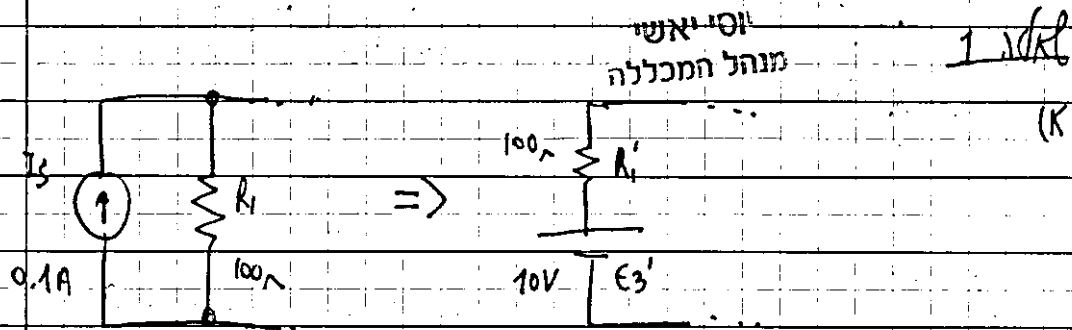
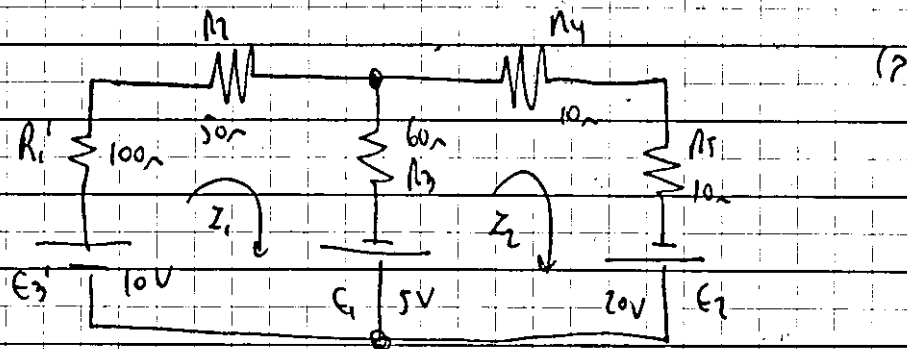


בתכנון
קבל
2014
מחיר - 2014
מחיר - 2014
מחיר - 2014



$$\epsilon_3' = I_s \cdot R_1 = 0.1 \cdot 100 = 10V$$



(כתיב) (שיל) (מחיר) (מחיר) (מחיר)

$$\begin{bmatrix} (R_1' + R_2 + R_3) & -R_3 \\ -R_3 & (R_3 + R_4 + R_5) \end{bmatrix} \begin{bmatrix} Z_1 \\ Z_2 \end{bmatrix} = \begin{bmatrix} \epsilon_3' + \epsilon_1 \\ -\epsilon_1 + \epsilon_2 \end{bmatrix}$$

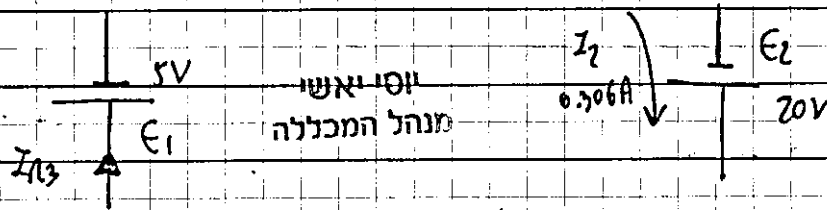
$$\begin{bmatrix} 210 & -60 \\ -60 & 80 \end{bmatrix} \begin{bmatrix} Z_1 \\ Z_2 \end{bmatrix} = \begin{bmatrix} 15 \\ 15 \end{bmatrix}$$

$$Z_1 = 0.159 A ; Z_2 = 0.306 A$$

$$I_{R_3} = Z_2 - Z_1 = 0.306 - 0.159 = 0.147 A$$

$$P_{R_3} = I_{R_3}^2 \cdot R_3 = 0.147^2 \cdot 60 = 1.296 (W)$$

(2) על מקור מתח ϵ_2 והספק הכוח המסופק למעגל
 נובע מהחילוק ϵ_2 מתחית האנז'יה מספק אנז'יה

