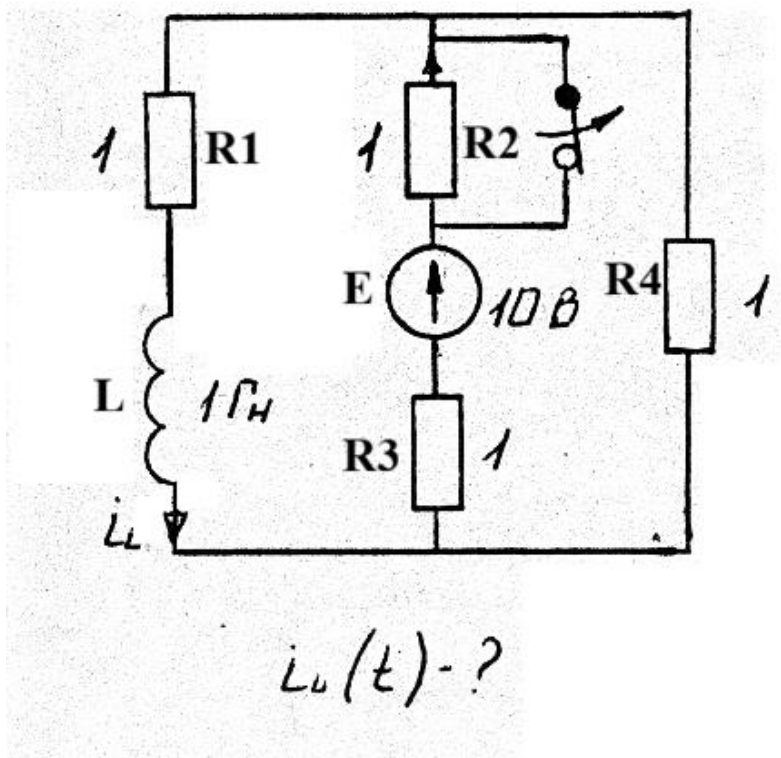


КУРСОВА РАБОТА часть 3
по дисциплине: «Электротехника»
на тему: «Переходные процессы»
Вариант 7

Выполнил:
студент 2 курса, гр. ЭН-25
Гатилов Руслан

Задание №1



Дано:

$$E = 10 \text{ В}$$

$$R_1 = R_2 = R_3 = R_4 = 1 \text{ Ом}$$

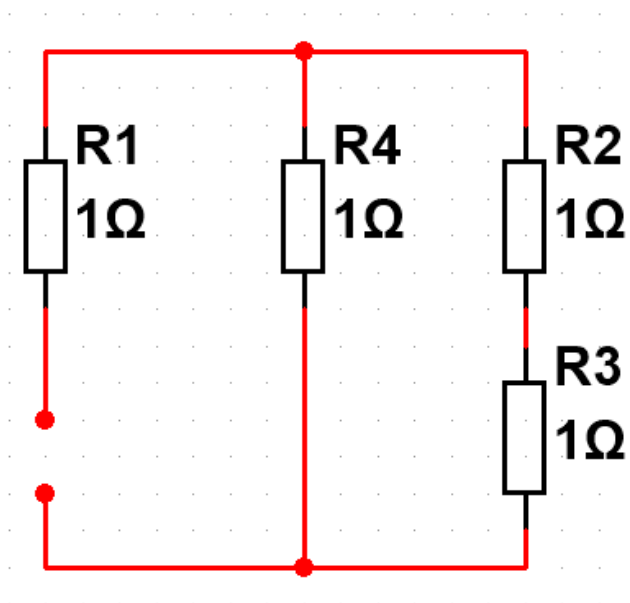
$$L = 1 \text{ Гн}$$

$$i_L(t) = ?$$

$$1) i_L(0-) = \frac{E}{2(R_3 + \frac{R_1}{2})} = 3.33 \text{ А}$$

$$2) i_{L \text{ ИР}+} = \frac{E}{2(R_2 + R_3 + \frac{R_1}{2})} = 2 \text{ А}$$

$$3) P = -\frac{1}{\tau}; \tau = \frac{L}{R_3} = 0.6; R_3 = \frac{3}{5} \text{ Ом} \gg P = -\frac{5}{3}$$

