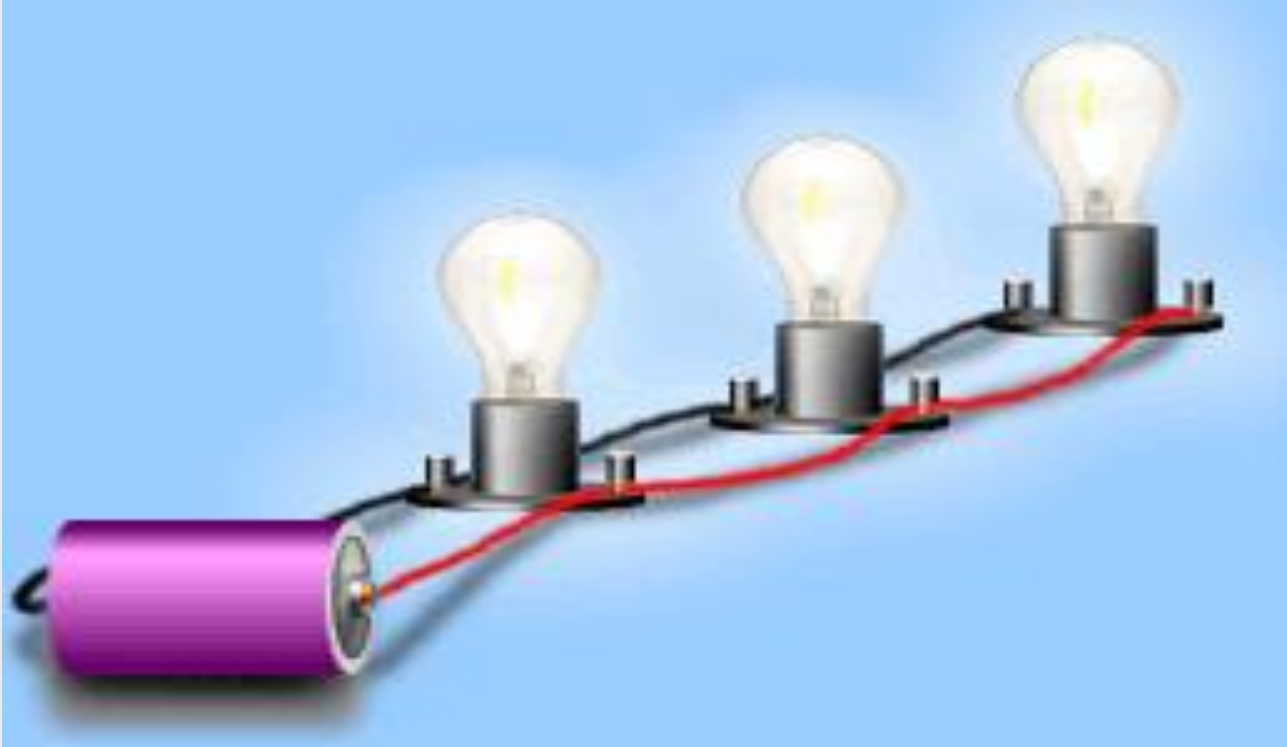


PARALEL DEVRELER

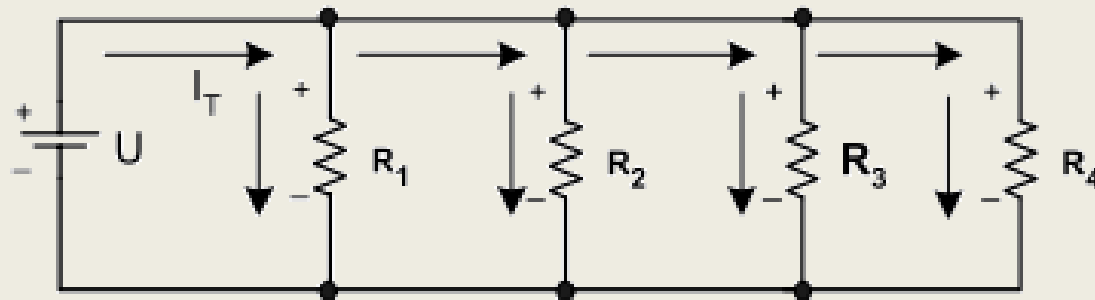
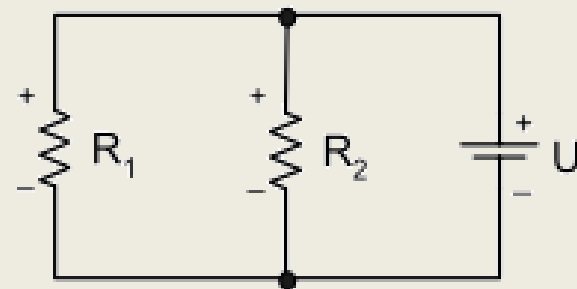
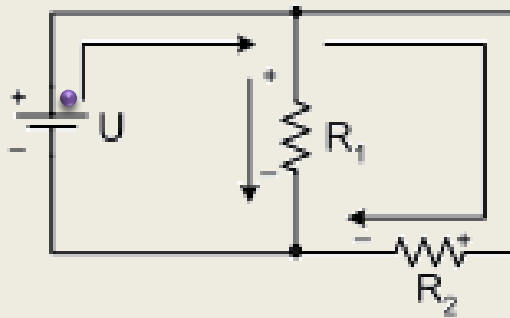
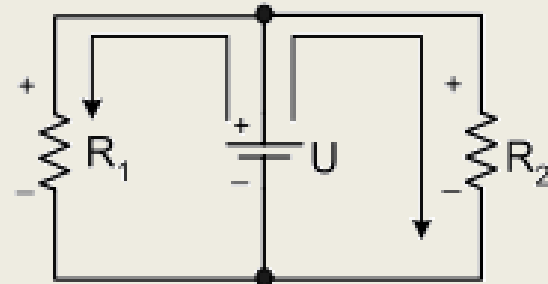
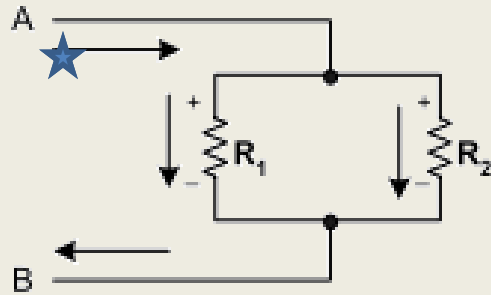
# Paralel Devreler

