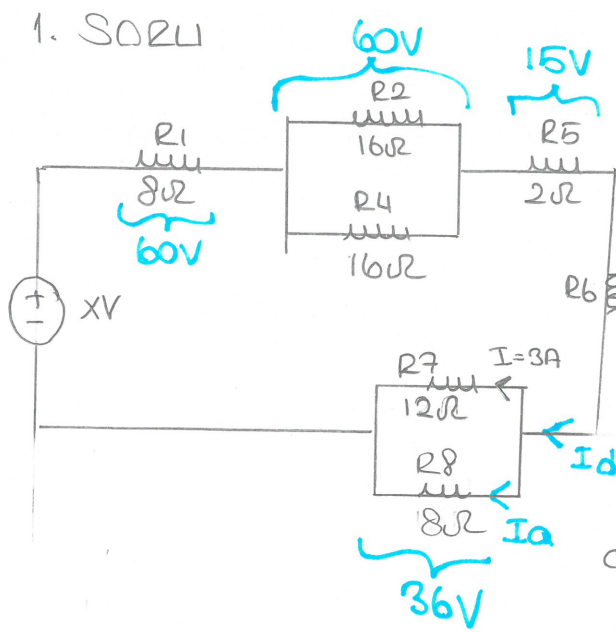


1. SORU



DEVRE GERİLİMİ = ?

Paralel dirençlerin gerilimleri eşittir
Yani

$$(12\Omega) \times (3A) = (8\Omega) \times (I_a)$$

$$36 = (8\Omega) \times (I_a)$$

$$I_a = 4,5$$

Kirchoff akım yasasına göre giren akımlar çıkan akımlara eşittir yani

$$I_d = I_a + 3A \Rightarrow I_a \text{ yı yerine koyarsak}$$

$$I_d = 4,5A + 3A = 7,5A \text{ Bulunur. (Ana koldan geçen akım)}$$

⇒ R2 // R4 olduğu için R2 ve R4 üzeri gerilimlerde aynı olacaktır.
($V_{R2} = V_{R4}$)

⇒ Vx'yi bulmak için tüm dirençler üzerindeki gerilimleri toplanır.

$$R_1 \text{ gerilimi} = 8 \cdot 7,5 = 60V$$

$$R_2 // R_4 \Rightarrow R_{es} = 8\Omega \Rightarrow 8 \cdot 7,5 = 60V$$

$$R_5 \text{ gerilimi} \Rightarrow 2 \cdot 7,5 = 15V$$

$$R_6 \text{ gerilimi} \Rightarrow 10 \cdot 7,5 = 75V$$

$$R_7 // R_8 \Rightarrow R_{es} = \frac{24}{5} \cdot 7,5 = 36V$$

$$\text{TOPLAM} = V_x$$

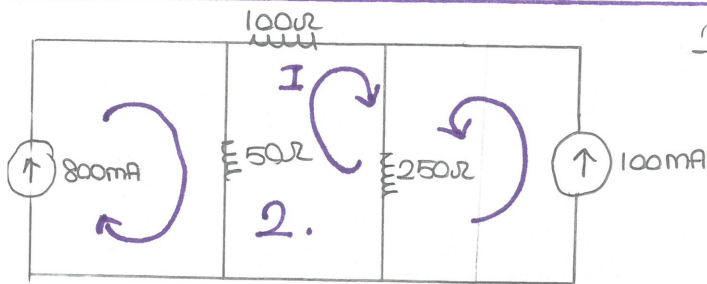
$$V_x = 60 + 60 + 15 + 75 + 36$$

$$V_x = 246V$$

* Esdeğer direnç bulma
dan paralel bağlı 2
dirençten 1'inin
gerilimini bularakta
çözülebilir. ($R_7 \cdot 3 = 36$)
($R_8 \cdot 4,5 = 36$)

2. SORU

GEVRE AKIMLA
I AKIMINI
HESAPLAYINIZ



mA ları A'ya dönüştür. ($100mA = 1A$) ($1mA = 10^{-3}A$)

$$800mA = 0,8A$$

$$100mA = 0,1A$$

2 Numaralı bölme için Gevre akım denklemi yazılır

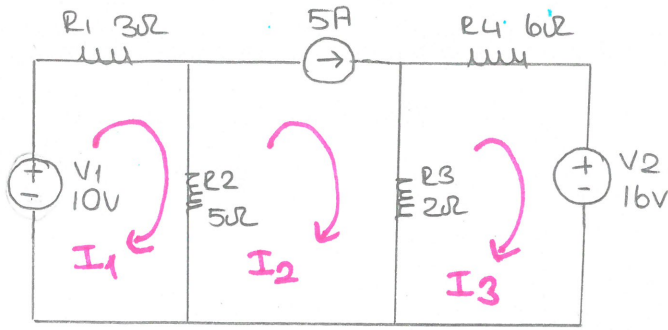
$$\Rightarrow 50 \cdot (I - 0,8) + 100 \cdot I + 250(I + 0,1) = 0$$

$$\Rightarrow 50I - 40 + 100I + 250I + 25 = 0$$

$$\Rightarrow 400I - 15 = 0$$

$$\Rightarrow I = 0,0375A \text{ bulunur.}$$

3. SORU



I_1, I_2, I_3 AKIMLARINI BULUNUZ.

I_1 için Kirschoff gerilim kanunu: $-V_1 + I_1 \cdot R_1 + R_2(I_1 - I_2) = 0$

$$-10 + 3 \cdot I_1 + 5I_1 - 5I_2 = 0$$

$$8I_1 - 5I_2 = 10 \text{ bulunur} \Rightarrow 1. \text{ denklem}$$

$$I_2 = 5A$$

I_3 için Kirschoff gerilim kanunu: $R_3(I_3 - I_2) + R_4 \cdot I_3 + V_2 = 0$

$$2(I_3 - I_2) + 6 \cdot I_3 + 16 = 0$$

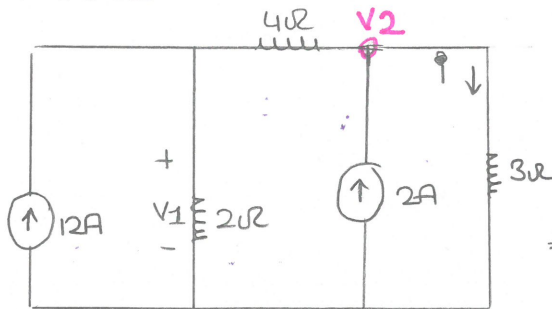
$$8I_3 - 2I_2 = -16 \Rightarrow 2. \text{ Denklem}$$

$I_2 = 5$ olduğundan 1. ve 2. denklemden yerine yazılır.

$$8I_1 - 5 \cdot 5 = 10 \Rightarrow 8I_1 = 35 \Rightarrow \underline{\underline{I_1 = 4,375A}}$$

$$8I_3 - 2 \cdot 5 = -16 \Rightarrow 8I_3 = -6 \Rightarrow \underline{\underline{I_3 = -0,75A}} \quad * (-) \text{ akım yoktur. } (-) \text{ yönü belirtir}$$

4. SORU



DİĞER GERİLİMLERİ YÖNTEMİYLE V_1 ve I yi BULUNUZ

$$-12 + \frac{V_1}{2} + \frac{V_1 - V_2}{4} = 0 \Rightarrow 4 \text{ ile denklemin iki tarafını çarpalım}$$

$$\Rightarrow -48 + 2V_1 + V_1 - V_2 = 0 \Rightarrow \underline{\underline{3V_1 - V_2 = 48}} \quad (1. \text{ DENKLEM})$$

$$\frac{V_2 - V_1}{4} - 2 + \frac{V_2}{3} = 0 \Rightarrow \text{denklemin 2 tarafında 12 ile çarp}$$

$$3V_2 - 3V_1 - 24 + 4V_2 = 0 \Rightarrow \underline{\underline{7V_2 - 3V_1 = 24}} \quad (2. \text{ DENKLEM})$$