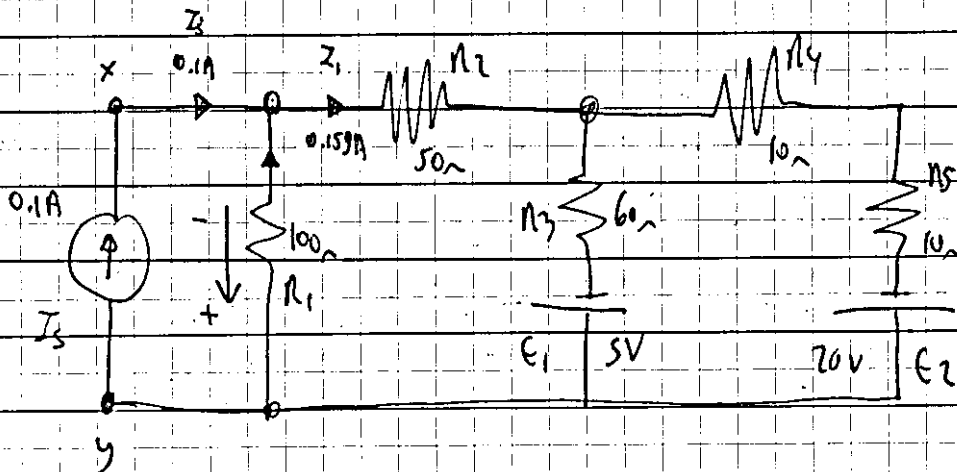


ציון
 אנז'יה!

מספק
 אנז'יה!

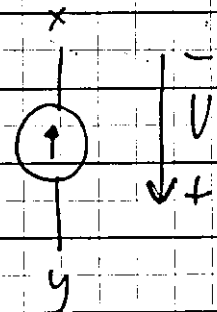
$$P_{\epsilon_2} = I_2 \cdot \epsilon_2 = 0.306 \cdot 20$$

$$P_{\epsilon_2} = 6.12 \text{ W}$$



$$I_{R_1} = I_1 - I_3 = 0.159 - 0.1 = 0.059 \text{ A}$$

מקור וולטג'ה ציון אנז'יה!



מספק עליו למספק הכוח המסופק למעגל ובו חן
 ע' מקור המתח ϵ_2 , ק"י , 6.12 (W)

2.10.18

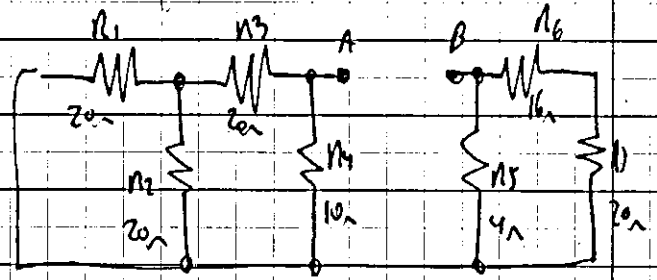
(RTH) RAB חילון (K)

$$R_{AB} = [(R_1 \parallel R_2) + R_3] \parallel R_4 + (R_6 \parallel R_7) \parallel R_5$$