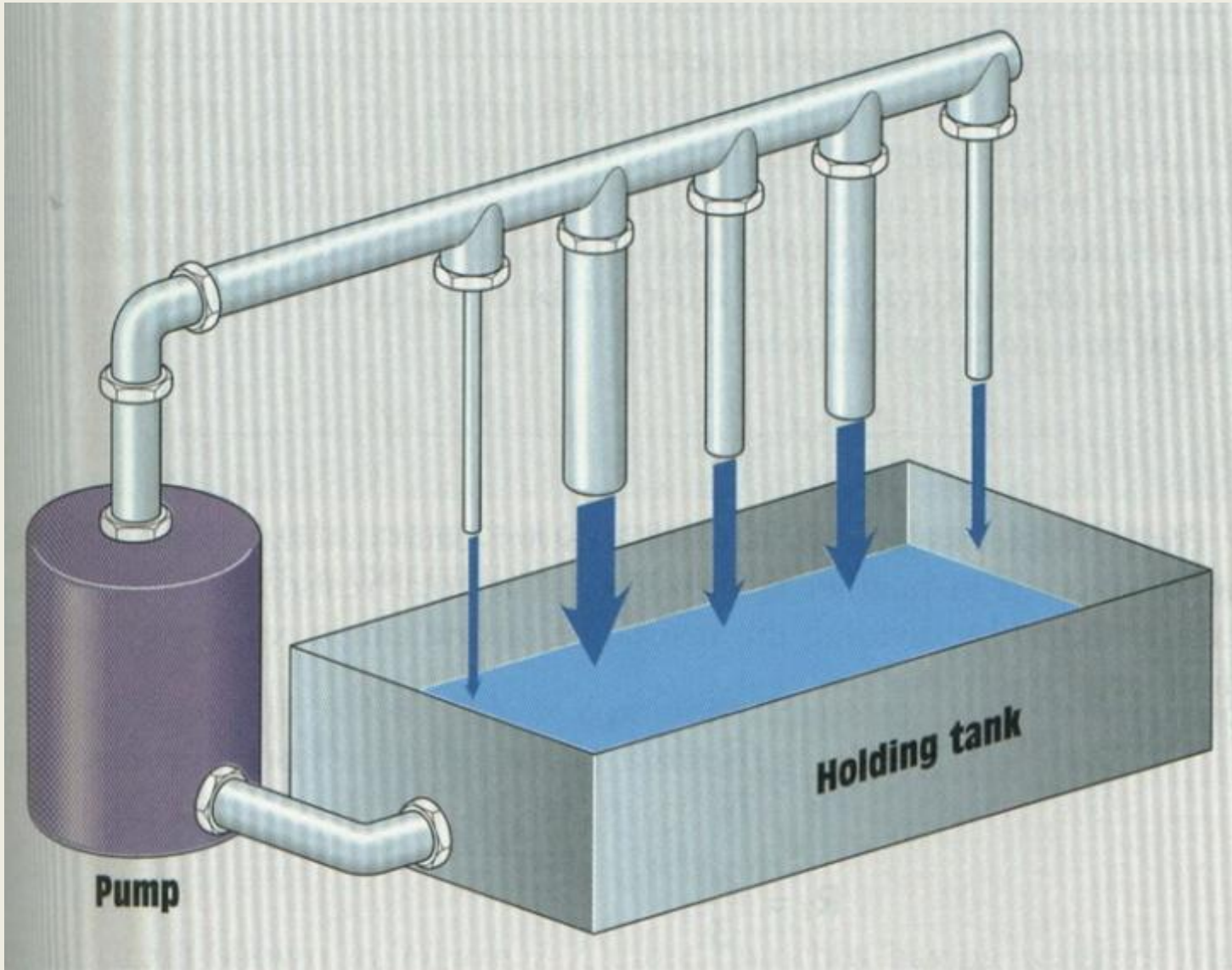
- Elektrik akımının akabileceği birden fazla yola sahip devrelerdir.



- Birden fazla direncin uçlarına aynı gerilim uygulanıp her birinden ayrı ayrı akım geçebilecek şekilde bağlanmalarına “Paralel Bağlama” denir.

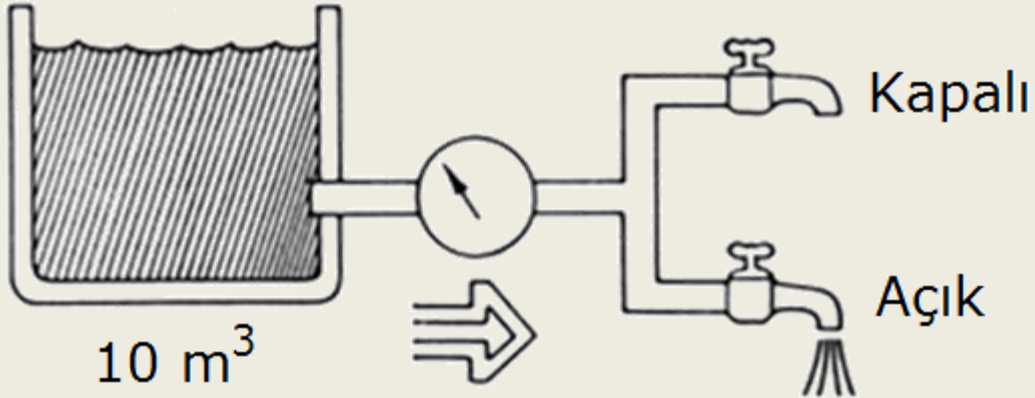
# Paralel Devre Örnekleri



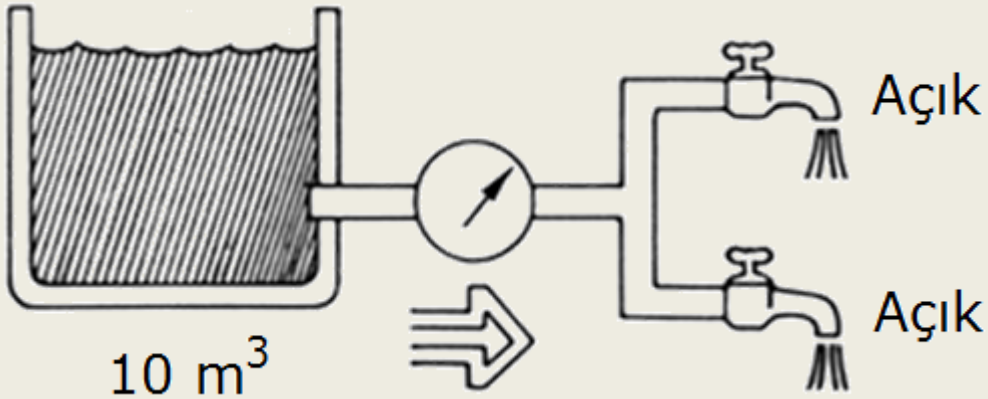


- Şekildeki gibi eklenen her yeni boru, su akışına gösterilen toplam direncin azalmasına yardım eder.