* Taraf tarafa 2 denklemin toplama

$$3V_1 - V_2 = 48$$

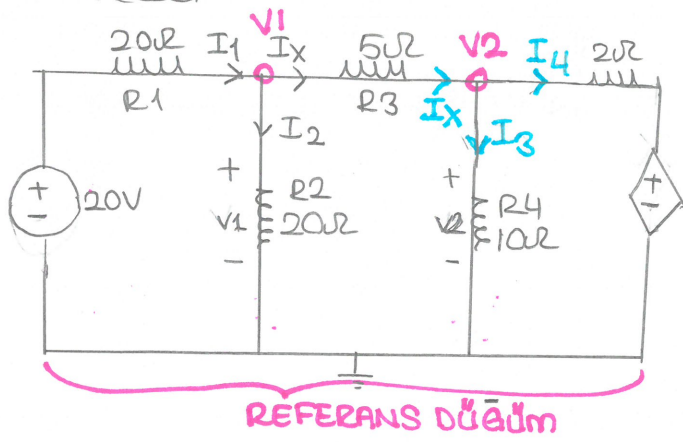
$$+ 7V_2 - 3V_1 = 24$$

$$\underline{\underline{6V_2 = 72}}$$

$$\underline{\underline{V_2 = 12V}} \Rightarrow 1 \text{ numaralı denklemden yerine koyarsak } V_1 = 20V \text{ bulunur}$$

$$I = V_2 / 3 \Rightarrow \underline{\underline{I = 12 / 3 = 4A}}$$

3. DÜĞÜM



DÜĞÜM GERİLİMLERİ YÖNTEMİ İLE
 I_x AKIMINI
 5Ω DİRENTE HARCANAN GÜÇÜ
 HESAPLAYINIZ. (R_3 TE)

$$I_x = \frac{V_1 - V_2}{5} \quad 1. \text{ denkleme}$$

V_1 için;

$$I_1 = I_x + I_2$$

$$\frac{20 - V_1}{20} = \frac{V_1 - V_2}{5} + \frac{V_1}{20}$$

(10) (4)

$$200 - 10V_1 = 4V_1 - 4V_2 + V_1$$

$$15V_1 - 4V_2 = 200 \Rightarrow 2. \text{ Denkleme}$$

V_2 için;

$$I_x = I_3 + I_4$$

$$\frac{V_1 - V_2}{5} = \frac{V_2}{10} + \frac{V_2 - 8I_x}{20}$$

(2) (5)

$$2V_1 - 2V_2 = V_2 + 5V_2 - 40I_x$$

$$2V_1 = 8V_2 - 40I_x \Rightarrow V_1 = 4V_2 - 20I_x \quad 3. \text{ denkleme}$$

3. denkleme ile I_x görüldüğümüz yere 1. denkleme koyulursa

$$V_1 = 4V_2 - 20I_x \Rightarrow V_1 = 4V_2 - 20 \cdot \left(\frac{V_1 - V_2}{5} \right) \Rightarrow V_1 = 4V_2 - 4V_1 + 4V_2 \Rightarrow 5V_1 = 8V_2$$

4. DENKLEM

4. denkleme ile 2. denkleme birleştirirsek

$$3 \cdot (5V_1) = (8V_2) \cdot 3 \Rightarrow 15V_1 = 24V_2 \Rightarrow 2. \text{ denkleme } 15V_1 \text{ yerine } 24V_2 \text{ yaz}$$

$$24V_2 - 4V_2 = 200 \Rightarrow \underline{V_2 = 10} \Rightarrow 4. \text{ denkleme } \text{yerine koy} \Rightarrow \underline{V_1 = 16V}$$

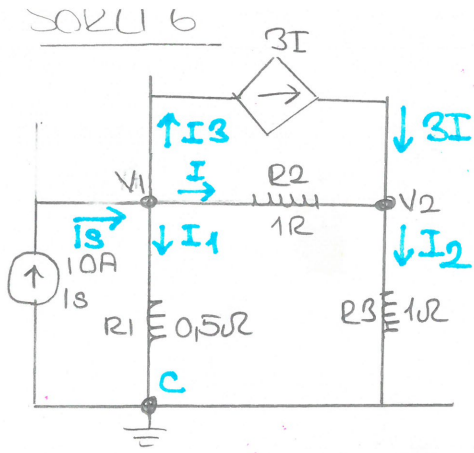
V_1 ve V_2 değerlerini 1. denkleme koy.

$$I_x = \frac{16 - 10}{5} = 1.2A$$

$$\text{GÜÇ DENKLEMİ } P = V \cdot I \Rightarrow R_3 (5\Omega) \text{ da harcanan güç } \Rightarrow P_{5\Omega} = I^2 \cdot R = (1.2)^2 \cdot 5$$

$$P_{5\Omega} = 7.2W$$

SORU 6



V_1 ve V_2 gerilimlerini düğüm yöntemiyle bulunuruz

I akımını ve 1ohm'lık R_2 direnci üzerine düşen gerilimi hesaplarız

* Gerilim yönteminden

$$I = \frac{V_1 - V_2}{R_2} \Rightarrow R_2 = 1\Omega \text{ olduğundan } I = V_1 - V_2 \text{ 1. denkleme}$$

V_1 düğümü

$$I_s - 3I - I - I_1 = 0$$

$$10 - 4I - I_1 = 0$$

$$10 - 4(V_1 - V_2) - \frac{(V_1 - V_c)}{(0,5)} = 0$$

* $V_c = 0 \Rightarrow$ (toprağa bağlı)

