

Çözümler - 3 (1)

$$1-) i_s(t) = \begin{cases} 20t \text{ mA} & 0 < t < 1 \\ 20 \text{ mA} & 1 < t < 3 \\ -50 + 10t & 3 < t < 5 \end{cases} \text{ olur.}$$

$$C_{eq} = 4 + 6 = 10 \mu\text{F' dir.}$$

$$v = \frac{1}{C_{eq}} \int_0^t i \, dt + v(0)$$

\*  $0 < t < 1$  için ;

$$v = \frac{10^{-3}}{10 \cdot 10^{-6}} \int_0^t 20t \, dt + 0 = t^2 \text{ kV}$$

\*  $1 < t < 3$  için ;

$$v = \frac{10^3}{10} \int_1^t 20 \, dt + v(1) = 2(t-1) + 1 \text{ kV} = 2t - 1 \text{ kV}$$

\*  $3 < t < 5$  için ;

$$v = \frac{10^3}{10} \int_3^t 10(t-5) \, dt + v(3) = \left( \frac{t^2}{2} - 5t \right) \Big|_3^t + 5 \text{ kV}$$

$$= \frac{t^2}{2} - 5t + 15.5 \text{ kV} \text{ olur.}$$

0 halde ;

$$v(t) = \begin{cases} t^2 \text{ kV} ; 0 < t < 1 \\ 2t - 1 \text{ kV} ; 1 < t < 3 \\ \frac{t^2}{2} - 5t + 15.5 \text{ kV} ; 3 < t < 5 \end{cases}$$

$$\Rightarrow \bar{i}_1 = C_1 \frac{dV}{dt} = 6 \cdot 10^{-6} \cdot \frac{dV}{dt} \text{ olur.}$$

$$\Rightarrow \bar{i}_1 = \begin{cases} 12t \text{ mA} & ; 0 < t < 1 \\ 12 \text{ mA} & ; 1 < t < 3 \\ 6t - 30 \text{ mA} & ; 3 < t < 5 \end{cases} \text{ ve}$$

$$\bar{i}_2 = C_2 \frac{dV}{dt} = 4 \cdot 10^{-6} \frac{dV}{dt} \text{ dir.}$$

$$\Rightarrow \bar{i}_2 = \begin{cases} 8t \text{ mA} & ; 0 < t < 1 \\ 8 \text{ mA} & ; 1 < t < 3 \\ 4t - 20 \text{ mA} & ; 3 < t < 5 \end{cases} \text{ olur.}$$

$$2-) * C_{\text{eş}} = 20 + 40 = 60 \Rightarrow \frac{1}{12} + \frac{1}{60} \Rightarrow C_{\text{eş}} = 10 \mu\text{F}$$

$$V_1 = \frac{10^{-3}}{12 \cdot 10^{-6}} \int_0^t 30 \cdot e^{-2t} dt + V_1(0) = -1250 e^{-2t} \Big|_0^t + 50$$

$$\Rightarrow V_1 = -1250 e^{-2t} + 1300 \text{ V olur.}$$

$$V_2 = \frac{10^{-3}}{60 \cdot 10^{-6}} \int_0^t 30 e^{-2t} dt + V_2(0) = 250 e^{-2t} \Big|_0^t + 20$$

$$\Rightarrow V_2 = -250 e^{-2t} + 270 \text{ V olur.}$$

\*  $t = 0.5 \text{ s}$  için ;

$$V_1 = -1250 e^{-1} + 1300 = 840.2, \quad V_2 = -250 e^{-1} + 270 = 178.03$$

$$W_{12\mu\text{F}} = \frac{1}{2} \cdot 12 \cdot 10^{-6} \cdot (840.2)^2 = 4.235 \text{ J}$$

$$W_{20\mu\text{F}} = \frac{1}{2} \cdot 20 \cdot 10^{-6} \cdot (178.03)^2 = 0.3169 \text{ J}$$

$$W_{40\mu\text{F}} = \frac{1}{2} \cdot 40 \cdot 10^{-6} \cdot (178.03)^2 = 0.6339 \text{ J}$$

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$$3-) \quad \bar{i} = \frac{1}{L} \int_0^t v(t) dt + i(0) = \frac{1}{10} \int_0^t v(t) dt - 1 \quad \text{dir.}$$

\*  $0 < t < 1$  için ;

$$\bar{i} = \frac{30}{10} \int_0^t dt - 1 = 3t - 1 \text{ A}$$

\*  $1 < t < 2$  için ;

$$\bar{i} = 0 + \bar{i}(1) = 0 + 2 = 2 \text{ A}$$

\*  $2 < t < 3$  için ;

$$\bar{i} = \frac{30}{10} \int_2^t dt + \bar{i}(2) = 3(t-2) + 2 = 3t - 4 \text{ A}$$

\*  $3 < t < 4$  için ;