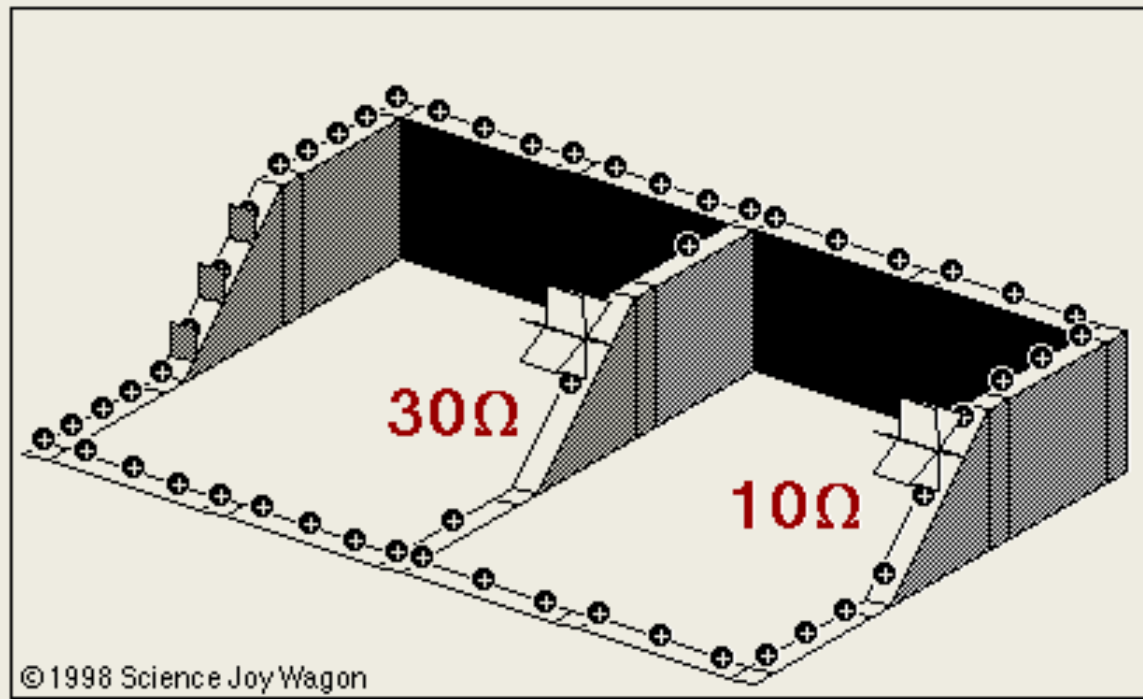
# Sıvılarda Paralel Mantık



Boşalma Süresi 10 saat

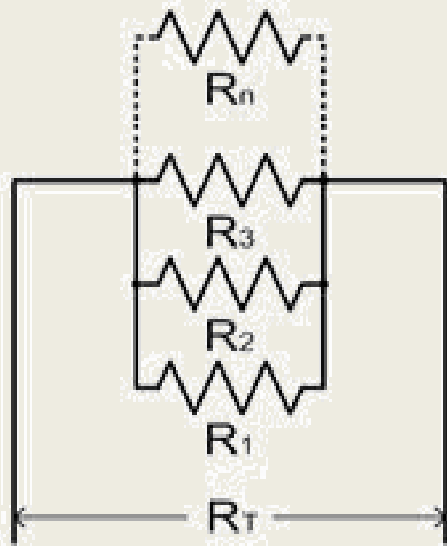


Boşalma Süresi 5 saat



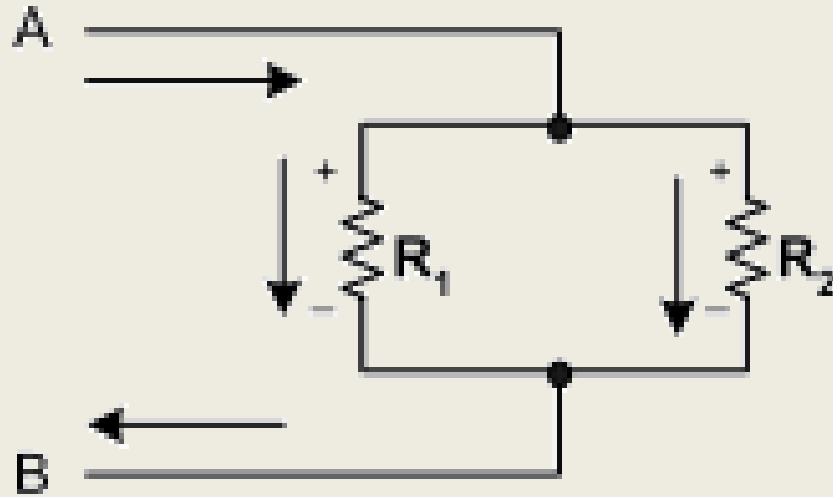
# Paralel Devrelerde Direnç

- Eşdeğer direnç; aşağıdaki gibi hesaplanır.
- Eşdeğer direnç, paralel dirençlerin en küçüğünden de azdır.



$$\frac{1}{R_{eş}} = \frac{1}{R_1} + \frac{1}{R_2} + \dots + \frac{1}{R_N}$$

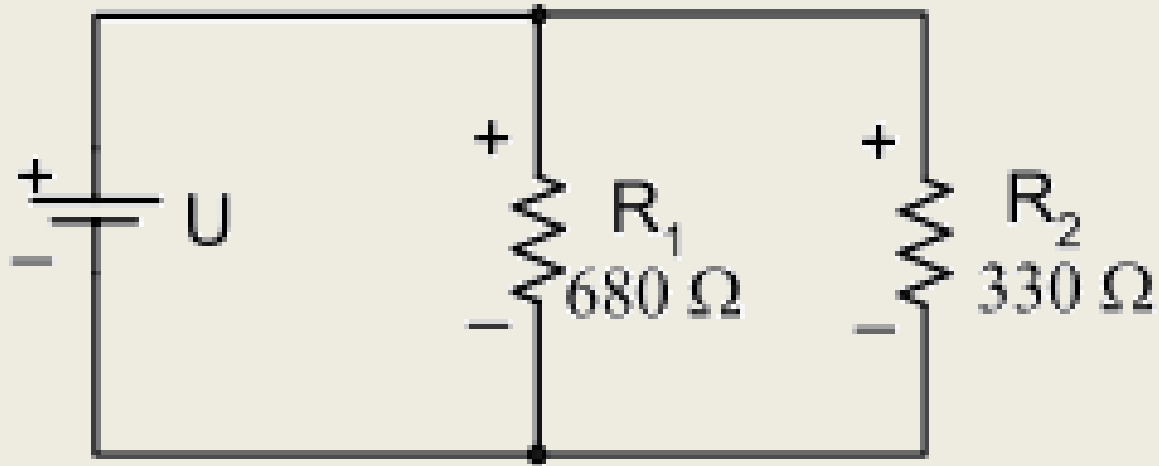
➤ İki paralel direnç için formül:



$$R_{E\mathcal{S}=T} = \frac{R_1 \cdot R_2}{R_1 + R_2}$$



Örnek: A-B noktaları arası eşdeğer direnci hesaplayalım.



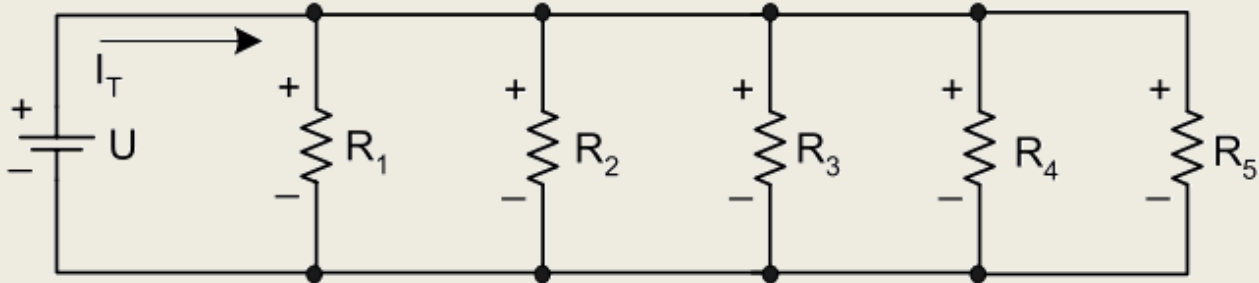
$$R_{E\check{S}=T} = \frac{R_1 \cdot R_2}{R_1 + R_2} = \frac{(680\Omega) \cdot (330\Omega)}{680\Omega + 330\Omega} = \frac{224.000\Omega^2}{1.010\Omega} = 222\Omega$$

➤ Eğer n tane aynı değerli direnç paralel bağlanırsa eşdeğer direnç formülü aşağıdaki gibi sadeleşir:

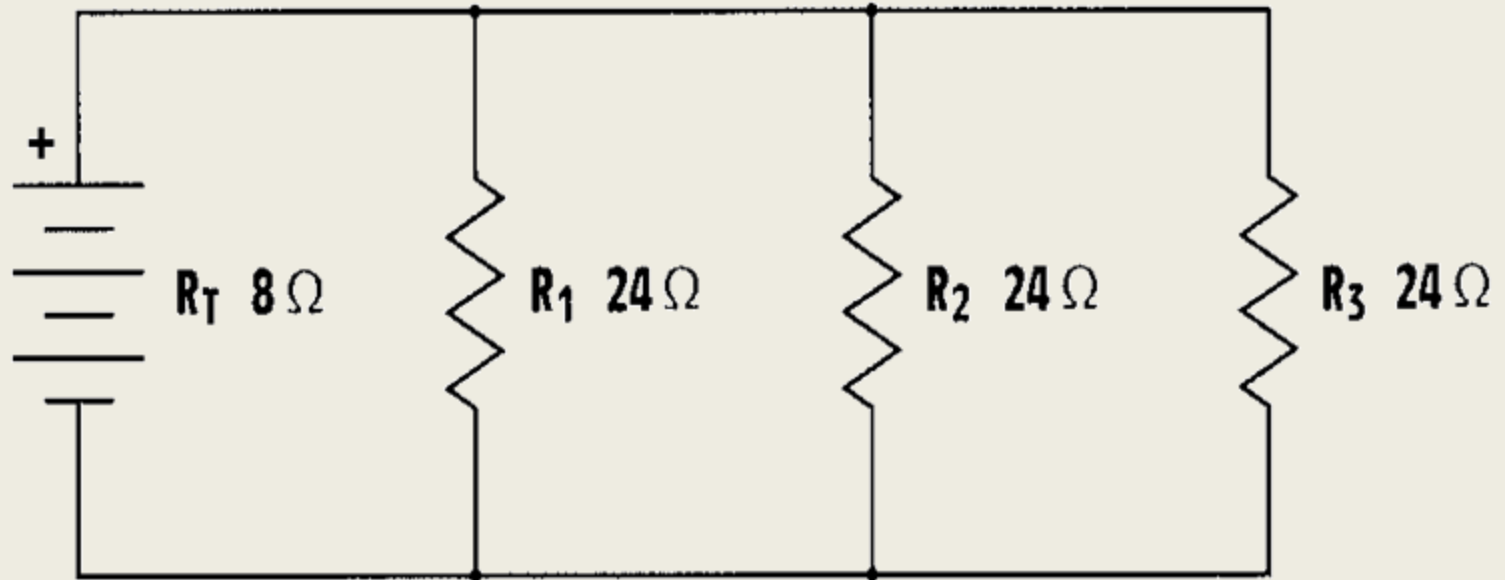
$$R_{EŞ=T} = \frac{R}{n}$$

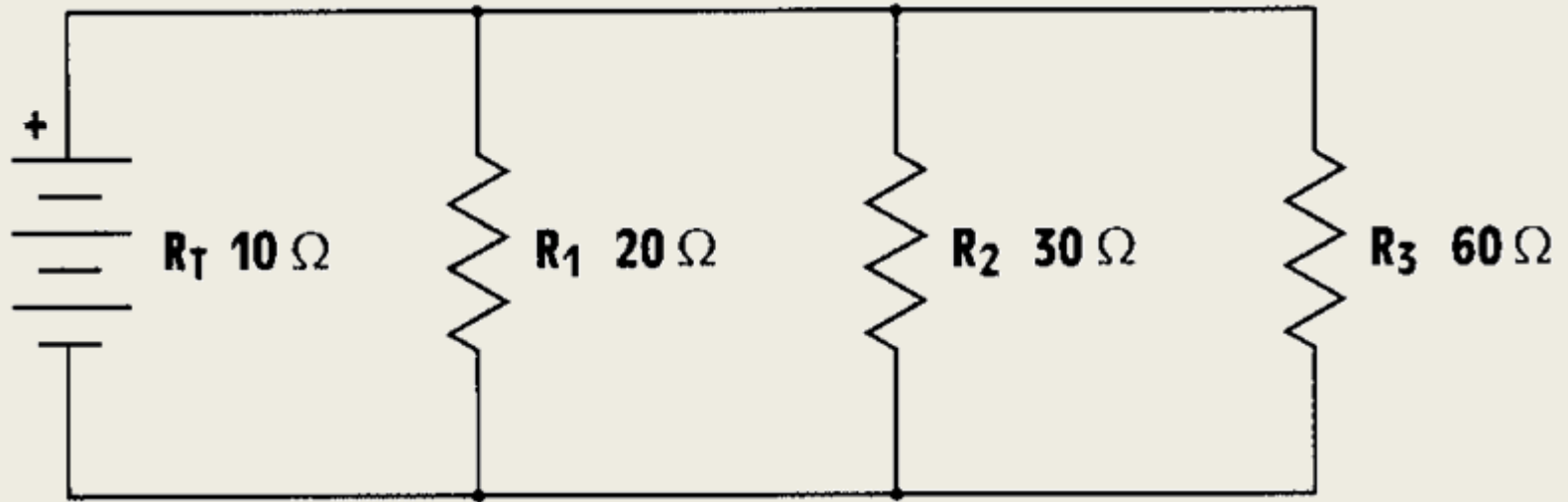
➤ Örnek:

➤ Bütün direnç değerleri  $100\Omega$ . Toplam direncini eşit değerli direnç formülünü kullanarak bulunuz.



$$R_{EŞ} = \frac{R}{n} = \frac{100\Omega}{5} = 20\Omega$$





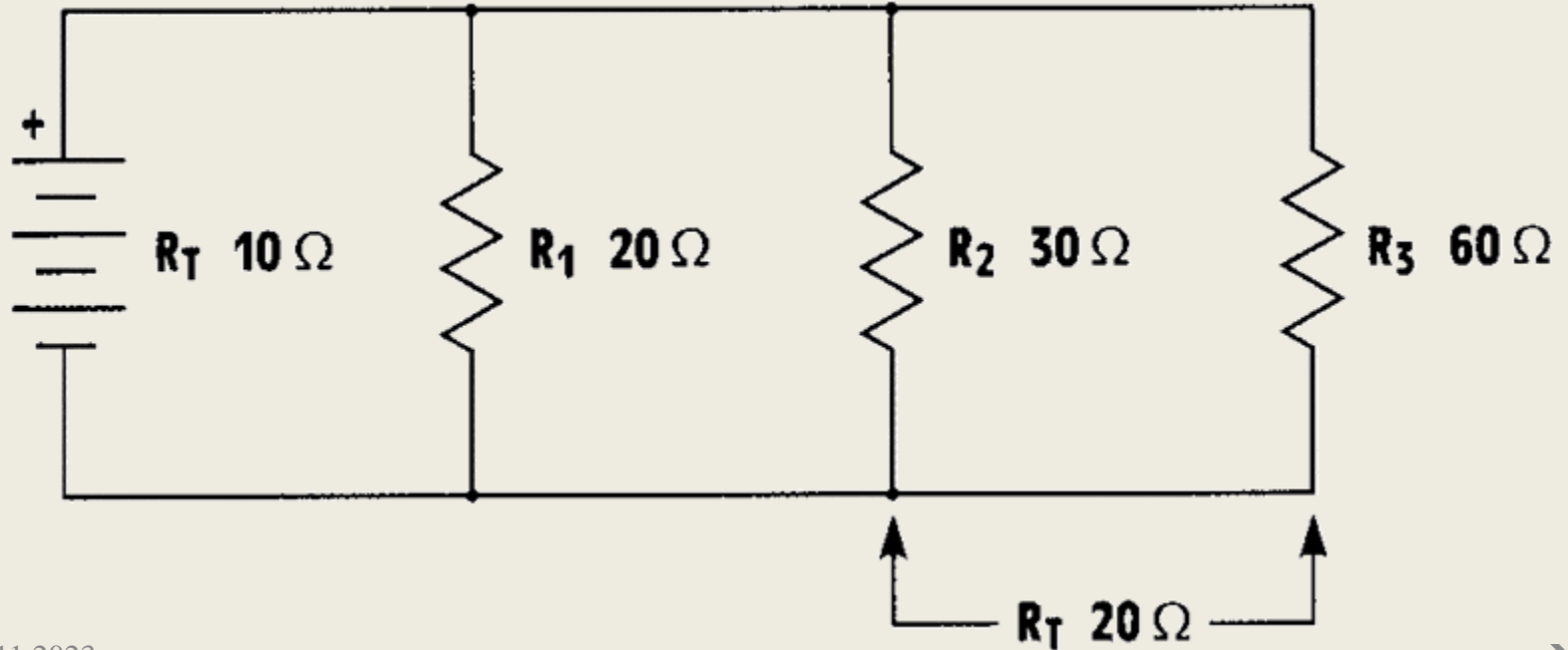
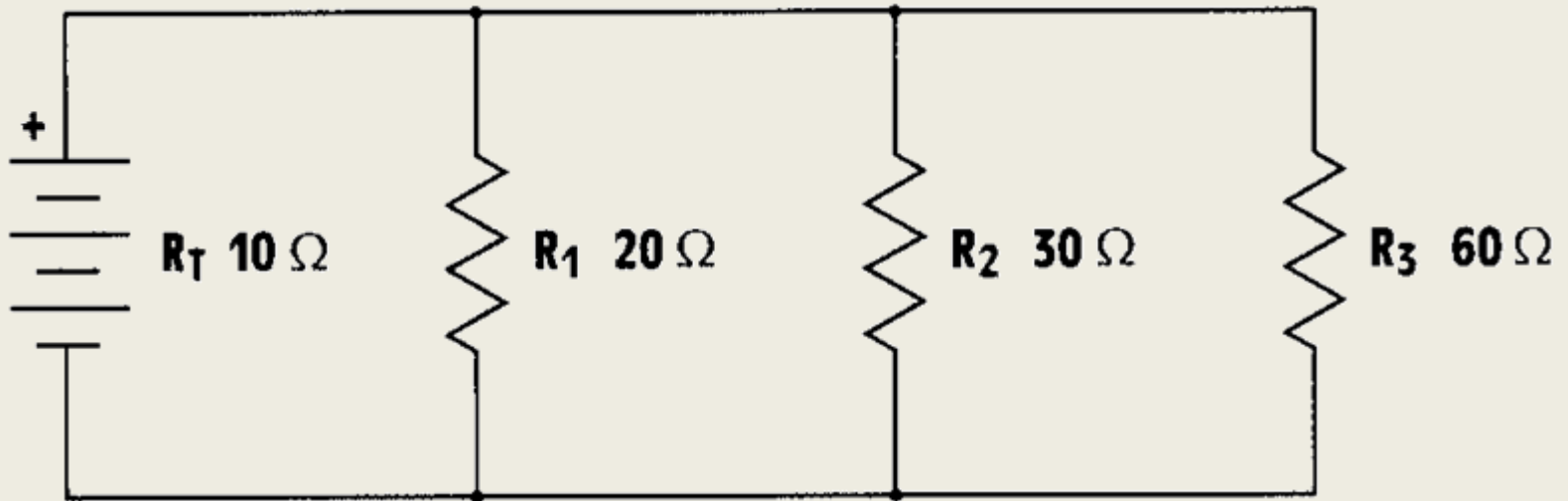
$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

$$\frac{1}{R_{eq}} = \frac{1}{20} + \frac{1}{30} + \frac{1}{60}$$

(6)      (4)      (2)

