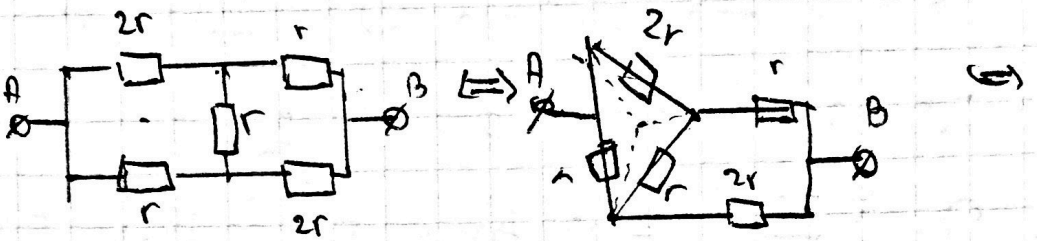
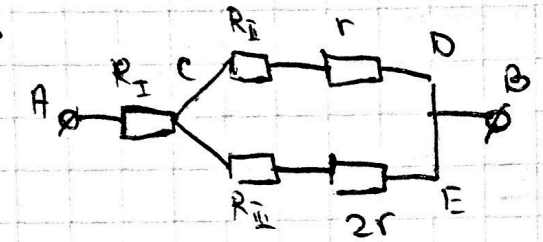
Задача 5.2.

Дано: r

Найти: R_{AB} - ?

Решение:





$$R_I = \frac{2r \cdot r}{2r + r + r} = \frac{2r^2}{4r} = \frac{r}{2}; \quad R_{II} = \frac{2r \cdot r}{4r} = \frac{r}{2}; \quad R_{III} = \frac{r \cdot r}{4r} = \frac{r}{4}.$$

$$R_{CD} = R_{II} + r = \frac{3r}{2}; \quad R_{CE} = R_{III} + 2r = \frac{9r}{4}$$

$$R_{CB} = \frac{1}{\frac{1}{R_{CD}} + \frac{1}{R_{CE}}} = \frac{1}{\frac{2}{3r} + \frac{4}{9r}} = \frac{9r}{10}$$

$$R_{AB} = R_I + R_{CB} = \frac{r}{2} + \frac{9r}{10} = \frac{14r}{10} = \frac{7r}{5}$$

Ответ: $\frac{7r}{5}$

Задача 5.3

Дано:

$I = kt^3$

$\tau = 7c$

$I_m = 5A$

$R = 2\,Ом$

$Q - ?$

Решение:

По з-ну Джоуля-Ленца $Q = \int_0^t I^2(t) R\, dt$

$I(\tau = 7c) = 5A \Leftrightarrow k \cdot 7^3 = 5 \Leftrightarrow k = \frac{5}{7^3}$

$Q = \int_0^{\tau} \frac{25}{7^6} t^6 \cdot 2\, dt\ Дж = \frac{50}{7^6} \int_0^7 t^6 dt = \frac{50}{7^6} \cdot \frac{t^7}{7} \Big|_0^7 =$

$= \frac{50 \cdot 7^7}{7^7}\ Дж = 50\ Дж$

Ответ: 50 Дж.

Задача 5.4

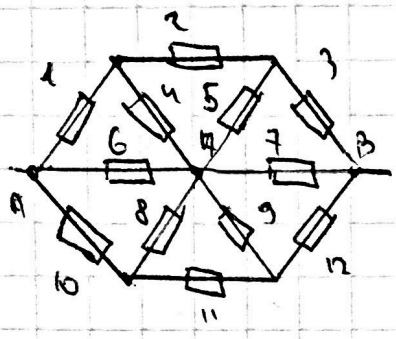
Решена в семинаре 4 под номером 4.5

Задача 5.5

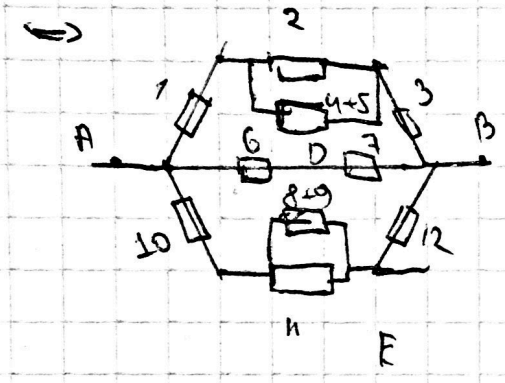
Дано:
R

Найти:
$R_{AB} - ?$

Решение:



$\Rightarrow$ $|I_4 - I_5 - I_6 = I_0|$ $\Rightarrow$



$$R_{ACB} = R + \frac{1}{\frac{1}{R} + \frac{1}{R+R}} + R = 2R + \frac{2R}{3} = \frac{8R}{3}$$

$$R_{AEB} = \frac{8R}{3}$$

$$R_{ADB} = R + R = 2R$$

$$R_{AB} = \frac{1}{\frac{1}{R_{ACB}} + \frac{1}{R_{ADB}} + \frac{1}{R_{AEB}}} = \frac{1}{\frac{3}{8R} + \frac{3}{8R} + \frac{1}{2R}} = \frac{1}{\frac{10}{8R}} = \frac{8R}{10} = \frac{4R}{5}$$

Ответ: $\frac{4}{5}R$