$$\Rightarrow 10 - 4V_a + 4V_b - 2V_a = 0$$

$$-6V_a + 4V_b = -10$$

2. Denkleme

V_2 düğümü

$$I + 3I - I_2 = 0$$

$$4I - I_2 = 0$$

$$I = (V_1 - V_2)$$

$$4(V_1 - V_2) - \left(\frac{V_2 - V_c}{1} \right) = 0$$

$$4V_1 - 4V_2 - V_2 = 0$$

$$4V_a - 5V_b = 0$$

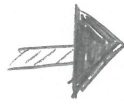
3. Denkleme

* Gerilimden I_2

$$\frac{V_2 - V_c}{1} = 0$$

$$2/ -6V_1 + 4V_2 = -10$$

$$3/ 4V_1 + 5V_2 = 0$$



$$-12V_1 + 8V_2 = -20$$

$$+ 12V_1 - 15V_2 = 0$$

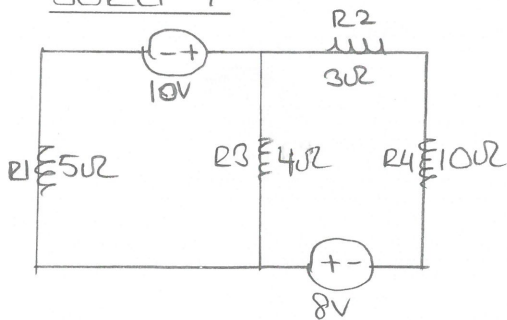
$$-7V_2 = -20$$

$$V_2 = 2,85V$$

$$V_1 = 3,57V$$

$$I = (V_1 - V_2) = 0,72 \quad V_{R_2} = 1\Omega \cdot (0,72) = 0,72V$$

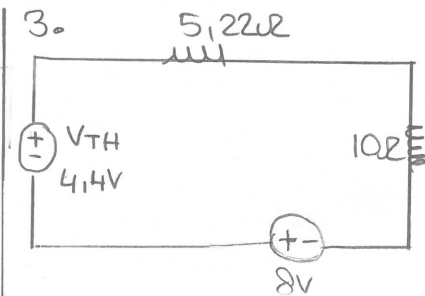
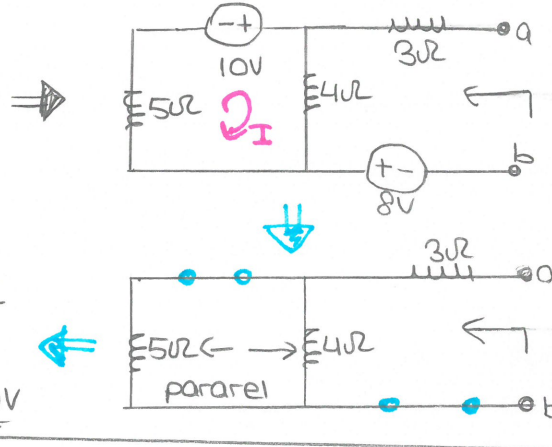
SORU 7



$$1. R_{TH} = \frac{5 \cdot 4}{5 + 4} + 3 \Rightarrow R_{TH} = 5,22\Omega$$

$$2. V_{TH} = I \cdot 4\Omega = \frac{10}{5 + 4} \cdot 4 = 4,44V$$

10 Ohm'lık R_4 direnci üzerindeki akım ve gerilim thevenin teoremi ile bulunuruz



$$V_{TH} = 8 + 4,44 = 12,44V$$

$$R_{TH} = 5,22 + 10 = 15,22\Omega$$

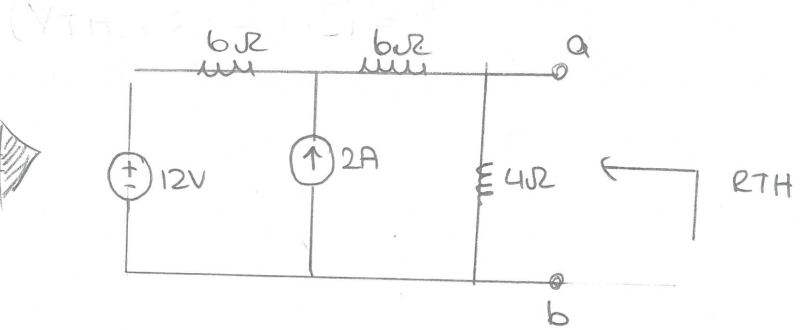
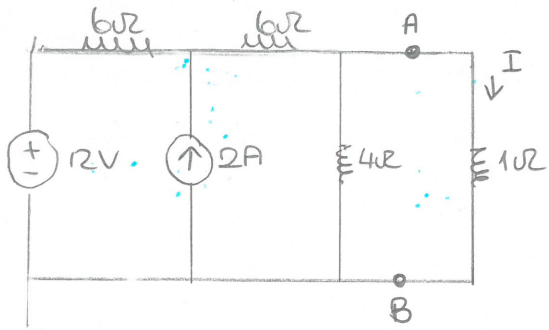
$$I_T = \frac{12,44}{15,22} = 0,817A$$

$$V_4 = (0,817) \cdot (10) = 8,17V$$

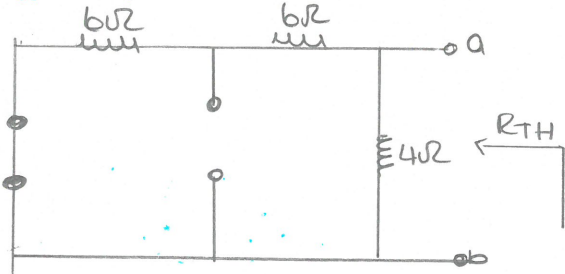
$$I_4 = 0,817A$$

0. SKK4

(V_{TH} , R_{TH} , $I = ?$)



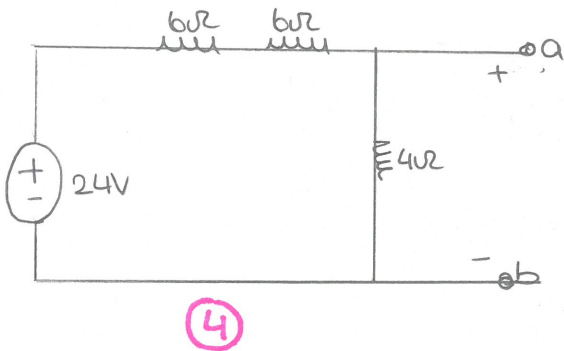
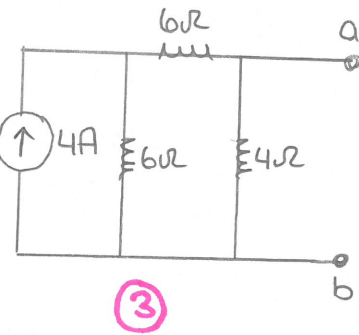
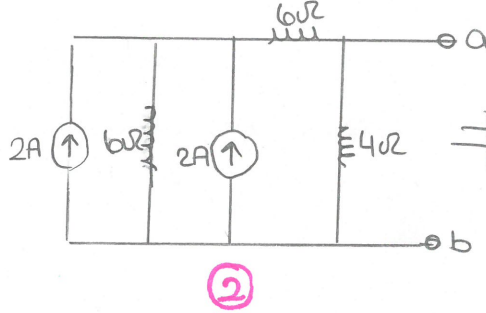
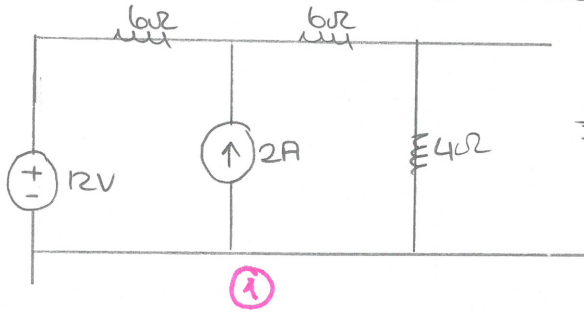
1) R_{TH}



$$L_{TH} = 6 + 6 = 12$$

$$R_{TH} = \frac{12 \cdot 4}{12 + 4} = \underline{\underline{3\Omega}}$$

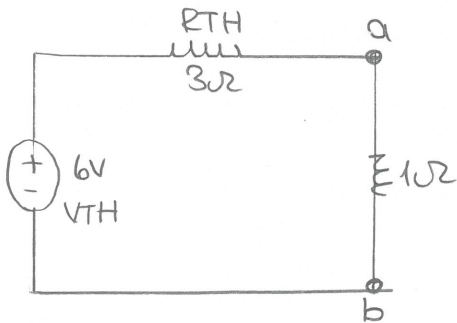
2) V_{TH} (kaynak dönüşümü ile)



$$\Rightarrow V_{TH} = \frac{24 \cdot 4}{6 + 6 + 4} = 6V$$

$$\underline{\underline{V_{TH} = 6V}}$$

3) THEVENIN ESDEĞER DEVRE GİZİMİ

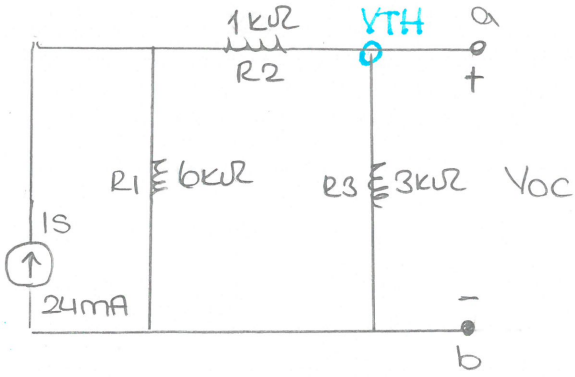


$$I = ?$$

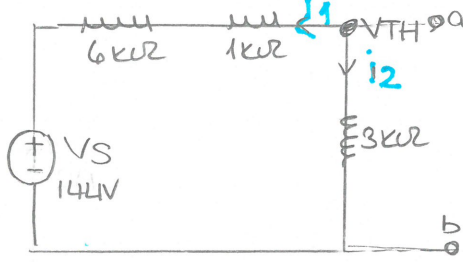
$$I = \frac{V}{R} = \frac{6}{4} = \underline{\underline{1.5A}}$$

9. SORU:

THEVENİN EŞDEĞER DEVRESİNİ BUL.