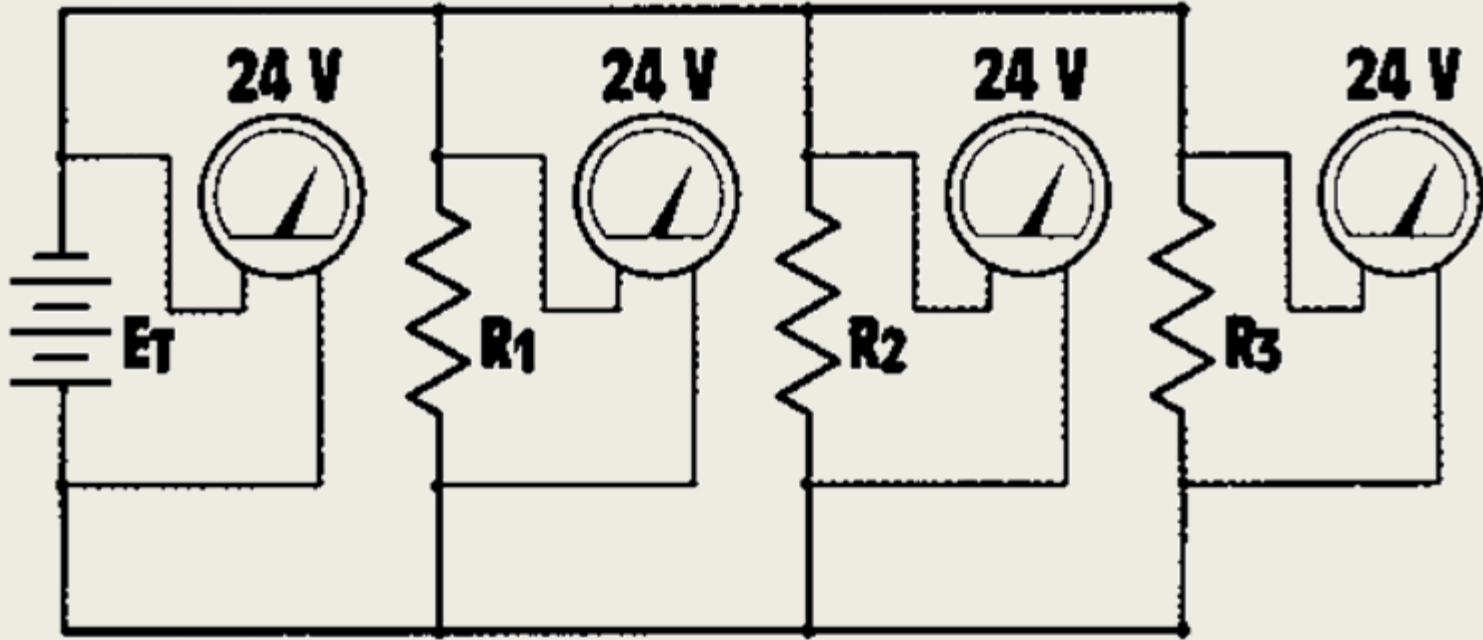
$$\frac{1}{R_{eq}} = \frac{6}{120} + \frac{4}{120} + \frac{2}{120}$$

$$\frac{1}{R_{eq}} = \frac{12}{120} \quad R_{eq} = \frac{120}{12} = 10 \Omega$$



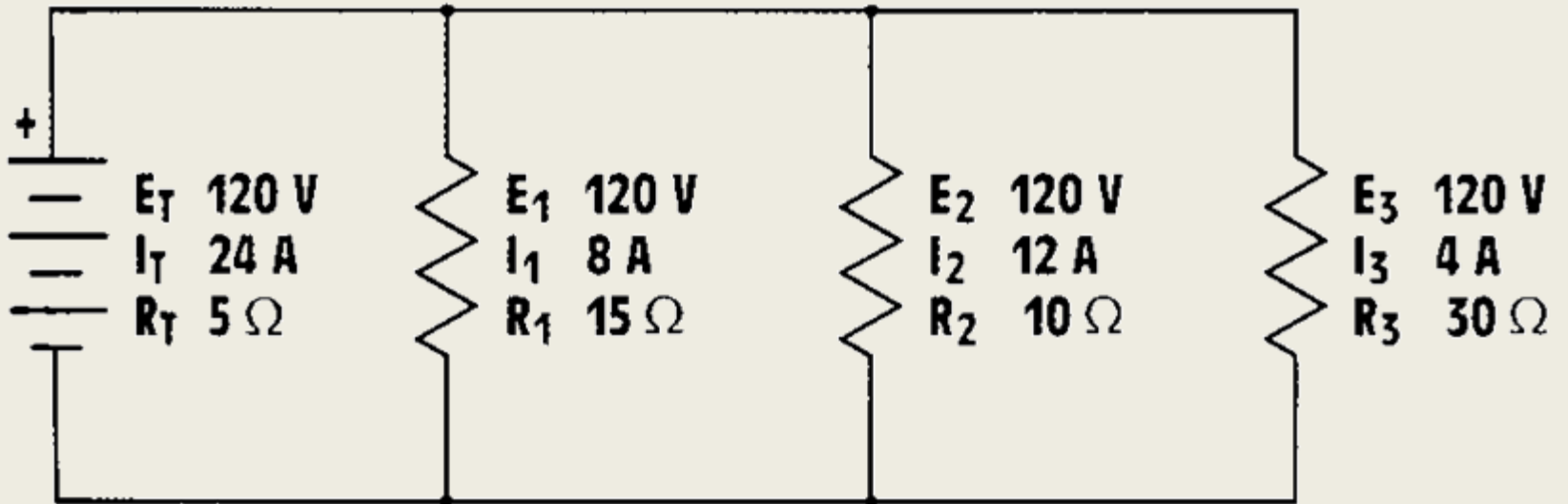
# Paralel Devrelerde Gerilim

Bir kaynağa paralel bağı her hangi bir kol üzerindeki gerilim düşümü, kaynağın uyguladığı EMK'ye eşittir.



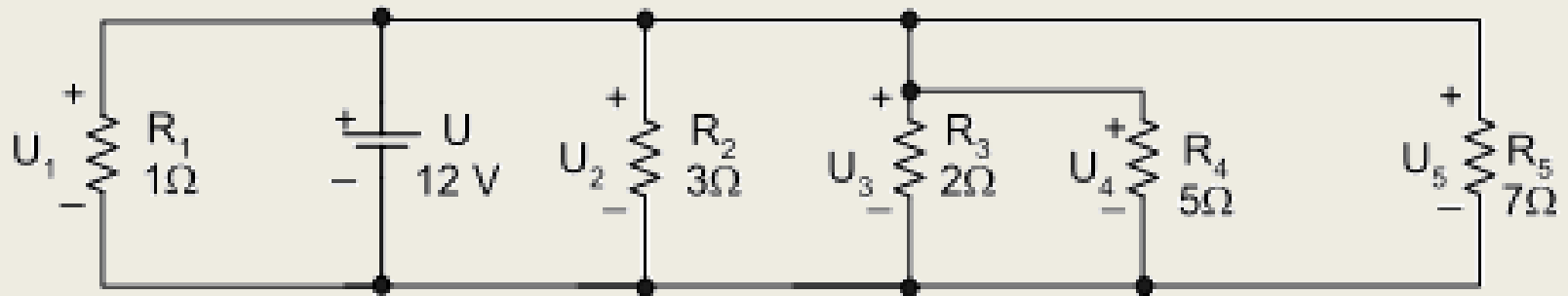
# Paralel Devrelerde Gerilim

Kol akımları dirençlere bağlı olarak farklılık gösterebilir.