$$R_{AB} = [20 \parallel 20 + 20] \parallel 10 + 36 \parallel 4$$

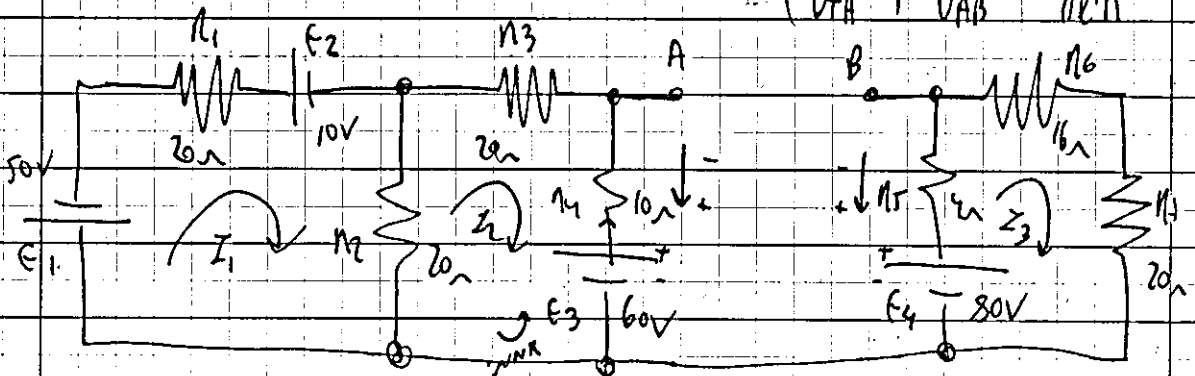
$$R_{AB} = 7.5 + 3.6 = 11.1 \Omega$$

$$R_{TH} = 11.1 \Omega$$



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(VTH) VAB חילון



$$I_3 = \frac{E_4}{R_5 + R_6 + R_7} = \frac{80}{40} = 2A$$

$$\begin{bmatrix} (R_1 + R_2) & -R_2 \\ -R_2 & (R_3 + R_4 + R_5) \end{bmatrix} \begin{bmatrix} I_1 \\ I_2 \end{bmatrix} = \begin{bmatrix} -E_1 - E_2 \\ -E_3 \end{bmatrix}$$

$$\begin{bmatrix} 40 & -20 \\ -20 & 50 \end{bmatrix} \begin{bmatrix} I_1 \\ I_2 \end{bmatrix} = \begin{bmatrix} -60 \\ -60 \end{bmatrix}$$

$$I_1 = -2.625A \left(\frac{15.1}{100} \right); I_2 = -2.25A \left(\frac{15.1}{100} \right)$$

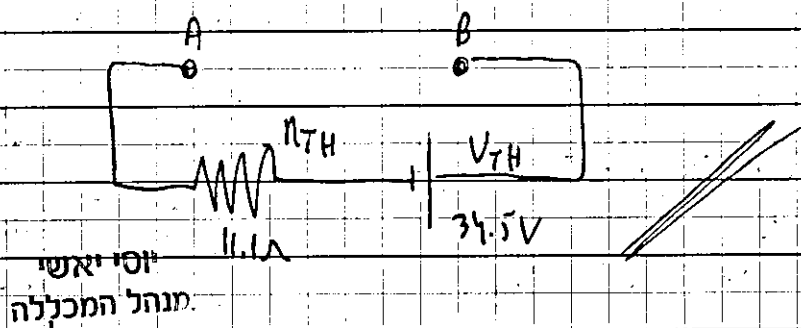
$$V_{AB} = -I_2 R_4 + E_3 - E_4 + I_3 R_5$$

$$V_{AB} = -R_4 \cdot I_2 + E_3 - E_4 + R_5 \cdot I_3$$

$$V_{AB} = -10 \cdot (-2.25) + 60 - 80 + 4 \cdot 2 = -34.5V$$

$$V_{TH} = 34.5V$$

160) גל מתח כניסתי (קוטר) $B = 1A$



$$P_{R_L \max} \quad R_L = R_{TH} = 11.1\Omega$$

$$P_{R_L \max} = \frac{\left(\frac{V_{TH}}{2}\right)^2}{R_L} = \frac{\left(\frac{34.5}{2}\right)^2}{11.1} = 26.807 \text{ (W)}$$

$$u_s(t) = \frac{100\sqrt{2}}{V_{max}} \sin\left(\frac{314}{\omega} t\right) \text{ V}$$

$$X_L = \omega L = 314 \cdot 100 \cdot 10^{-3} = 31.4 \Omega$$

$$X_C = \frac{1}{\omega C} = \frac{1}{314 \cdot 60 \cdot 10^{-6}} = 53.078 \Omega$$

$$\bar{Z}_T = \left[(R_2 + jX_L) \parallel (R_3 - jX_C) \right] + R_1$$

$$\bar{Z}_T = \left[(15 + j31.4) \parallel (40 - j53.078) \right] + 5$$

$$\bar{Z}_T = (37.818 + j21.295) \Omega = 43.401 \angle 29.384^\circ \Omega$$

$$\bar{I}_T = \frac{\bar{V}_T}{\bar{Z}_T}$$

$$\bar{U}_T = \frac{100\sqrt{2}}{\sqrt{2}} \angle 0 = 100 \angle 0^\circ \text{ V} \quad V_{rms} = \frac{V_{max}}{\sqrt{2}}$$

$$|\vec{B}| = \frac{\Phi}{A} = \frac{20 \cdot 10^{-6}}{25 \cdot 10^{-6}} = 0.8 \text{ (T)}$$

