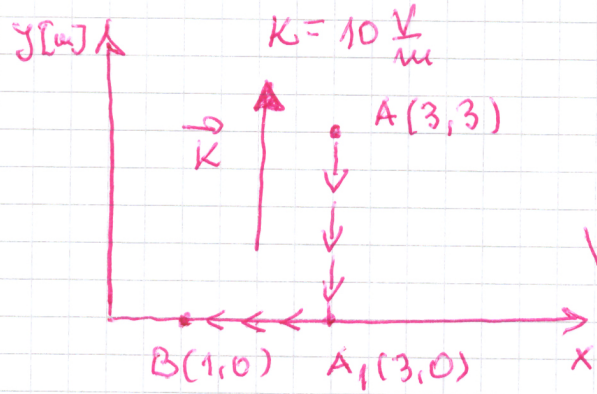
GRUPA 1

① 

$W = \Delta Q \left(\vec{K} \cdot |AA_1| \cos\vec{\pi}^{\circ} + \vec{K}(A_1B) \cdot \cos\frac{\pi}{2} \right)$

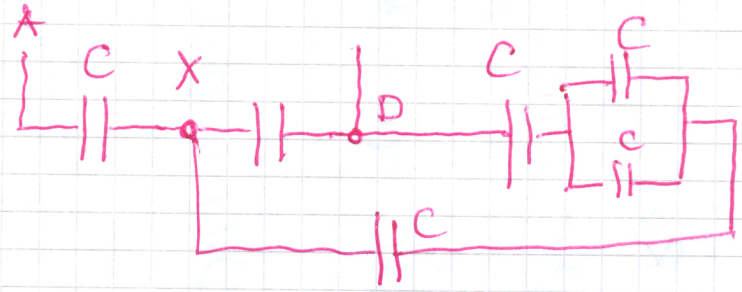
$W = \Delta Q \cdot K(3) \cdot (-1) =$

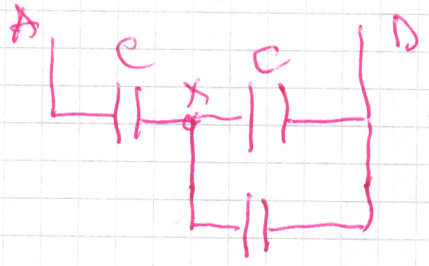
$= 10 \cdot 10^{-6} \cdot 10 \cdot 3(-1) =$

$= -3 \cdot 10^{-4}$ J

$$\boxed{W = -3 \cdot 10^{-4}\ J}$$

Kod izbora ugla između vektora i pravca se uzima $\alpha(\vec{K}, \vec{e}) = \left\{ \begin{matrix} 0 \\ \pi \\ \pi/2 \end{matrix} \right\}$

② 



$$\frac{1}{C_{DX}} = \frac{1}{C} + \frac{1}{2C} + \frac{1}{C} = \frac{5}{2C}$$

$$C_{DX} = \frac{2C}{5}$$

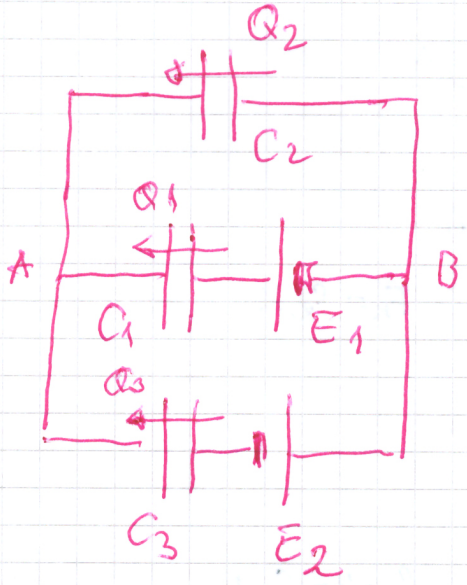
$$C + C_{DX} = C + \frac{2C}{5} = \frac{7C}{5}$$

