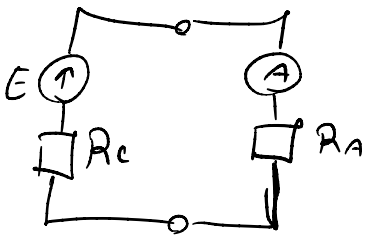
Group no 1, Lab 5, MON 13:15

1)



$E \approx 1.3\,V$

$R_C\ [\Omega] = 10, 30, 100, 300, 1k, 3k, 10k$

$I_{LIMIT} = 150\,mA$

R_A: A: $\frac{23}{I_r\,[mA]} + 0.004\,\Omega$, D: $\frac{\text{burden volt.}}{I_r}$

analog

Ohm's Law ↓

R_c [Ω]	I_{exp}	l	l_{max}	I_r [mA]	I	ΔI	δI	$I \pm \Delta I$
10		66	75	150				
30		45	-11-	~~75~~				
100		67	-11-	15				
300		45.5	-11-	7.5	4.55			
1k		34	-11-	3				
3k		12	-11-	3				
10k		5	-11-	3				

$$I = \frac{l}{l_{max}} \cdot I_r = \frac{45.5}{75} \cdot 7.5 = 4.55\ mA$$

$$\Delta I = \frac{0.5 \cdot 7.5}{100} = 0.0375\ mA$$

R_A	$\Delta_m I$	$\delta_m I$	c	I_c	$I_c \pm \Delta I$

$$R_A = \frac{23}{7.5} + 0.004 = 3.070666\ldots\ \Omega$$

digital

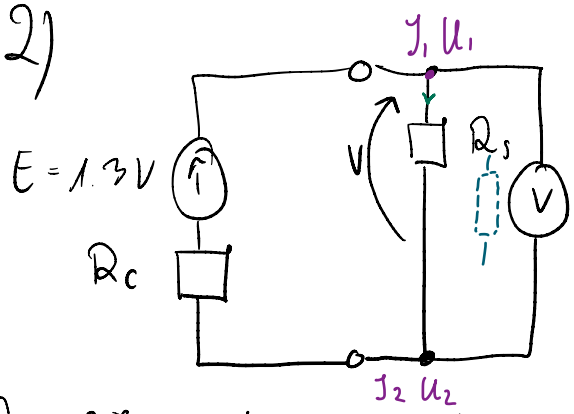
R_c [Ω]	I [mA]	digits
10	86.4317	6
30	37.9869	6
100	12.8199	6
300	4.43229	6
1k	1.34645	6

$I_r = 10\,mA$

$$R_A = \frac{0.1\,V}{10\,mA} = \frac{0.1\,V}{0.01\,A} = 10\,\Omega$$

3k	0.45049	6
10k	0.13522	6

2)



R_c [Ω] = 10, 100, 1k, 10k

$100\% \frac{\Delta J}{J} = \frac{\delta J}{J} \Rightarrow \Delta J = \frac{J \delta J}{100\%}$

$\rightarrow \delta V + \delta R_s$

only digital

$\frac{V}{R_s}$

Ω R_c	V V	6d. V_R	Acc	ΔV	δV	R_s Ω	d	J	ΔJ	δJ	$J \pm \Delta J$
10	1.22609					100	0.01				
100	0.6f5053					-11-	-11-				
1k	0.122755					-11-	-11-				
10k	13.3754m					-11-	-11-				
10	0.658095					10	0.01				
100	0.122238					-11-	-11-				
1k	13.368 9m					-11-	-11-				
10k	1.3483m					-11-	-11-				
10	1.33456					1k	0.01				
100	1.22532					-11-	-11-				
1k	0.673799					-11-	-11-				
10k	0.122527					-11-	-11-				

$-\mathcal{I}_A \frac{R_A}{R_C} \parallel R_S$

$\Delta_m \mathcal{I} \quad \delta_m \mathcal{I} \quad c \quad \mathcal{I}_c \quad \mathcal{I}_c \pm \Delta \mathcal{I}$

$V_r = 10\,V$

$Acc = 0.0035 + 0.0005$ (reading + range)

$\Delta V = \frac{0.0035}{100} \cdot 1.22609 + \frac{0.0005}{100} \cdot 10 = \dots$

$= 0,000042891 + 0,00005 = 0,000092891\,V$

$\delta V = \frac{0,000092891\,V}{1.22609} \cdot 100\% = 0.007577932564\%$

$\mathcal{I} = \frac{V}{R_0} = \frac{1.22609}{100} = 0.0122609\,A$

$\Delta \mathcal{I} = \frac{\delta \mathcal{I} \cdot \mathcal{I}}{100\%} = \frac{0.01 \cdot 0.0122609}{100} = 0,000000123\,A$

$R_A = R_S$

$\Delta_m \mathcal{I} = -\mathcal{I} \frac{R_A}{R_c} = -\mathcal{I} \frac{R_S}{R_c} =$

$= -0,0122609 \cdot \frac{100}{10} = -0,122609\,A$

$C = -\Delta_m \mathcal{I} = 0,122609\,A$

$\mathcal{I}_c = \mathcal{I} + C = 0.0122609 + 0,122609 = 0,1348699\,A$

$0.1348699 \pm 0.0000013\,A$