על המגנט (המגנט) על הליין.

$$|\vec{B}| = 0.8 \text{ (T)} \Rightarrow |\vec{H}| = 500 \left(\frac{\text{AT}}{\text{m}} \right)$$

$$|\vec{B}| = \mu |\vec{H}|$$

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$$\mu = \frac{|\vec{B}|}{|\vec{H}|} = \frac{0.8}{500} = 0.0016$$

$$\mu = \mu_0 \cdot \mu_r$$

$$\mu_r = \frac{\mu}{\mu_0} = \frac{0.0016}{4\pi \cdot 10^{-7}} = 1273.239$$

$$R_m = \frac{l}{\mu_0 \mu_r A}$$

$$(\mu_r = 1) \quad R_{g1} = \frac{l_{g1}}{\mu_0 A} = \frac{3 \cdot 10^{-3}}{4\pi \cdot 10^{-7} \cdot 25 \cdot 10^{-6}} = 95.492 \cdot 10^6 \left(\frac{\text{AT}}{\text{wb}} \right)$$

$$(\mu_r = 1) \quad R_{g2} = \frac{l_{g2}}{\mu_0 A} = \frac{2 \cdot 10^{-3}}{4\pi \cdot 10^{-7} \cdot 25 \cdot 10^{-6}} = 63.661 \cdot 10^6 \left(\frac{\text{AT}}{\text{wb}} \right)$$

$$R_m = \frac{l_{av} - (l_{g1} + l_{g2})}{\mu_0 \mu_r A} = \frac{95 \cdot 10^{-3}}{0.0016 \cdot 25 \cdot 10^{-6}} = 2.375 \cdot 10^6 \left(\frac{\text{AT}}{\text{wb}} \right)$$

$$R_{mT} = R_m + R_{g1} + R_{g2} = 161.528 \cdot 10^6 \left(\frac{\text{AT}}{\text{wb}} \right)$$

$$F_{mm} = \Phi_T \cdot R_{mT} = 20 \cdot 10^{-6} \cdot 161.528 \cdot 10^6 = 3230.56 \text{ AT}$$

$$F_{mm} = NI$$

$$|\vec{I}| = \frac{F_{mm}}{N} = \frac{3230.56}{360} = 10.368 \text{ (A)}$$

(17)

$$i_s(t) = \underbrace{\sqrt{2} \cdot 5}_{I_{smax}} \sin(\underbrace{314t}_{\omega t}) \text{ A}$$

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$$\bar{I}_s = \frac{5\sqrt{2}}{1} \angle 0^\circ \text{ A} \quad (1)$$

$$R_{12} = R_1 \parallel R_2 = 12 \parallel 24 = 8 \Omega$$

$$L_T = L_1 \parallel L_2 = 60 \parallel 80 = 34.285 \text{ mH}$$

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$$C_T = C_1 + C_2 = 60 + 32 = 92 \mu\text{F}$$

$$X_{LT} = \omega L_T = 314 \cdot 34.285 \cdot 10^{-3} = 10.765 \Omega \quad (2)$$

$$X_{CT} = \frac{1}{\omega C_T} = \frac{1}{314 \cdot 92 \cdot 10^{-6}} = 34.616 \Omega$$

$$\bar{Z}_{AB} = \left(\frac{1}{R_{12}} + \frac{1}{jX_{LT}} + \frac{1}{-jX_{CT}} \right)^{-1}$$