Örnek

$R_4$  direnci uçlarındaki gerilimi bulunuz

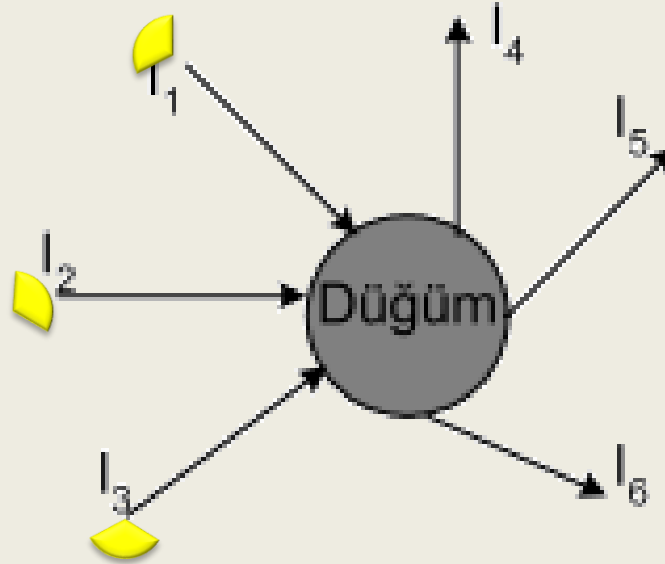


$$U = U_1 = U_2 = U_3 = U_4 = U_5 = 12V$$

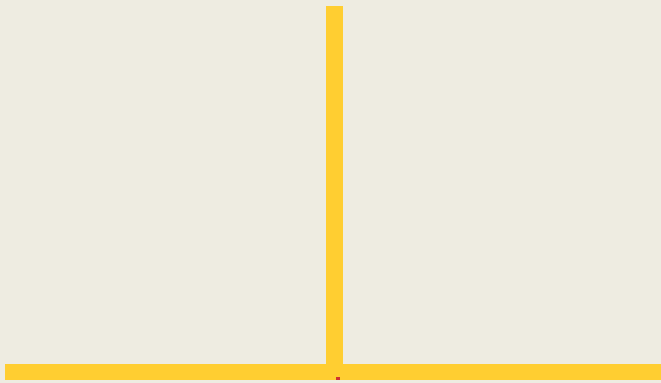


# Kirşof'un Akımlar Kanunu

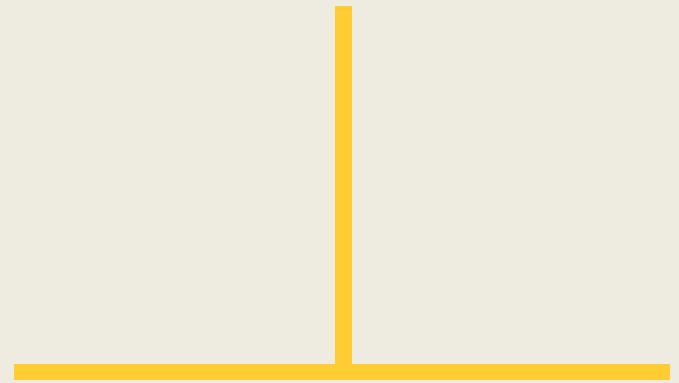
Bir elektrik devresinde bir noktaya giren akımların toplamı, o noktayı terk eden yani çıkan akımların toplamına eşittir.



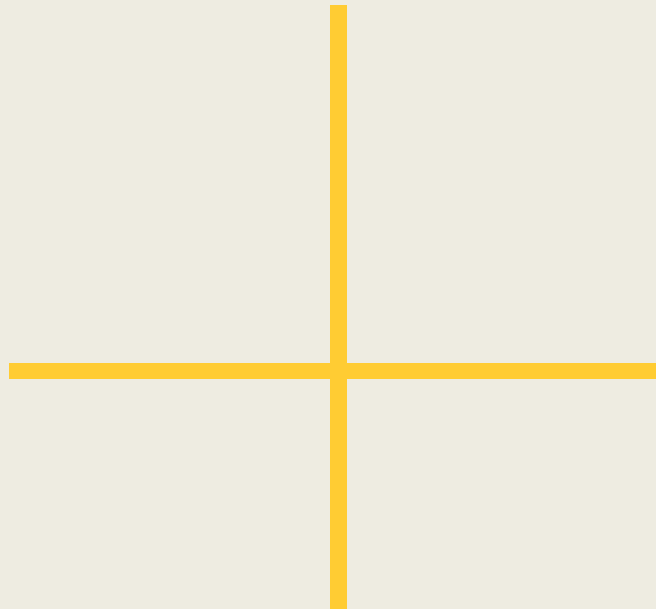
$$I_1 + I_2 + I_3 = I_4 + I_5 + I_6$$



©1999 Science Joy Wagon



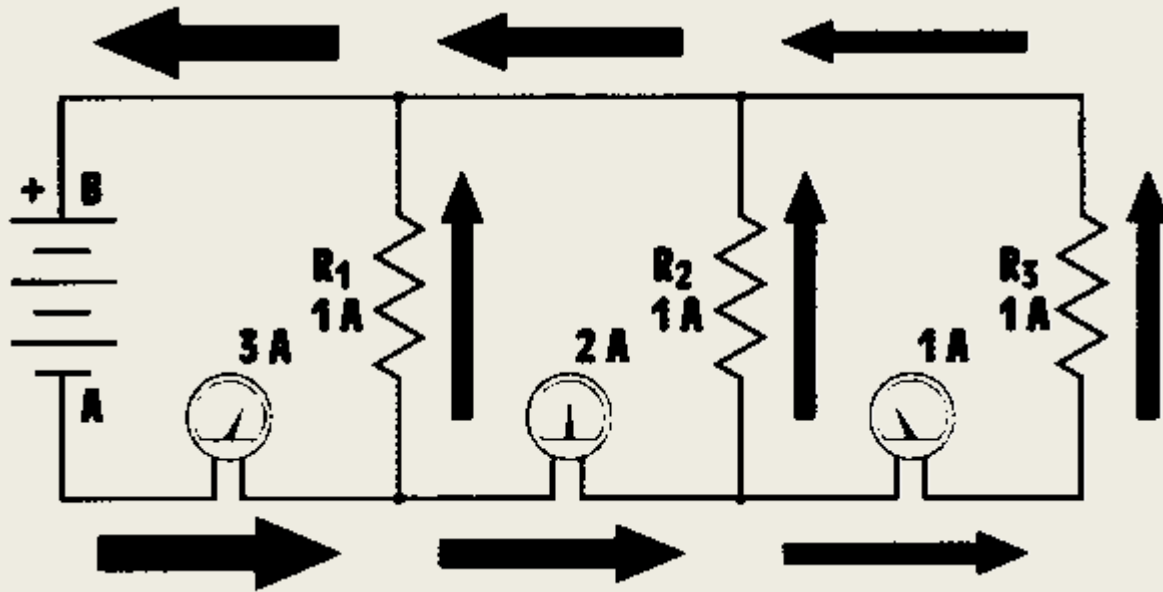
©1999 Science Joy Wagon



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# Paralel Devrelerde Akım

Kaynaktan çekilen akım kollara dağılan akımların toplamına eşittir.