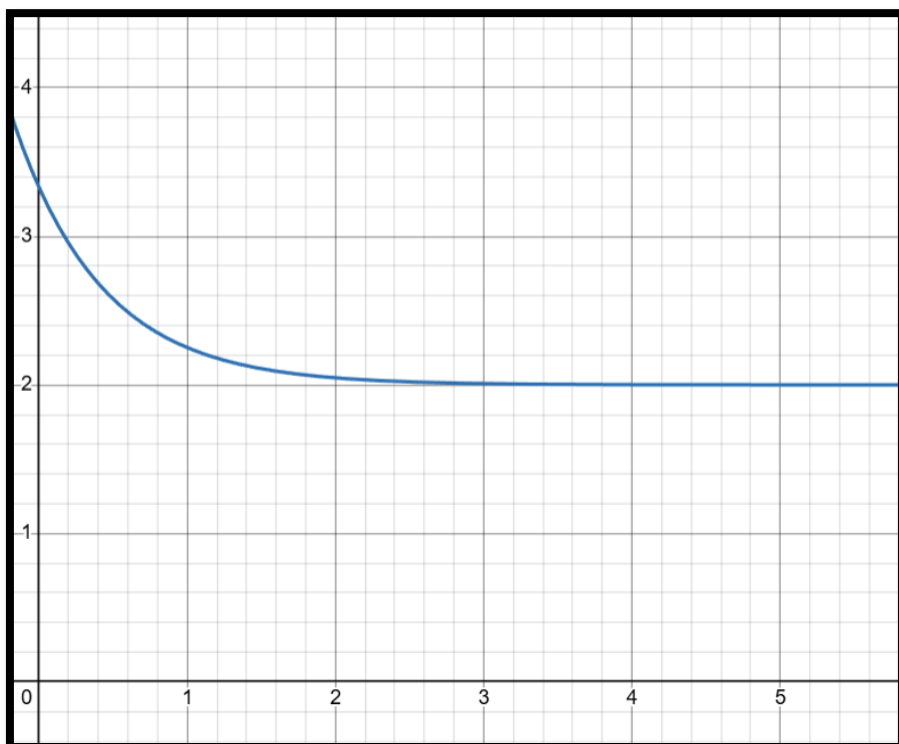


$$4) i_{L \text{ CB}} = A e^{P\tau}$$

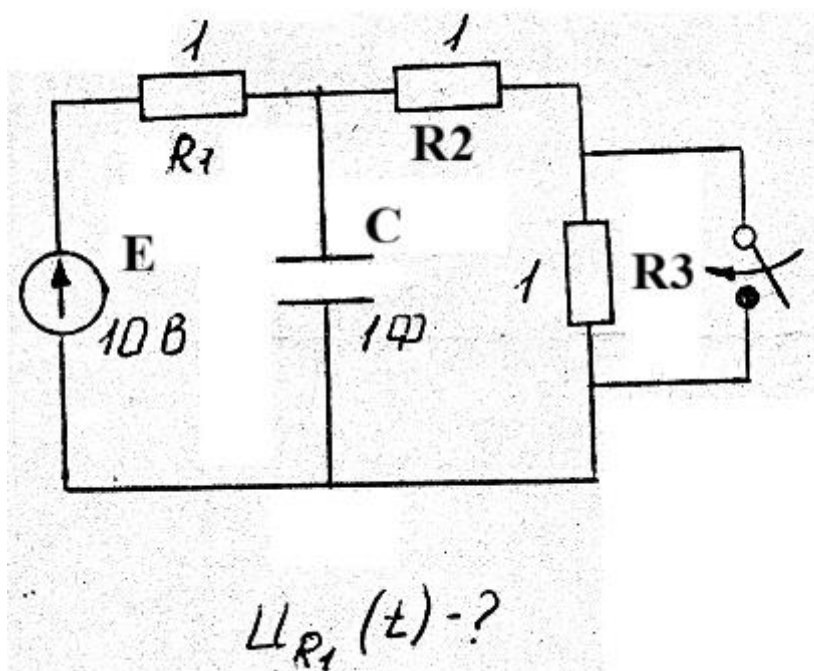
$$5) i_L(0+) = i_{L \text{ ИР}}(0+) + i_{L \text{ CB}}(0+)$$