KAYNAK DÖNÜŞTÜRME YAPILARAK ALTAKİ DEVRE GİZİLİR



$$V_S = 24\text{mA} \cdot 6\text{k} = 144\text{V}$$

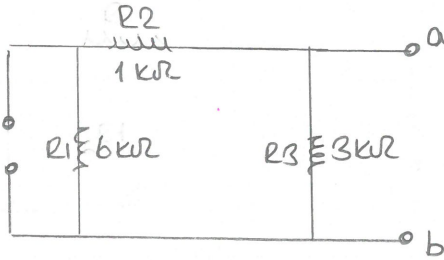
DÜĞÜM GERİLİMLERİ İLE

$$\frac{V_{TH} - 144}{7\text{k}\Omega} + \frac{V_{TH}}{3\text{k}\Omega} = 0$$

(3) (7)

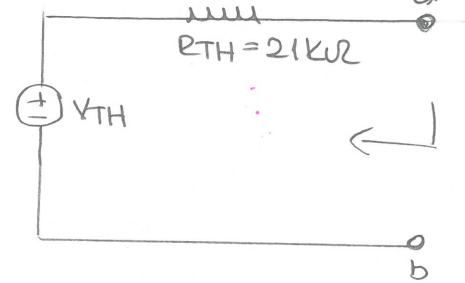
$$\left. \begin{array}{l} 1\text{k}\Omega = 10^3\Omega \\ 1\Omega = 10^{-3}\text{k}\Omega \end{array} \right\} \text{*Gevrimleri yap}$$

$$\Rightarrow 3V_{TH} - 432 + 7V_{TH} = 0 \Rightarrow 10V_{TH} = 432 \Rightarrow V_{TH} = 43,2\text{V}$$



$$R_{TH} = \frac{7 \cdot 3}{7 + 3} = 2,1\text{k}\Omega$$

EŞDEĞER DEVRE



10. SORU

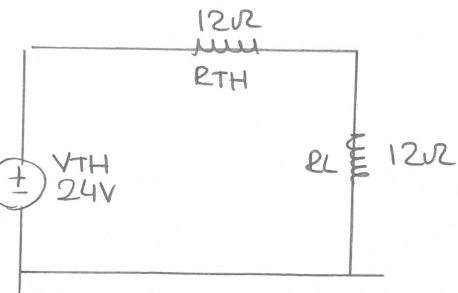
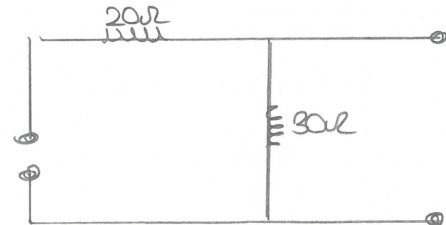
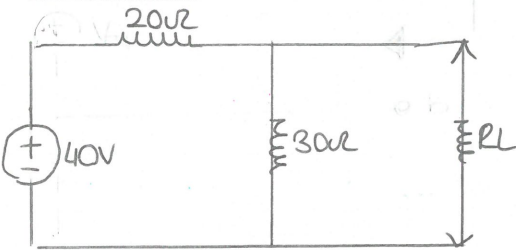
MAX GÜÇ TRANSFERİ İÇİN R_L NE OLMALIDIR
 P_{RL} NE OLMALIDIR (P_{max})=?

$$V_{TH} = V_{ab} = \frac{30}{30 + 20} \cdot 40 = 24\text{V}$$

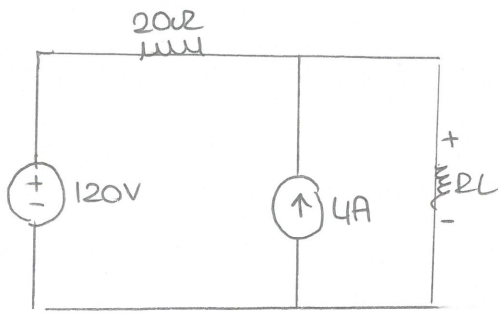
$$R_{TH} = \frac{20 \cdot 30}{20 + 30} = 12\Omega \Rightarrow R_L = 12\Omega$$

$$P_{RL} (P_{max}) = i^2 \cdot R_L$$

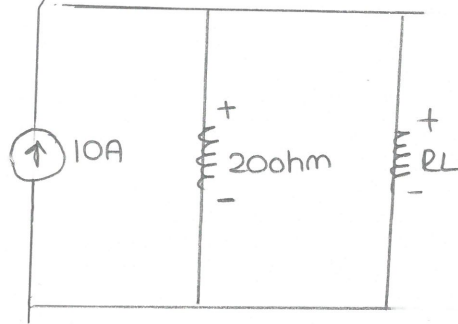
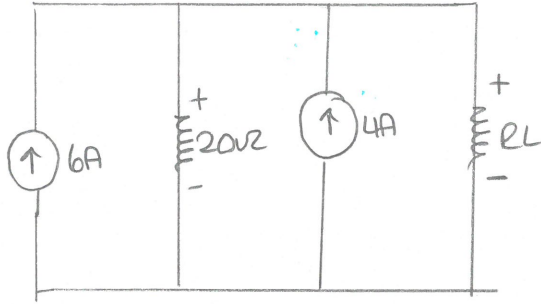
$$P_{max} = \left(\frac{V_{TH}}{R_{TH} + R_L} \right)^2 \cdot R_L \Rightarrow P_{max} = \left(\frac{24}{12 + 12} \right)^2 \cdot 12 = 12\text{W}$$



11. SORU

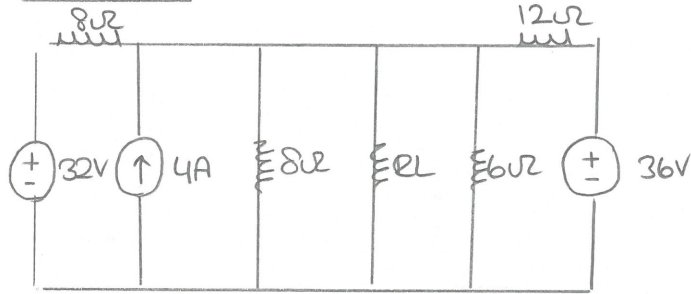


P MAX için $R_L = ?$



$$R_L = R_p = \underline{20\Omega}$$

12. SORU



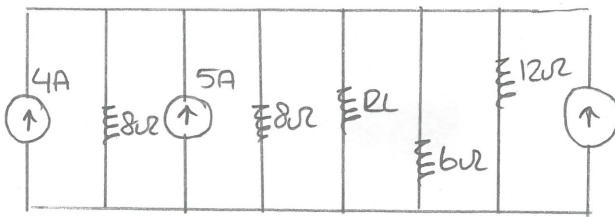
GÜCÜN MAKS OLMASI İÇİN R_L KAG OLMU

* R_L harici 1 akım kaynağı ve 1 paralel direnç oluşan devreye dönüşüm yapılacaktır
kaynak dönüştürme yöntemi kullanılacaktır