$$\frac{1}{C_{AD}} = \frac{1}{C} + \frac{1}{C + C_{DX}}$$

$$\frac{1}{C_{AD}} = \frac{1}{C} + \frac{5}{7C} = \frac{12}{7C}$$

$$\boxed{C_{AD} = \frac{7C}{12}}$$

3

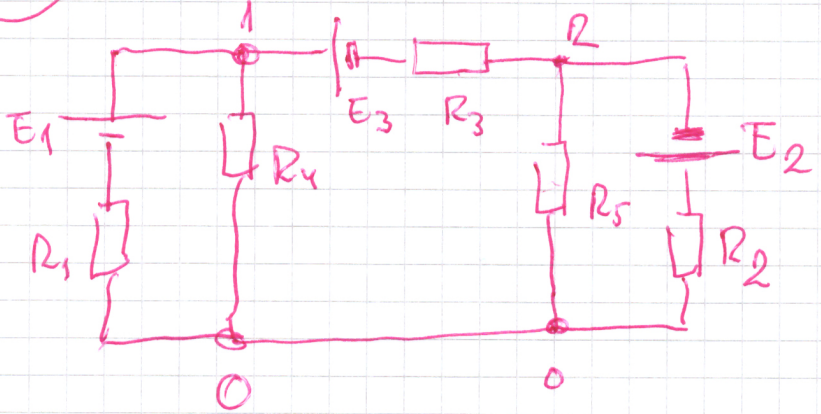


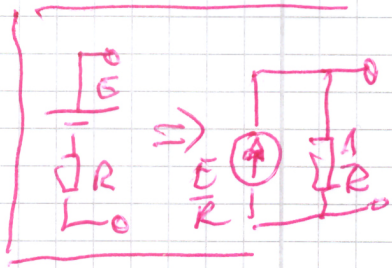
$$U_{BA} = \frac{Q_2}{C_2} = \frac{Q_1}{C_1} - E_1 = \frac{Q_3}{C_3} + E_2$$

$$Q_2 = C_2\left[\frac{Q_1}{C_1} - E_1\right]$$

$$Q_3 = C_3\left[\frac{Q_1}{C_1} - E_1 - E_2\right]$$

4 Коло има 3 чвора

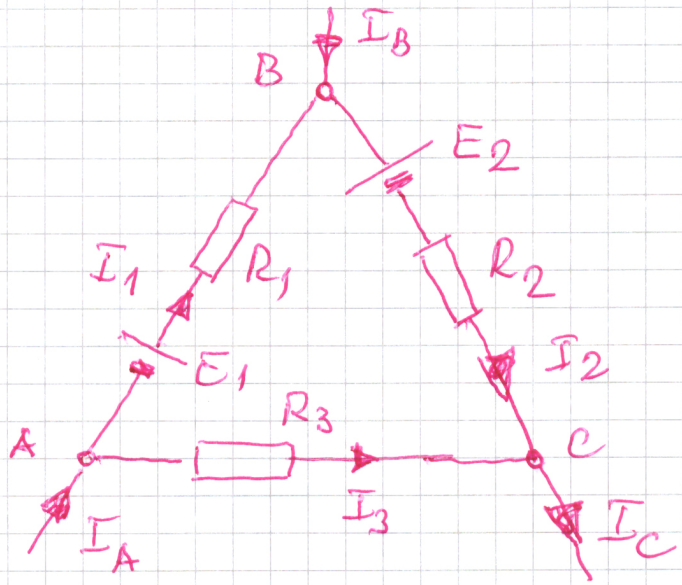




$$\left(\frac{1}{R_1} + \frac{1}{R_4} + \frac{1}{R_3}\right)U_{10} - \frac{1}{R_3}U_{20} = \frac{E_1}{R_1} + \frac{E_3}{R_3}$$

$$-\frac{1}{R_3}U_{10} + \left(\frac{1}{R_3} + \frac{1}{R_2} + \frac{1}{R_5}\right)U_{20} = -\frac{E_3}{R_3} - \frac{E_2}{R_2}$$