$$I = I_1 + I_2 + I_3$$

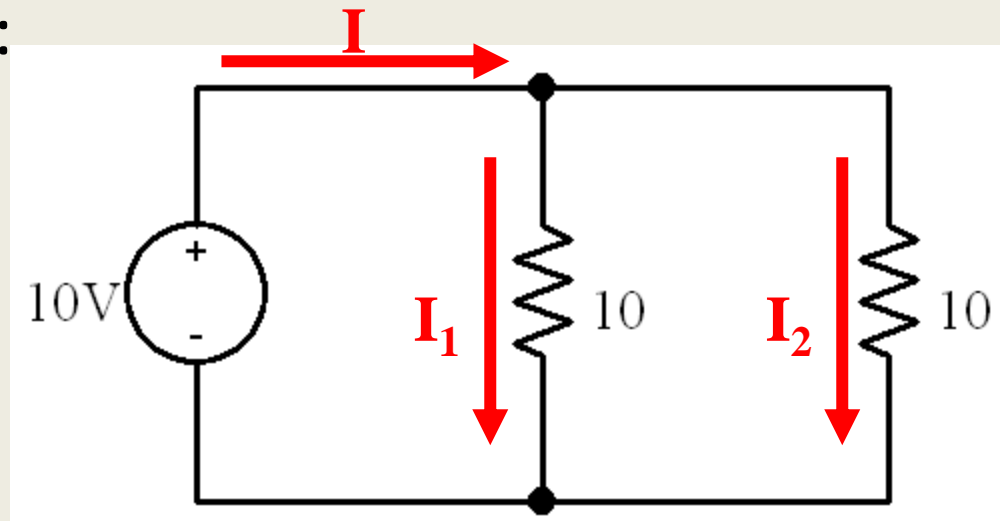
# Paralel Devrede Ohm Kanunu

- $I_1$  ve  $I_2$  akımlarından  $I$  akımının hesaplanması:

- $I_1 = 10/10 = 1A$

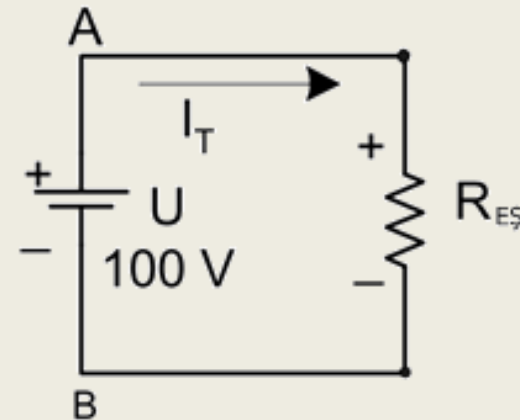
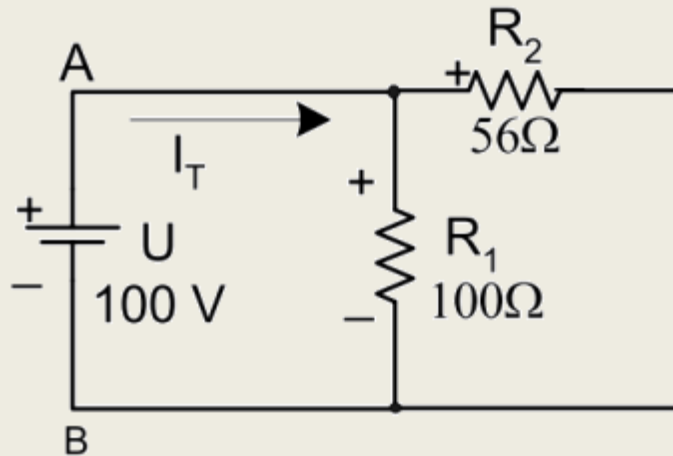
- $I_2 = 10/10 = 1 A$

- $I = I_1 + I_2 = 2 A$



# Paralel Devrede Ohm Kanunu

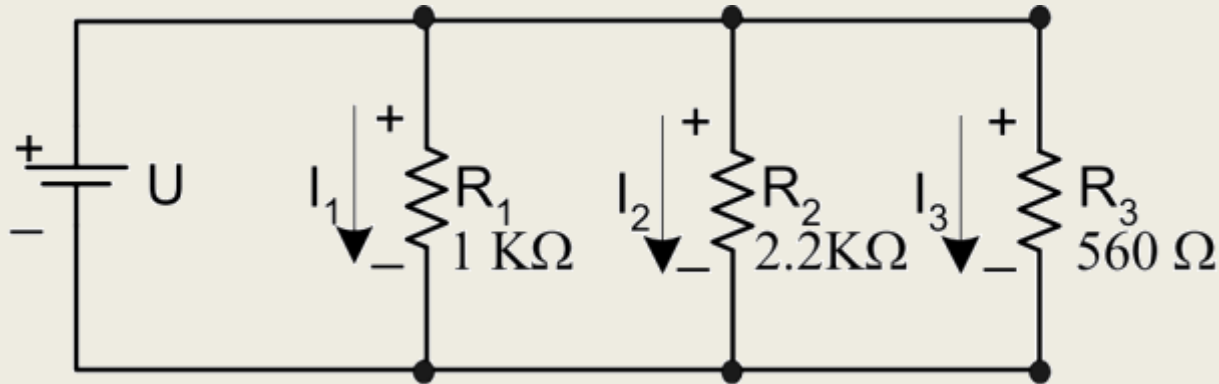
Örnek: Şekildeki devrede kaynaktan çekilen akımı bulunuz.



$$R_{EŞ} = \frac{R_1 \cdot R_2}{R_1 + R_2} = \frac{(100\Omega) \cdot (56\Omega)}{(100\Omega) + (56\Omega)} = \frac{5600\Omega^2}{156\Omega} = 35,9\Omega$$

$$I_T = \frac{100V}{35,9\Omega} = 2,79A$$

Örnek: Şekildeki devrede elemanlar üzerinden geçen kol akımlarını bulunuz.

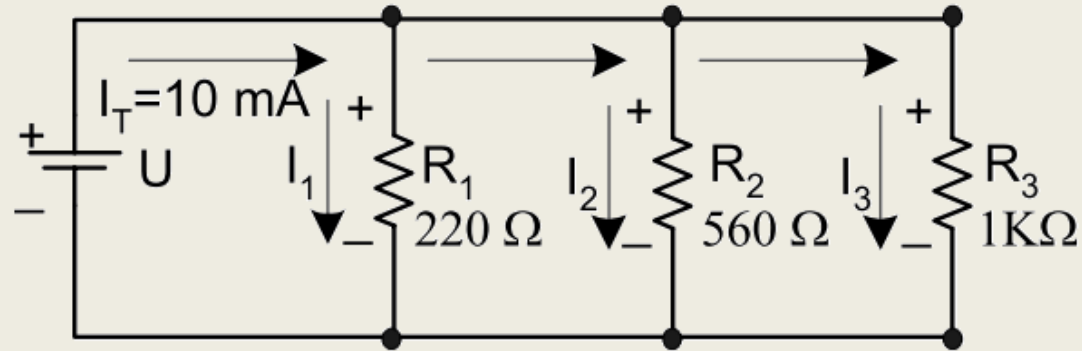


$$I_1 = \frac{U}{R_1} = \frac{20\text{V}}{1\text{k}\Omega} = \frac{20\text{V}}{1 \cdot 10^3 \Omega} = 20 \cdot 10^{-3} \text{ A} = 20\text{mA}$$

$$I_2 = \frac{U}{R_2} = \frac{20\text{V}}{2,2\text{k}\Omega} = \frac{20\text{V}}{2,2 \cdot 10^3 \Omega} = 9,1 \cdot 10^{-3} \text{ A} = 9,1\text{mA}$$

$$I_3 = \frac{U}{R_3} = \frac{20\text{V}}{560\Omega} = 35,7\text{mA}$$

Örnek: Şekildeki devrede dirençler üzerinden geçen akımları bulunuz.