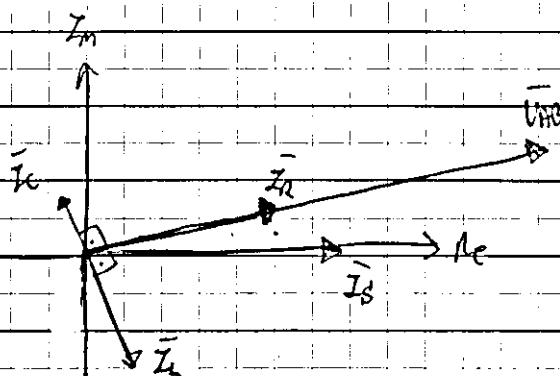
$$\bar{Z}_{AB} = \left(\frac{1}{8} + \frac{1}{j10.765} + \frac{1}{-j34.616} \right)^{-1} = (6.338 + j3.745) \Omega = 7.12 \angle 27.114^\circ$$

$$\bar{V}_{AB} = \bar{Z}_{AB} \cdot \bar{I}_s = 7.12 \angle 27.114^\circ \cdot 5 \angle 0^\circ = 35.6 \angle 27.114^\circ \text{ (V)}$$

$$\bar{I}_R = \frac{\bar{V}_{AB}}{R_{12}} = \frac{35.6 \angle 27.114^\circ}{8 \angle 0^\circ} = 4.45 \angle 27.114^\circ \text{ A} \quad (3)$$

$$\bar{I}_L = \frac{\bar{V}_{AB}}{jX_{LT}} = \frac{35.6 \angle 27.114^\circ}{10.765 \angle 90^\circ} = 3.31 \angle -62.886^\circ \text{ A}$$

$$\bar{I}_C = \frac{\bar{V}_{AB}}{-jX_{CT}} = \frac{35.6 \angle 27.114^\circ}{34.616 \angle -90^\circ} = 1.028 \angle +117.114^\circ \text{ A}$$



6. אלק

המסלול הנכון (נכון) נמצא!

$$\omega_0 = \frac{1}{\sqrt{LC}} \sqrt{\left(\frac{L}{C}\right) - R^2}$$

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(1)

$$\omega_0 = \frac{1}{\sqrt{1.5 \cdot 10^{-3} \cdot 20 \cdot 10^{-6}}} \sqrt{\frac{(1.5 \cdot 10^{-3})}{(20 \cdot 10^{-6})} - 5^2} = 5314.94 \text{ rad/sec}$$

$$f_0 = \frac{\omega_0}{2\pi} = \frac{5314.94}{2\pi} = 845.898 \text{ (Hz)}$$

המסלול הנכון (נכון) נמצא!

$$X_L = \omega_0 L = 5314.94 \cdot 1.5 \cdot 10^{-3} = 7.972 \Omega$$

$$X_C = \frac{1}{\omega_0 C} = \frac{1}{5314.94 \cdot 20 \cdot 10^{-6}} = 9.407 \Omega$$

$$\bar{Z}_T = (R_1 + jX_L) \parallel (R_2 - jX_C) = (5 + j7.972) \parallel (4 - j9.407) = 10.554 \Omega$$

$$\bar{I}_T = \frac{\bar{V}_S}{\bar{Z}_T} = \frac{60 \angle 0^\circ}{10.554 \angle 0^\circ} = 5.685 \text{ (A)}$$