$\Rightarrow$ Solda 32V'lık kaynak ile 8Ω dirençten bir akım kaynağı yapalım. ($I_1 = 32/8 = 4A$)

$\Rightarrow$ Sağ taraftaki 36 voltluk gerilim kaynağı ile 12Ω'lık dirençten akım kaynağı yapalım. ($I_2 = 36/12 = 3A$)

OLLUŞAN DEVRE



R_L harici tüm dirençlerin eşdeğer direnci R_S olsun

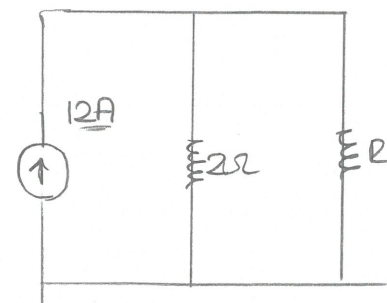
$$R_S = 1/8 + 1/8 + 1/6 + 1/12$$

$$R_S = 2\Omega$$

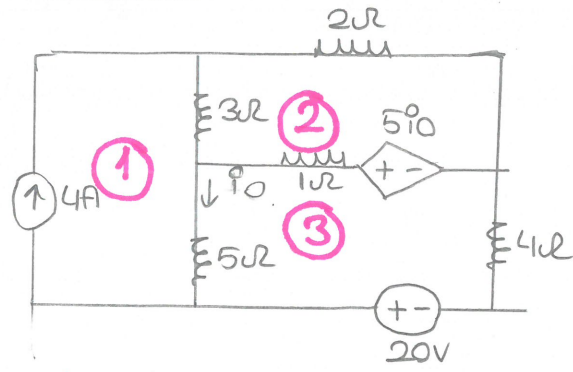
$\Rightarrow$ Akım toplamaları I_S olsun

$$I_S = 4 + 5 + 3 = 12A$$

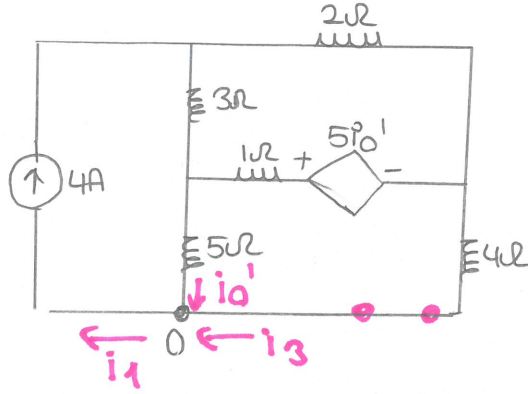
OLLUŞAN DEVRE



$\Rightarrow R_L$ üzerindeki direncin maks olması için $R_L = 2\Omega$ olmalıdır
 $\Rightarrow R_L = 2\Omega$ olduğuna göre
 $\Rightarrow I_L = \frac{12 \cdot 2}{4} = 6A$
 $\Rightarrow V_L = 6 \cdot 2 = 12V$
 $\Rightarrow P_L = I^2 \cdot R = 36 \cdot 2 = \underline{72W}$



i_0' AKIMI İÇİN DEVRE



i_0 AKIMINI SUPERPOZİSYONLA BULUNUZ.

$$\Rightarrow i_0 = i_0' + i_0'' \quad \text{1. denklemler}$$

$$\Rightarrow i_1 = 4A \quad \text{2. denklemler}$$

$$\Rightarrow \text{Gevre 2 için}$$

$$-3i_1 + 6i_2 - 1i_3 - 5i_0' = 0 \quad \text{3. denklemler}$$

$$\Rightarrow \text{Gevre 3 için}$$

$$-5i_1 - 1i_2 + 5i_3 + 1i_3 + 4i_3 + 5i_0' = 0$$

$$= -5i_1 - i_2 + 10i_3 + 5i_0' \quad \text{4. denklemler}$$

$$\Rightarrow \text{Düğüm 0 için}$$

$$i_3 = i_1 - i_0' = 4 - i_0' \quad \text{5. denklemler}$$

Denklemler 2 ve 5'i 3. denklemlerde yerine koyarsak

$$\Rightarrow -3(4) + 6i_2 - (4 - i_0') - 5i_0' = 0 \Rightarrow -12 + 6i_2 - 4 + i_0' - 5i_0' = 0$$

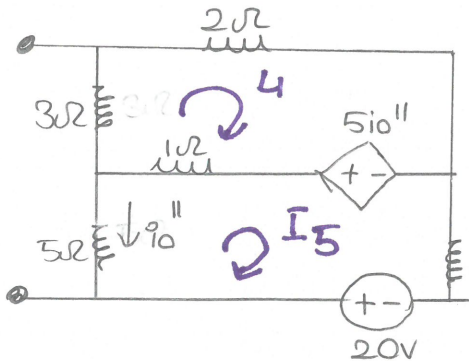
$$\Rightarrow -16 + 6i_2 - 4i_0' = 0 \Rightarrow 6i_2 - 4i_0' = 16 \Rightarrow \underline{\underline{3i_2 - 2i_0' = 0}}$$

Denklemler 2 ve 5'i 4. denklemlerde yerine koyarsak

$$\Rightarrow -5(4) - i_2 + 10(4 - i_0') + 5(i_0') = 0 \Rightarrow -20 - i_2 + 40 - 10i_0' + 5i_0' = 0$$

$$\Rightarrow -i_2 - 5i_0' = -20 \Rightarrow 5i_0' + i_2 = 20 \Rightarrow \underline{\underline{i_0' = \frac{52}{17} A}}}$$

i_0'' AKIMI İÇİN DEVRE:



4. Gevreye gerilim yasası uygulanır

$$\Rightarrow 6i_4 - i_5 - 5i_0'' = 0$$

5. Gevreye için

$$\Rightarrow -i_4 + 5(i_5) + 1(i_5) + 4(i_5) - 20V + 5i_0'' = 0$$

$\Rightarrow$ Devreden $i_5 = -i_0''$ bulunur.

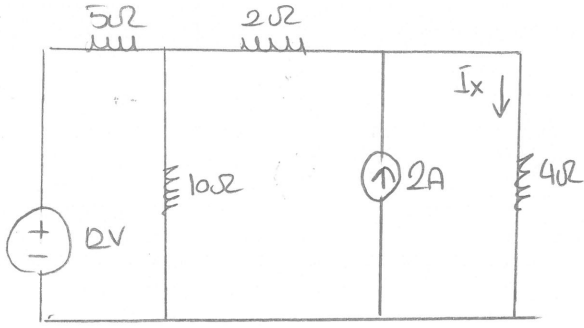
$$\Rightarrow 6i_4 - 4i_0'' = 0 \Rightarrow i_4 + 5i_0'' = -20 \Rightarrow \underline{\underline{i_0'' = -\frac{60}{17} A \text{ bulunur}}}$$