$$3,33 = 2 + A; A = 1.33$$

$$6) i_L(t) = 2 + 1.33e^{-\frac{5}{3}t}$$



Задание №2



Дано:

$$E_1 = 10 \text{ В}$$

$$R_1 = R_2 = R_3 = 1 \text{ Ом}$$

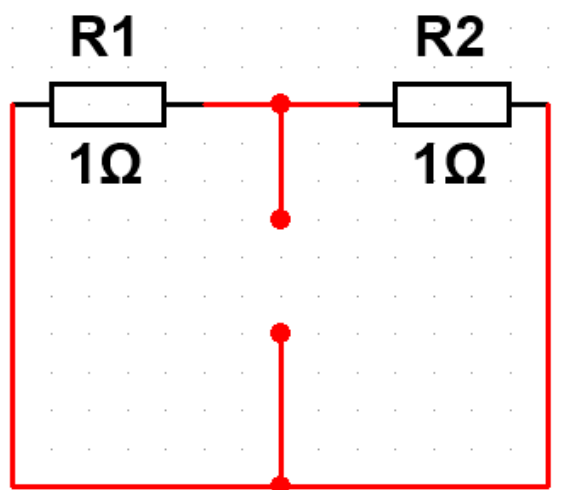
$$C = 1 \text{ Ф}$$

$$U_{R1}(t) = ?$$

$$1) u_c(0-) = \frac{E(R_2 + R_3)}{R_1 + R_2 + R_3} \approx 6.67 \text{ В}$$

$$2) i_{R1} \text{ ПП+} = \frac{E_1}{R_1 + R_2} = 5 \text{ А}$$

$$3) P = -\frac{1}{\tau}; \tau = CR_3 = 0.5; R_3 = 0.5 \text{ Ом} \gg P = -2$$

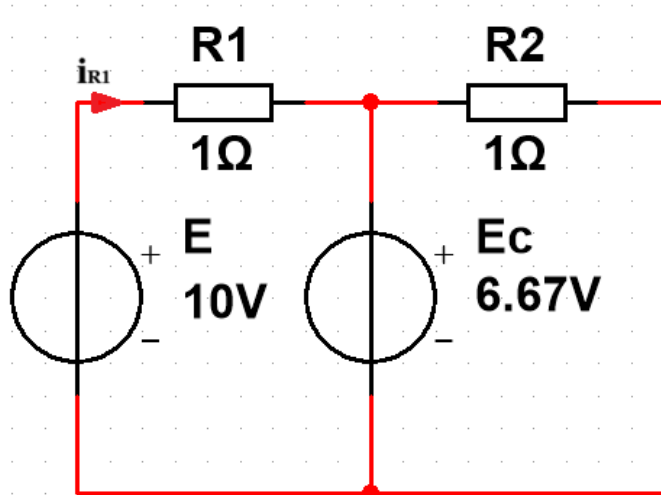


$$4) i_{R1 \text{ CB}+} = Ae^{P\tau}$$

$$5) i_{R1}(0+) = i_{R1 \text{ ПП}}(0+) + i_{R1 \text{ CB}}(0+)$$

$$? = 5 + A$$

Составим схему замещения:



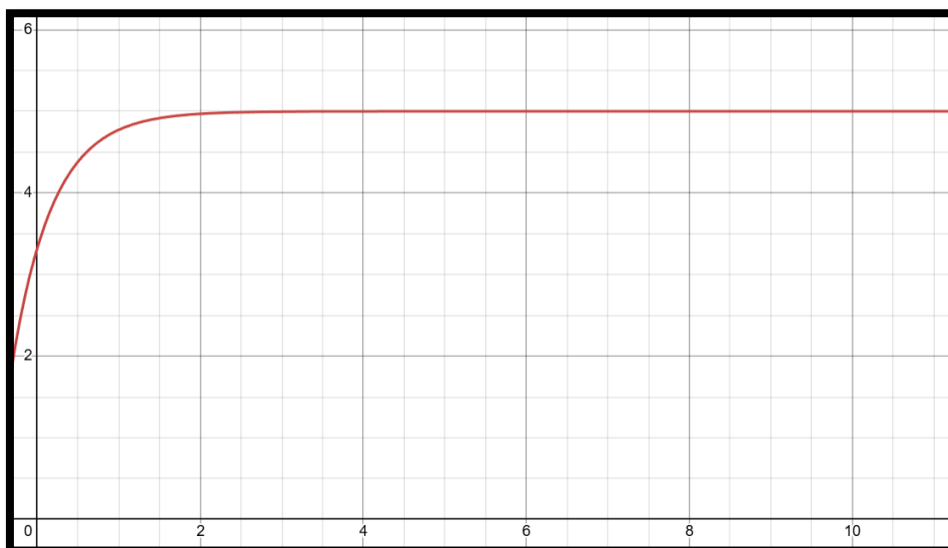
$$E_C(0+) = u_C(0-)$$

$$i_{R1}(0+) = i_E(0+) - i_{EC}(0+) = \frac{E}{R_1} - \frac{E_C}{\frac{R_1 R_2}{R_1 + R_2} \times 2} = 3.33 \text{ A}$$

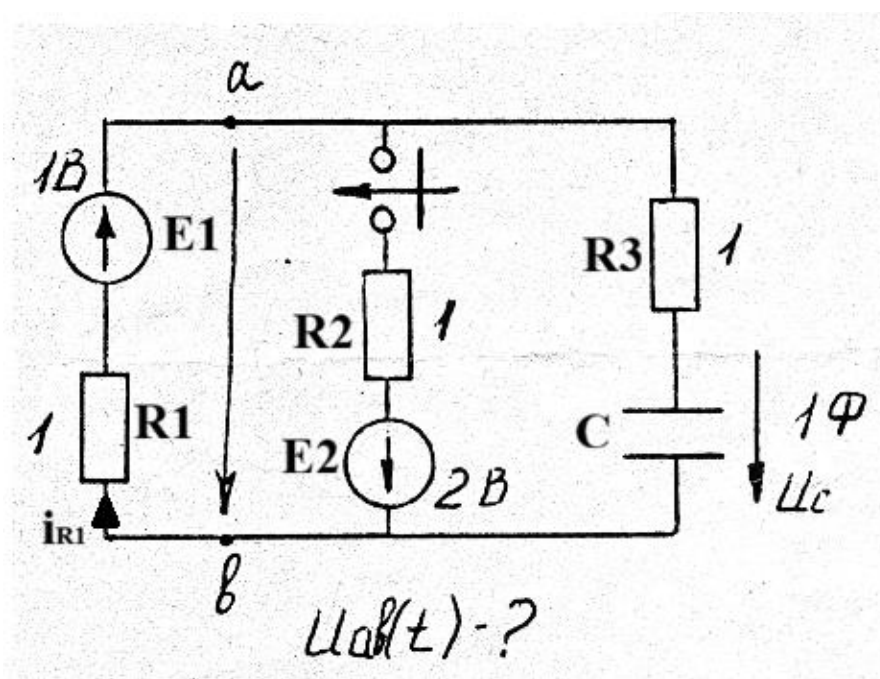
$$A = -1.67$$

$$6) i_{R1}(t) = 5 - 1.67e^{-2t}$$

$$u_{R1}(t) = i_{R1}(t) R_1 = 5 - 1.67e^{-2t}$$



Задание №3



Дано:

$$E_1 = 1B$$

$$E_2 = 2B$$

$$R_1 = R_2 = R_3 = 1 \text{ Ом}$$

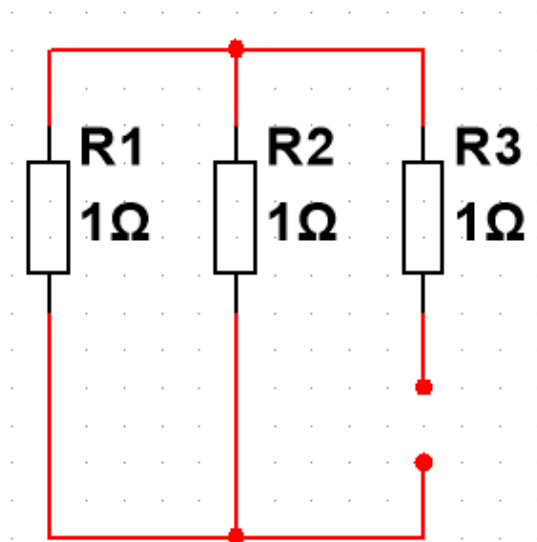
$$C = 1F$$

$$U_{AB}(t) = ?$$

$$1) u_c(0-) = E_1 = 1B$$

$$2) i_{R1} \text{ нп+} = 1.5 \text{ A}$$

$$3) P = -\frac{1}{\tau}; \tau = CR_3 = 1.5; R_3 = 1.5 \text{ Ом} \gg P = -\frac{2}{3}$$

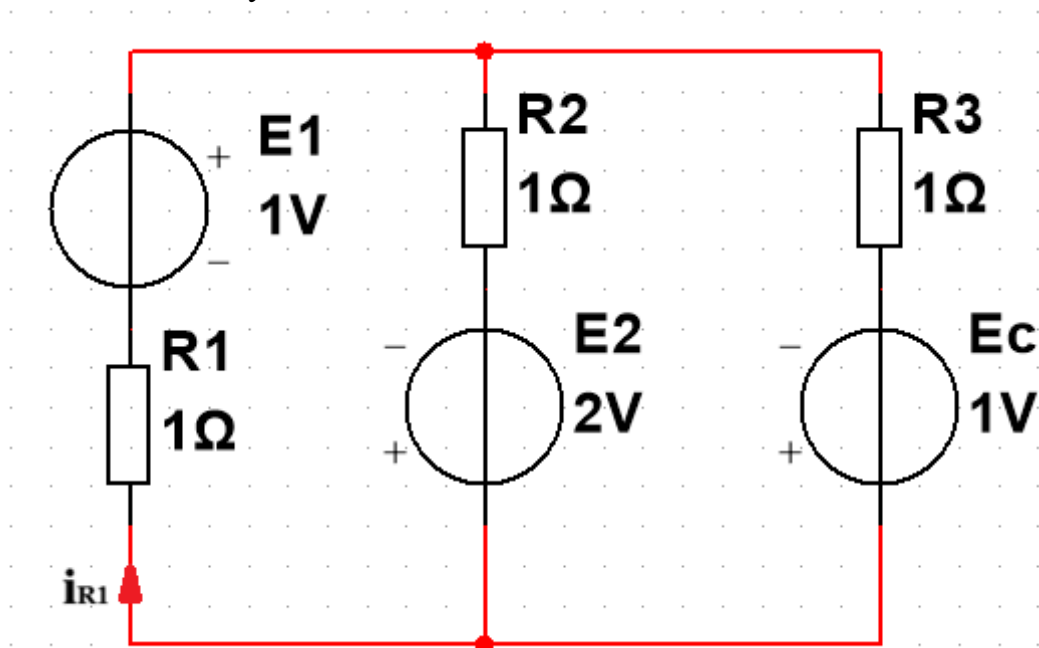


4) $i_{R1\text{ CB}} = Ae^{P\tau}$

5) $i_{R1}(0+) = i_{R1\text{ ПП}}(0+) + i_{R1\text{ CB}}(0+)$

$? = 1.5 + A$

Составим схему замещения:



$$i_{R1}(0+) = i_1(0+) + i_2(0+) + i_3(0+) = \frac{E_1}{R_1 + \frac{R_2 R_3}{R_2 + R_3}} + \frac{E_2}{(R_2 + \frac{R_1 R_3}{R_1 + R_3}) \times 2} + \frac{E_c}{(R_3 + \frac{R_2 R_1}{R_2 + R_1}) \times 2}$$

$= 1.67 \text{ A}$

$A = 0.17$

6) $i_{R1}(t) = 1.5 + 0.17e^{-\frac{2}{3}t} \text{ A}$

$U_{BA}(t) = i_{R1}(t)R_1 - E_1 = 0.5 + 0.17e^{-\frac{2}{3}t} \text{ B}$

$U_{AB}(t) = -U_{BA}(t) = -0.5 - 0.17e^{-\frac{2}{3}t} \text{ B}$