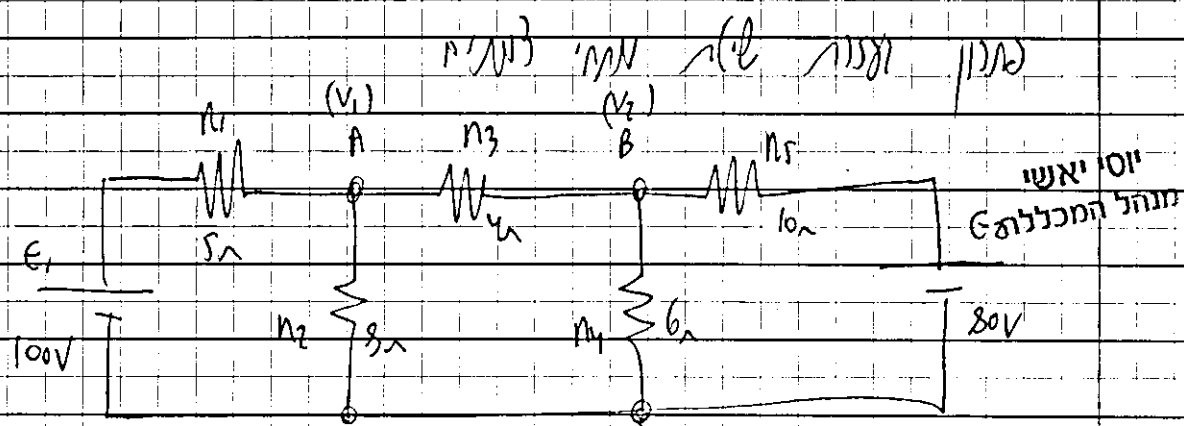
קראו את הנושא

$$\bar{I}_{R_1} = \frac{\bar{V}_S}{R_1 + jX_L} = \frac{60 \angle 0^\circ}{5 + j7.972} = 6.376 \angle -57.909^\circ \text{ A}$$

$$\bar{I}_{R_2} = \frac{\bar{V}_S}{R_2 - jX_C} = \frac{60 \angle 0^\circ}{4 - j9.407} = 5.869 \angle 66.969^\circ \text{ A}$$

$$\bar{V}_{XY} = -\bar{V}_{R_1} + \bar{V}_{R_2} = -R_1 \cdot \bar{I}_{R_1} + R_2 \cdot \bar{I}_{R_2} = -5 \cdot 6.376 \angle -57.909^\circ + 4 \cdot 5.869 \angle 66.969^\circ$$

$$\bar{V}_{XY} = 49.225 \angle 99.061^\circ \text{ (V)}$$



$$\begin{bmatrix} \left(\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \right) & -\frac{1}{R_3} \\ -\frac{1}{R_3} & \left(\frac{1}{R_3} + \frac{1}{R_4} + \frac{1}{R_5} \right) \end{bmatrix} \begin{bmatrix} V_1 \\ V_2 \end{bmatrix} = \begin{bmatrix} \frac{E_1}{R_1} \\ \frac{E_2}{R_5} \end{bmatrix}$$

$$\begin{bmatrix} \left(\frac{1}{5} + \frac{1}{8} + \frac{1}{4} \right) & -\left(\frac{1}{4} \right) \\ -\left(\frac{1}{4} \right) & \left(\frac{1}{4} + \frac{1}{6} + \frac{1}{10} \right) \end{bmatrix} \begin{bmatrix} V_A \\ V_B \end{bmatrix} = \begin{bmatrix} 20 \\ 8 \end{bmatrix}$$

$$V_A = 52.535 \text{ V} ; V_B = 40.923 \text{ V}$$

$$V_{AB} = V_A - V_B = 11.652 \text{ (V)} \quad (1)$$

$$I_{R_4} = \frac{V_B}{R_4} = \frac{40.923}{6} = 6.82 \text{ (A)} \quad (?)$$

$$I_{R_1} = \frac{E_1 - V_A}{R_1} = \frac{100 - 52.535}{5} = 9.485 \text{ A} \quad (2)$$

$$P_{E_1} = E_1 \cdot I_{E_1} = 100 \cdot 9.485 = 948.5 \text{ (W)}$$

$$Q_{C3} = 10 \mu\text{C}$$

$$C_{2,3} = \frac{4 \cdot 6}{4+6} = 2.4 \mu\text{F}$$

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(1)

$$C_{2,4} = C_{2,3} + C_4 = 2.4 + 3.6 = 6 \mu\text{F}$$

$$C_T = \frac{12 \cdot 6}{18} = 4 (\mu\text{F})$$

$$Q_{C3} = Q_{C2} = 10 \mu\text{C}$$

(2)

$$U_{C2,3} = \frac{Q_{C2,3}}{C_{2,3}} = \frac{10 \cdot 10^{-6}}{2.4 \cdot 10^{-6}} = 4.166 \text{ V}$$

$$U_{C2,3} = U_{C4} = 4.166 \text{ V}$$

$$Q_{C4} = U_{C4} \cdot C_4 = 4.166 \cdot 3.6 \cdot 10^{-6} = 15 \mu\text{C}$$

$$Q_T = Q_{C2,3} + Q_{C4} = 10 + 15 = 25 (\mu\text{C})$$

$$U_T = \frac{Q_T}{C_T} = \frac{25 \cdot 10^{-6}}{4 \cdot 10^{-6}} = 6.25 (\text{V})$$

(3)