$i_0 = i_0' + i_0''$ denkleminde değerler konulur

$$\underline{\underline{i_0 = -\frac{8}{17} = -0,4706A}}$$

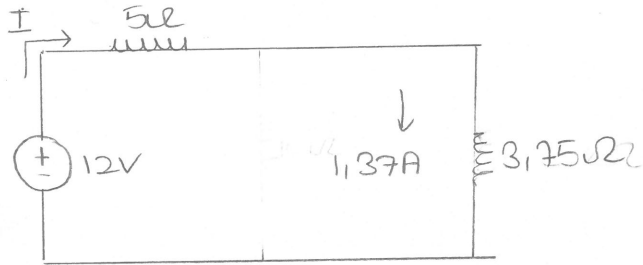
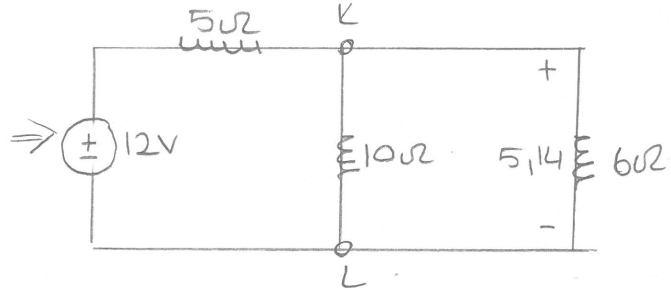
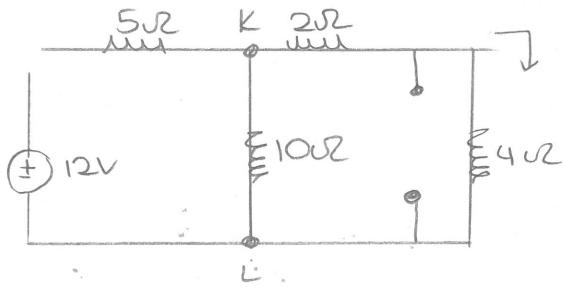
(-) yön belirtir.

14. SORU



I_x i SUPERPOZİSYONLA HESAPLAYINIZ.

1. Durum 12V aktif : diğeri "0"ı

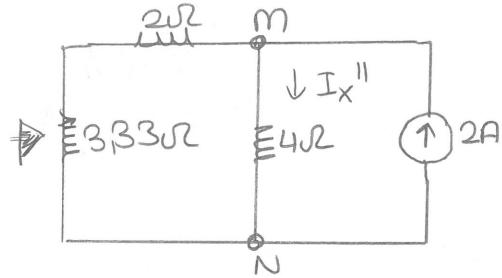
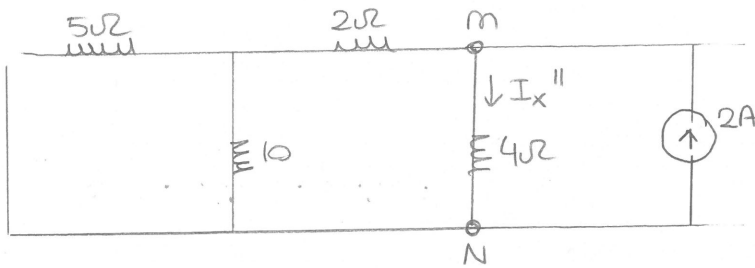


$$V_{KL} = 5,14V$$

$$I_{x'} = \frac{5,14}{6} = 0,86A$$

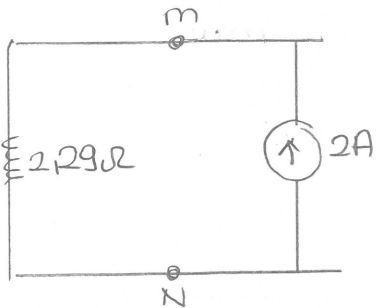
$$I = \frac{12}{8,75} = 1,37A$$

2. Durum 2A Aktif, diğeri 0'ı



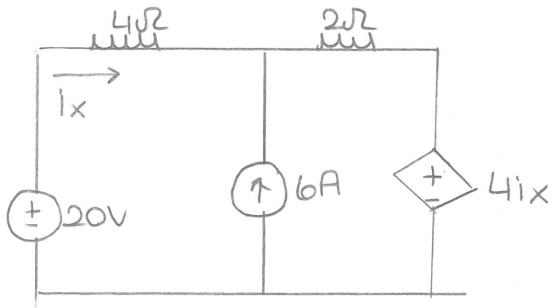
$$V_{MN} = 4,57V$$

$$I_{x''} = \frac{4,57}{4} = 1,14A$$



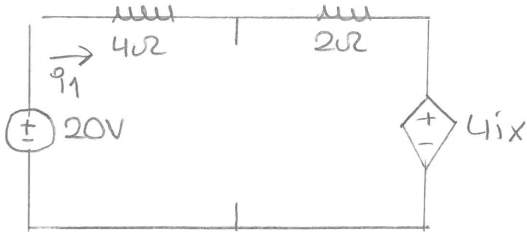
$$I_x = I_{x'} + I_{x''} = 0,84 + 1,14 = 1,98 \approx \underline{\underline{2A}}$$

15. SORU



i_x akımını superpozisyon teoremi ile hesaplayınız

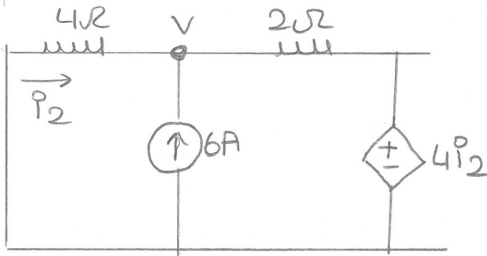
1. Durum



$$-20V + 4i_1 + 2i_1 + 4i_1 = 0$$

$$10i_1 = 20 \Rightarrow i_1 = 2A$$

2. Durum



$$V = -4i_2$$

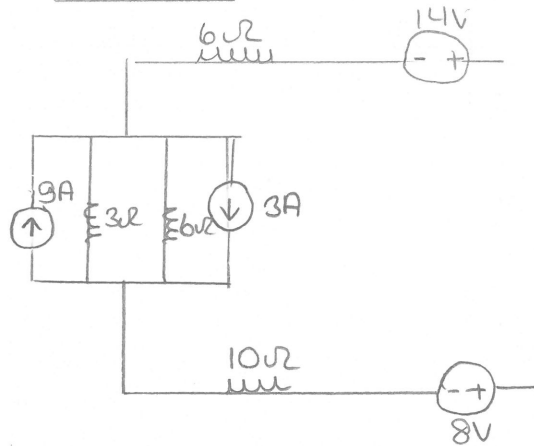
NODE V

$$\frac{V}{4} + \frac{V - 4i_2}{2} - 6 = 0$$

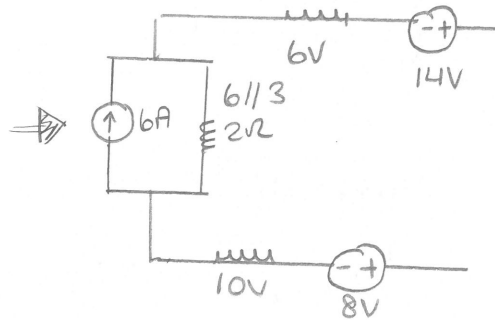
$$\Rightarrow \frac{-4i_2}{4} + \frac{-4i_2 - 4i_2}{2} = 6 \Rightarrow -4i_2 - 8i_2 - 8i_2 = 24 \Rightarrow -20i_2 = 24 \Rightarrow i_2 = -1.2A$$