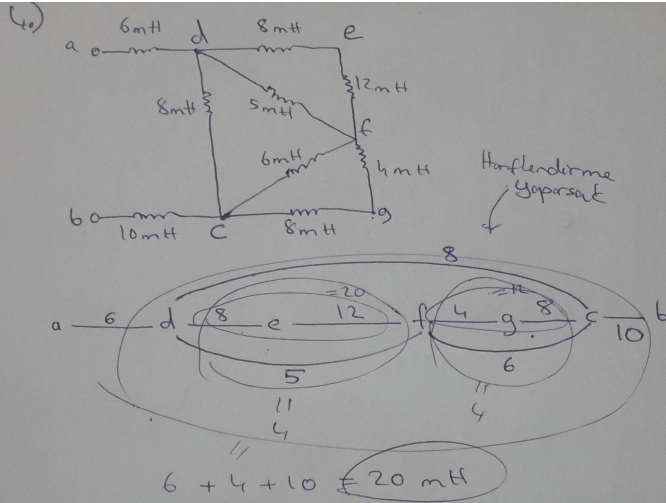
$$\bar{i} = 0 + \bar{i}(3) = 5 \text{ A}$$

\*  $4 < t < 5$  için ;

$$\bar{i} = \frac{30}{10} \int_4^t dt + \bar{i}(4) = 3(t-4) + 5 = 3t - 7 \text{ A}$$

0 halde ;

$$\bar{i}(t) = \begin{cases} 3t - 1 \text{ A} & ; 0 < t < 1 \text{ için} \\ 2 \text{ A} & ; 1 < t < 2 \text{ için} \\ 3t - 4 \text{ A} & ; 2 < t < 3 \text{ için} \\ 5 \text{ A} & ; 3 < t < 4 \text{ için} \\ 3t - 7 \text{ A} & ; 4 < t < 5 \text{ için} \end{cases}$$



5.)  $L_{ef} = 40 \text{ mH}$  olur.

$$V = L_{ef} \cdot \frac{di}{dt} \rightarrow i = \frac{1}{L_{ef}} \int v(t) dt + i(0)$$

$$= \frac{10^{-3}}{40 \cdot 10^{-3}} \int_0^t 12 \cdot e^{-3t} dt + i(0) = -0.1(e^{-3t} - 1) + i(0)$$

Akım bölünmesinden ;

$$i_1 = \frac{3}{4} i \text{ ve } i_2 = \frac{1}{4} i \text{ 'dir.}$$

$$i_1(0) = \frac{3}{4} i(0) \text{ ve } 0.75 i(0) = -0.01 \Rightarrow i(0) = -0.01333$$

$$i_2 = \frac{1}{4} i \Rightarrow i_2 = \frac{1}{4} (-0.1e^{-3t} + 0.08667) \text{ A}$$

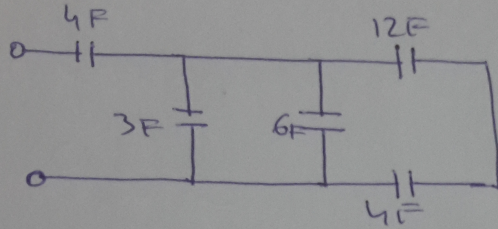
$$\Rightarrow i_2 = -25e^{-3t} + 21.67 \text{ mA} \Rightarrow i_2(0) = -25 + 21.67$$

$$\Rightarrow i_2(0) = -3.33 \text{ mA} \text{ olur.}$$

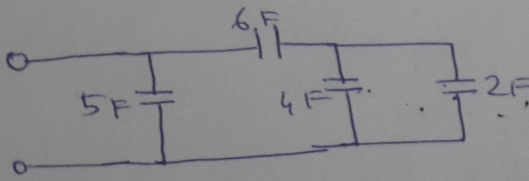
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$$i_1(t) = \frac{3}{4} (-0.1e^{-3t} + 0.08667) A = -75e^{-3t} + 65 \text{ mA}$$

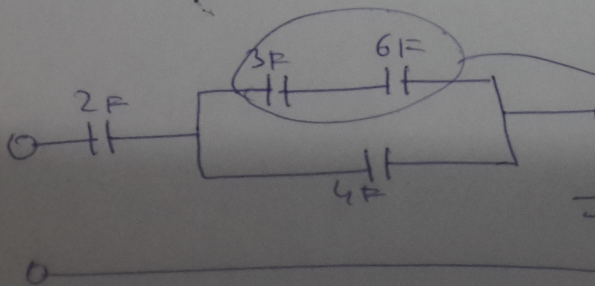
6.)



→ 4-12 → seridir → 3F  
3-3-6 paraleldir → 12F  
4-12 seridir →  $C_{eq} = 3F$



→ 2-4 paraleldir → 6F  
6-6 seridir → 3F  
3-5 paraleldir →  $C_{eq} = 8F$



seridir → 2F  
2-4 paralel → 6F  
3-2-6 seridir →  $C_{eq} = 1F$