5



$I_A = 5A$

$I_1 = 2A$

$R_3 = 2A$

$R_1 = 3\Omega$

$I_A - I_1 - I_3 = 0 \quad I_3 = I_A - I_1 = 3A$

$U_{AC} = R_3 I_3 = 2 \cdot 3 = 6V$

$U_{AC} = -E_1 + R_1 I_1 + E_2 + R_2 I_2$

$$\frac{U_{AC} + E_1 - E_2 - R_1 I_1}{R_2} = I_2$$

$$I_2 = \frac{6 + 4 - 6 - 3 \cdot 2}{1} = -2A$$

$I_C = I_3 + I_2 = 3 - 2 = 1A$

$I_B + I_1 - I_2 = 0 \quad I_B = I_2 - I_1 = -2 - 2 = -4A$

ПРОВЕРА $I_A + I_B - I_C = 0$

$5 - 4 - 1 = 0$

Prvi kolokvijum GRUPA 2

Ime Prezime br.indeksa

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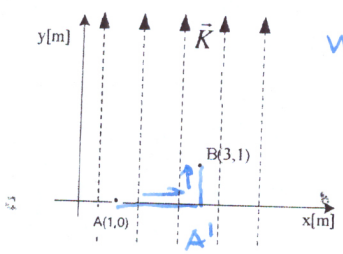
1. U ravni pravougaonog koordinatnog sistema postoji homogeno elektrostatičko polje intenziteta $K = 10\frac{V}{m}$, prikazano ravnomerno raspoređenim orijentisanim linijama linijama paralelnim osi y , slika (1).Izračunati rad sila elektrostatičkog polja koji je potreban da se naelektrisanje $\Delta Q = 10\mu C$ prenese iz tačke A u tačku B



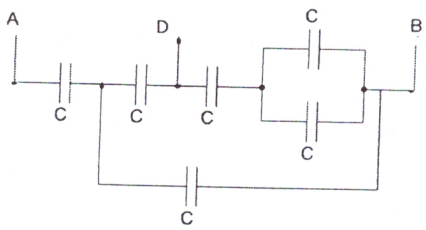
$$W = \Delta Q \int_A^B \vec{K}\cdot d\vec{l} = \Delta Q \left[\int_A^{A'} \vec{K}\cdot d\vec{l} + \int_{A'}^{B} \vec{K}\cdot d\vec{l}\right]$$

$$= \left[10\cdot 2\cdot \cos 90^\circ + 10\cdot 1\cdot \cos 0\right] 10^{-5} =$$

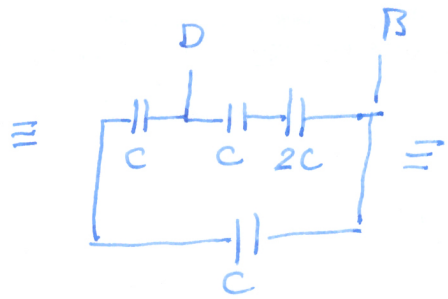
$$= 10\cdot 10^{-5} = 10^{-4}\,J$$

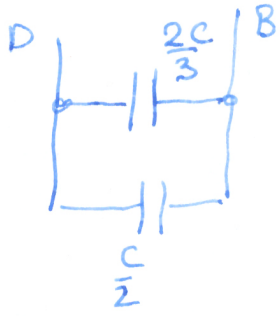
Slika 1

2. Grupa od sedam kondenzatora pozatog kapaciteta C vezana je kao na slici (2). Odrediti ekvivalentni kapacitet između tačaka B i D



Slika 2

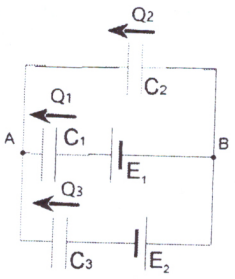




$$C_\epsilon = \frac{C}{2} + \frac{2C}{3} = \frac{3C+4C}{6}$$

$$\boxed{C_\epsilon = \frac{7}{6}C}$$

3. U kolu na slici (3) poznate su vrednosti E_1, E_2, C_1, C_2, C_3. Ako je kondenzator C_3 opterećen sa količinom naelektrisanja Q_3 u naznačenom smeru. Izračunati Q_1 i Q_2.