$$i_x = i_1 + i_2 = 2 - 1.2 = 0.8A$$

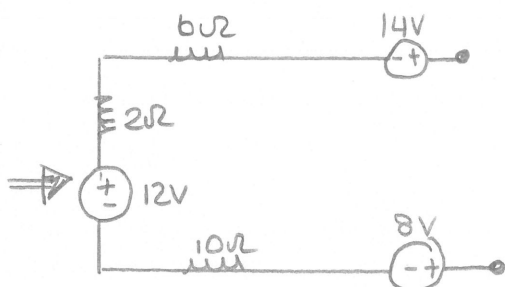
16. SORU



YANDAKİ DEVREYİ TEK VOLTAJ KAYNAKL DEVREYE DÖNÜŞTÜRÜLÜZ

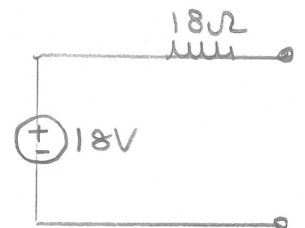


$$\Rightarrow 6A \cdot 2\Omega = 12V$$

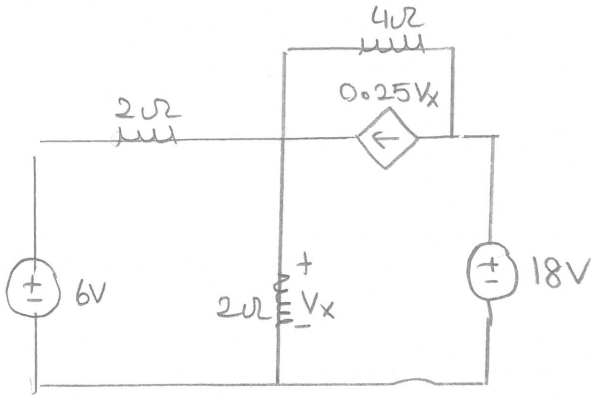


$$V_T = 14 + 12 - 8 \Rightarrow V_T = 18V$$

$$R_T = 6 + 2 + 10 = 18\Omega$$

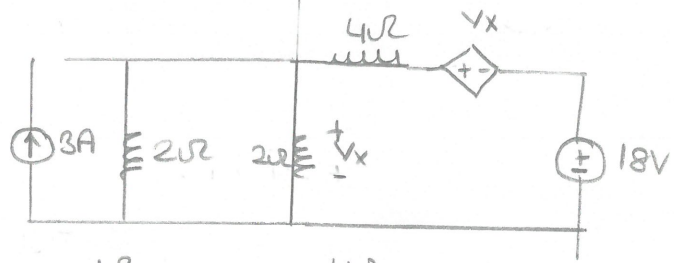


17. SORU

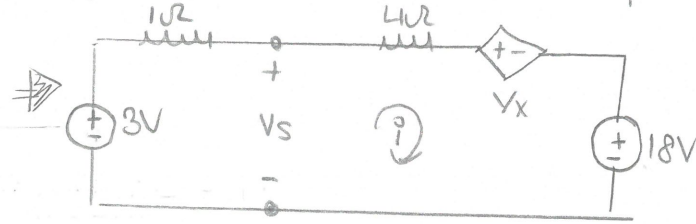


VERİLEN DEVREDE KAYNAK DÖNÜŞÜMÜNÜ KULLANARAK V_x GERİLİMİNİ BULUNUZ

6V LUK GERİLİM KAYNAĞINI 3A LUK AKIMA DÖNÜŞTÜR



⇒ AKIM KAYNAĞINI GERİLİM KAYNAĞINA DÖNÜŞTÜR



$$\Rightarrow \text{KVL UYGULARSAM} \Rightarrow -3 + 5i + V_x + 18 = 0$$

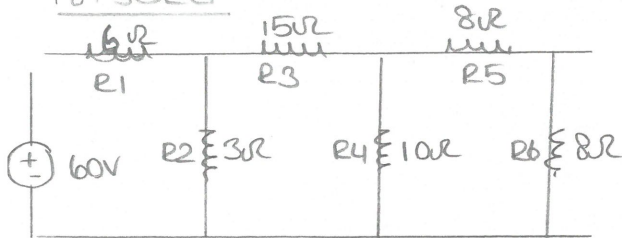
⇒ 3V LUK DEVREDE, 1Ω LUK DİRENC VE V_x GERİLİMİNİ İÇEREN GEVREDE KVL UYGULU
 $\Rightarrow -3 + 1 \cdot i + V_x = 0 \Rightarrow V_x = 3 - i$ bulunur. Sonuç ilk denkleme yerine konulur.

$$\Rightarrow 15 + 5i + 3 - i = 0 \Rightarrow i = -4.5A$$

$$\Rightarrow \text{Ana devrede KVL uygulanır.} \Rightarrow -V_x + 4i + V_x + 18 = 0 \Rightarrow i = -4.5A$$

$$\Rightarrow \text{Buradan } V_x = 3 - i = 7.5V$$

18. SORU



$R_6 = 8\Omega$ için

NORTHON ESDEĞER AKIMINI, DİRENCİNİ DEVRESİNİ BULUNUZ

R_6 ÜZERİ AKIMI (I) ve GERİLİMİ (V) BULUNUZ

⇒ R_6 kısa devre yapılarak, göz akımları bulunur. Kısa devre sonucu bulunan akım R_6 dan geçen eşdeğer akımdır.

1. Göz için

$$-60 + 6I_1 + 3(I_1 - I_2) = 0$$

$$6I_1 + 3I_1 - 3I_2 = 60$$

$$9I_1 - 3I_2 = 60 \quad (1)$$

2. Göz için

$$3(I_2 - I_1) + 15I_2 + 10(I_2 - I_3) = 0$$

$$3I_2 - 3I_1 + 15I_2 + 10I_2 - 10I_3 = 0$$

$$28I_2 - 3I_1 - 10I_3 = 0 \quad (2) \text{ denklemin}$$

3. Göz için

$$10(I_3 - I_2) + 8I_3 = 0$$

$$18I_3 - 10I_2 = 0$$

$$(3) \text{ denklemin}$$

$$3. \text{ BAĞINTIDAN BAŞLAYARAK DENK GÖZ} \Rightarrow 18I_3 - 10I_2 = 0 \Rightarrow I_3 = \frac{5I_2}{9}$$

$$\text{ÜSTTEKİ DEĞERİ KULLANARAK 2. DENK} \Rightarrow 28I_2 - 3I_1 - \frac{10 \cdot 5I_2}{9} = 0 \Rightarrow I_1 = \frac{202I_2}{27}$$

$$1. \text{ NOLU DENK GÖZ} \Rightarrow 9I_1 - 3I_2 = 60 \Rightarrow \frac{9 \cdot 202I_2}{27} - 3I_2 = 60 \Rightarrow I_2 = 0.93A$$

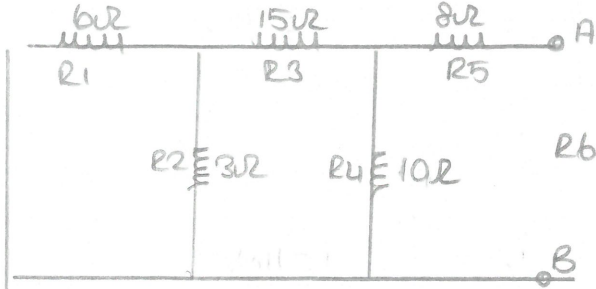
18. SORU 2 (DEVAMI)

$$I_1 = \frac{202 \cdot I_2}{27} \Rightarrow I_1 = 6,96A$$

$$I_3 = \frac{5 \cdot 12}{9} = 0,52A = I_N$$

→ I_3 NORTON ESDEĞER AKIMIDIR

NORTON ESDEĞER R İÇİN V KAYNAK KISA DEVRE YAPILSIN

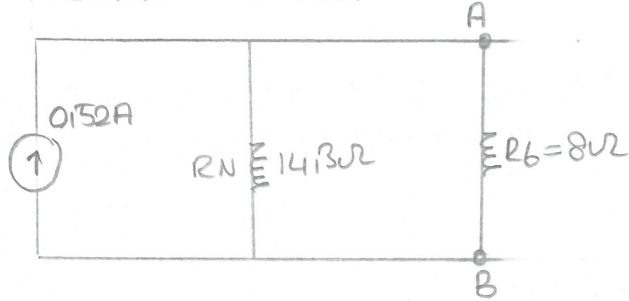


* ŞEKİLDEKİ DEVREDE A NOKTASI GİRİŞ, B NOKTASI ÇIKIŞ GİBİ DÜŞÜNÜLMEKTEDİR.

