 = 1,5k + 483 \approx 1983\Omega$

$I_{tot} = U/R_{tot} = 12V / 1,983k = \underline{6,05mA} = I_{R1}$

$U_{R1} = I_{R1} \cdot R_1 = 6,05mA \cdot 1,5k = \underline{9,075V}$

$U_{R2} = U_{R3} = U_{R4} = U - U_{R1} = 12V - 9,075V = \underline{2,925V}$

$I_{R2} = U_{R2} / R_2 = 2,925V / 2,5k = \underline{1,17mA}$

$I_{R3} = U_{R3} / R_3 = 2,925V / 1,5k = 1,95mA$

$I_{R4} = U_{R4} / R_4 = 2,925V / 1k = 2,925mA$

5, $\tau = RC \Rightarrow C = \frac{\tau}{R} = \frac{150\mu s}{1,5k} = \underline{100nF}$