Slika 3

$$E_2 + \frac{Q_3}{C_3} = \frac{Q_1}{C_1} - E_1$$

$$\frac{Q_1}{C_1} = E_1 + E_2 + \frac{Q_3}{C_3}$$

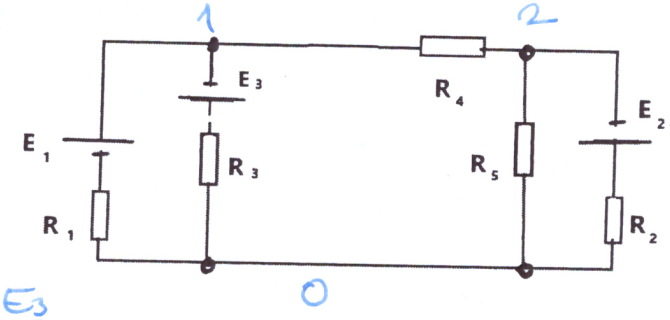
$$Q_1 = C_1(E_1 + E_2) + \frac{C_1}{C_3} Q_3$$

$$\frac{Q_2}{C_2} = E_2 + \frac{Q_3}{C_3}$$

$$Q_2 = C_2 E_2 + \frac{C_2}{C_3} Q_3 \quad \text{w}$$

$$\frac{Q_2}{C_2} = \frac{Q_1}{C_1} - E_1$$

4. Za električno kolo slici (4) postaviti odgovarajući sistem jedančina po metodi napona između čvorova. Sve vrednosti otpornosti otpornika i elektromotornih sila su poznate



Slika 4

$$G_{11}U_{10} - G_{12}U_{20} = \sum_1 I_g$$

$$-G_{12}U_{10} + G_{22}U_{20} = \sum_2 I_g$$

$$\sum_2 I_g = -\frac{E_2}{R_2}$$

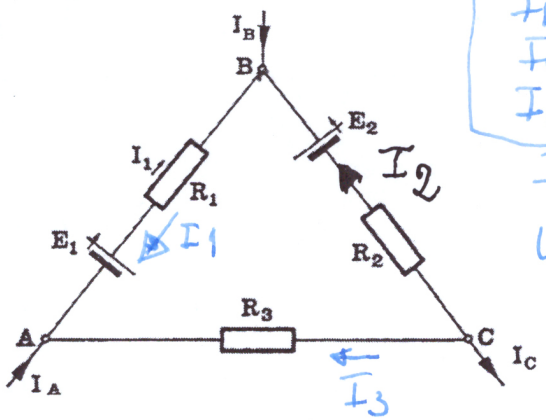
$$\sum_1 I_g = \frac{E_1}{R_1} - \frac{E_3}{R_3}$$

$$G_{11} = \left(\frac{1}{R_1} + \frac{1}{R_3} + \frac{1}{R_4}\right)$$

$$G_{12} = \frac{1}{R_4}$$

$$G_{22} = \frac{1}{R_4} + \frac{1}{R_5} + \frac{1}{R_2}$$

5. U delu složenog električnog kola prikazanog na slici (5) poznate su vrednosti elektromotornih sila $E_1 = 4V$ i $E_2 = 6V$,otpornosti otpornika $R_1 = 3\Omega, R_2 = 1\Omega$ i $R_3 = 2\Omega$ kao i struje $I_C = 1A$ i $I_2 = 2A$. Odrediti struje I_A i I_B .



Slika 5

$I_B = -4A$ w
$I_C = 1A$
$I_A = 5A$ w

$$I_3 = -I_C - I_2 = -3A$$

$$U_{CA} = I_3 R_3 = -3 \cdot 2 = -6V$$

$$I_3 + I_C + I_2 = 0$$

$$I_3 = -I_C - I_2 = -3A$$

$$U_{CA} = R_2 I_2 - E_2 + R_1 I_1 + E_1$$

$$I_B - I_1 + I_2 = 0$$

$$I_B = I_1 - I_2 = -2 - 2 = -4A$$

$$U_{CA} - R_2 I_2 + E_2 - E_1 = R_1 I_1$$

$$-6 - 1 \cdot 2 + 6 - 4 = R_1 I_1$$

$$-6 = R_1 I_1 \qquad I_1 = -2A$$

$$I_A + I_3 + I_1 = 0$$

$$I_A = -I_3 - I_1 = 3 + 2 = 5A$$

$$I_1 = -2A$$

$$-2 + I_A - 3 = 0 \qquad I_A = 5$$