$$R_{1,2} = \frac{6 \cdot 3}{9} = 2\Omega \Rightarrow R_{1,2,3,4} = \frac{17 \cdot 10}{27} = 6,3\Omega$$

$$R_{1-5} = 6,3 + 8 = 14,3 \Rightarrow R_{eq} = 14,3 \Rightarrow R_N = 14,3$$

NORTON DEVRESİ

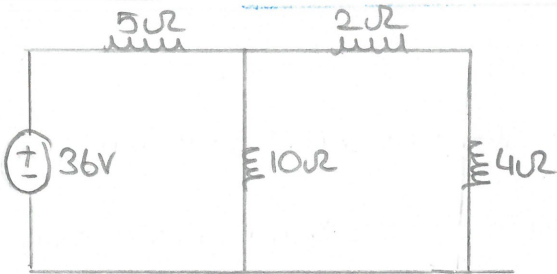


ŞİMDİ I_{R6} VE V_{R6} HESAPLA

$$I_{R6} = 0,33A$$

$$V_{R6} = 0,33 \cdot 8 = 2,64V$$

19. SORU



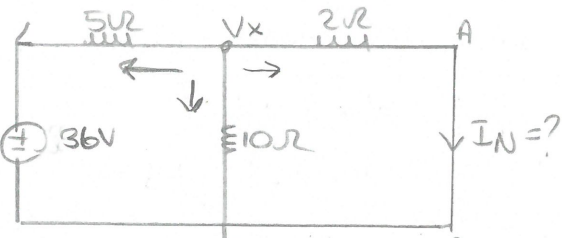
HARCANAN GÜÇÜ BULLUNUZ

$$\Rightarrow \frac{V_x - 36}{5} + \frac{V_x - 0}{10} + \frac{V_x - 0}{2} = 0$$

$$\Rightarrow U_x (1/5 + 1/10 + 1/2) = 36/5$$

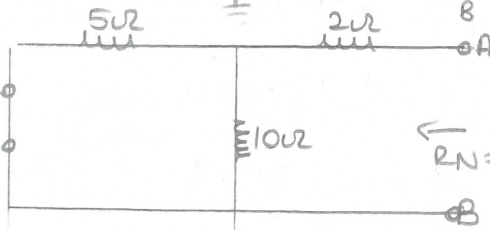
$$U_x (0,8) = 7,2 \Rightarrow U_x = 9VOLT$$

$$I_N = \frac{9 - 0}{2} = 4,5A$$



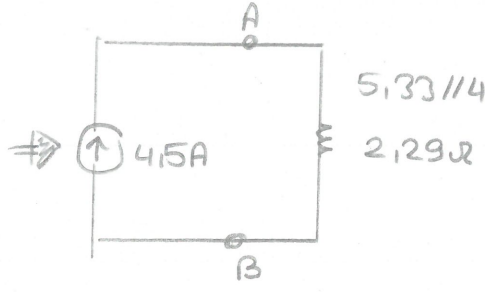
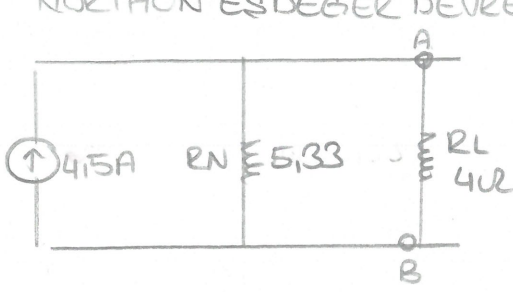
$$\Rightarrow AP = \frac{50}{15} = 3,33$$

$$\Rightarrow R_N = 5,33\Omega$$



19. SORU DEVAM(2)

NORTHON ESDEĞER DEVRESİ



$$5.33 // 4$$

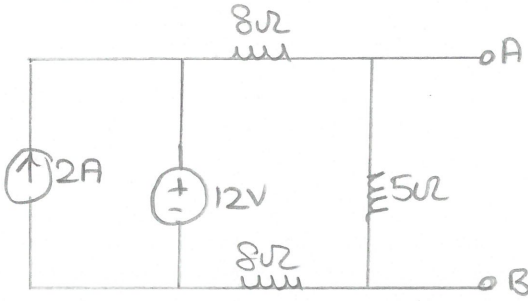
$$V_{AB} = 10.28V$$

$$\Rightarrow P_{RL} = I^2 \cdot R$$

$$\Rightarrow I_{RL} = \frac{10.28}{4} = 2.57A$$

$$\Rightarrow P_{RL} = (2.57)^2 \cdot 4 = \underline{\underline{26.14 W}}$$

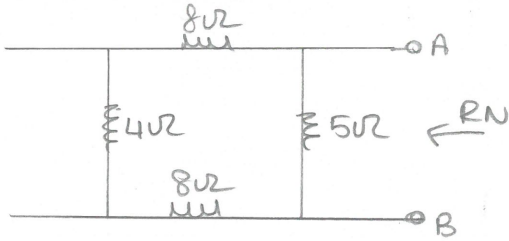
20. SORU



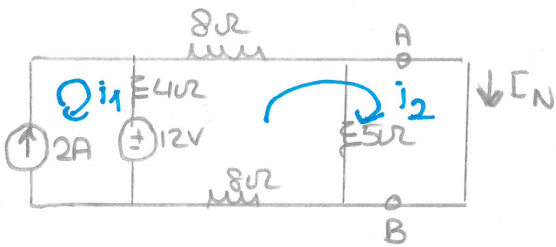
a-b uçlarından görülen northon eşdeğer devresini bulunuz

$\Rightarrow R_{TH}$ direnci ile aynı yoldan bulunur

$\Rightarrow$ Bağımsız kaynakları kapatırız.



$$\Rightarrow R_N = 5 // (8 + 4 + 8) = 5 // 20 = \frac{20 \cdot 5}{25} = 4 \Omega$$

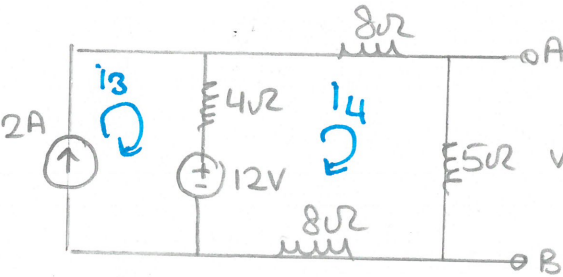


$\Rightarrow$ DEVRE ANALİZİ KULLANIRAK

$$i_1 = 2A \Rightarrow 20i_2 - 4i_1 - 12 = 0 \Rightarrow \text{bulunur}$$

$$\text{DENKLEMDEN} \Rightarrow i_2 = 1A = I_N$$

NORTHON ESDEĞER DEVRESİ



$$V_{TH} = V_{OC}$$

$$V_{TH} = 4 \Omega \cdot I_N = 4 \Omega \cdot 1 = \underline{\underline{4V}}$$