$$R_{EŞ} = \frac{1}{\left(\frac{1}{R_1}\right) + \left(\frac{1}{R_2}\right) + \left(\frac{1}{R_3}\right)} = \frac{1}{\left(\frac{1}{220\Omega}\right) + \left(\frac{1}{560\Omega}\right) + \left(\frac{1}{1000}\right)}$$

$$= \frac{1}{0,00455 + 0,00179 + 0,001} = \frac{1}{0,00734} = 136\Omega$$

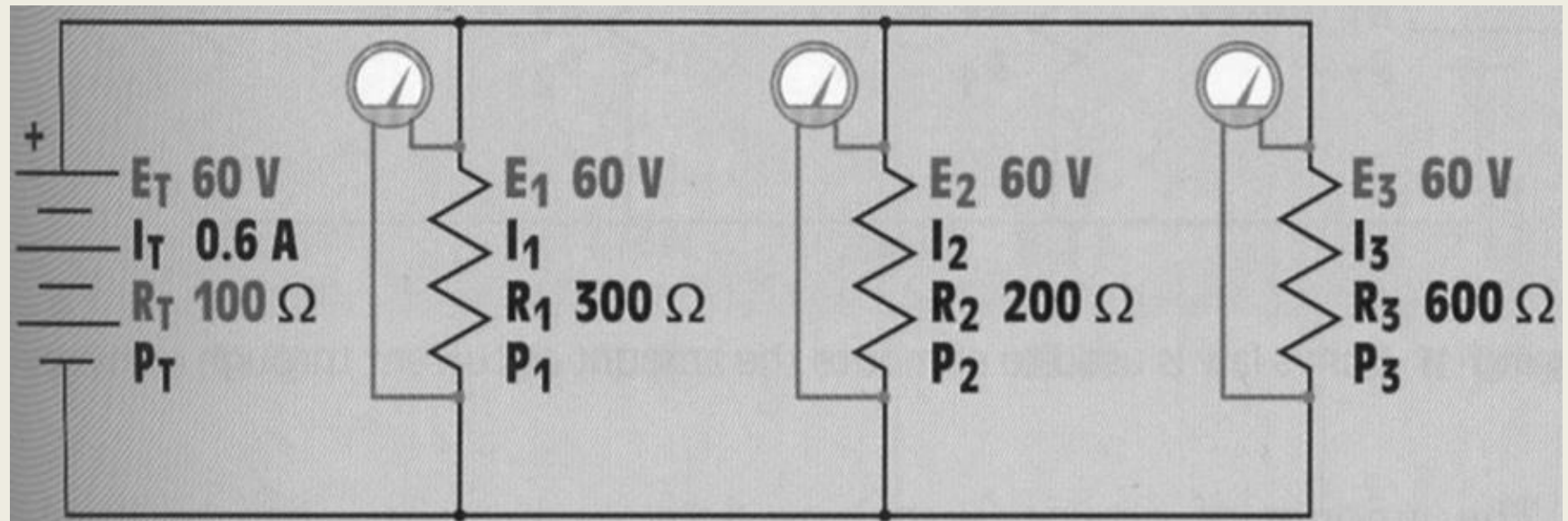
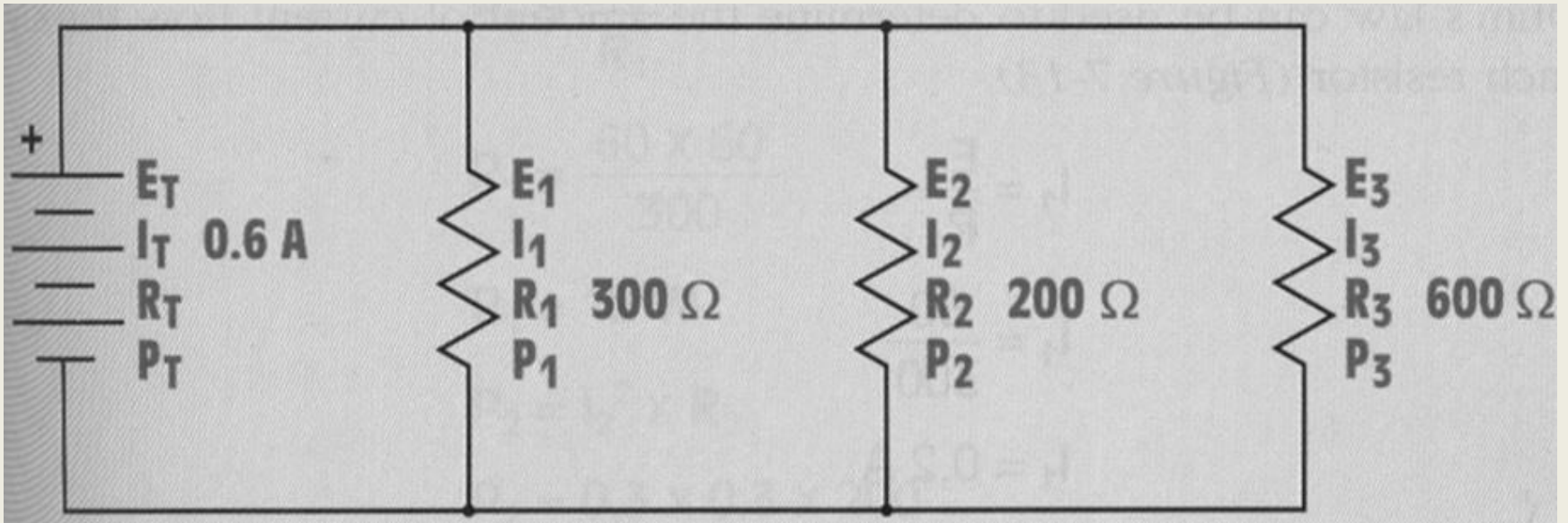
$$U = I_T \cdot R_{E\bar{S}} = (10\text{mA}) \cdot (136\Omega) = (10 \cdot 10^{-3} \text{ A}) \cdot (136\Omega) = 1,36\text{V}$$

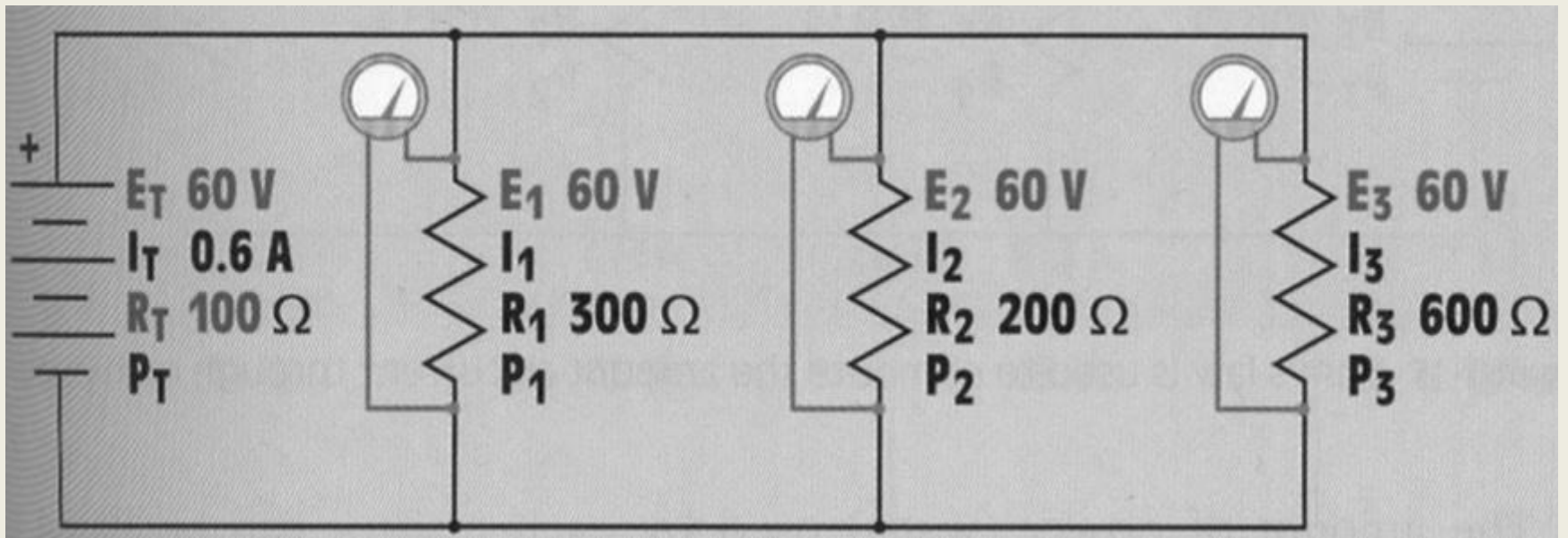
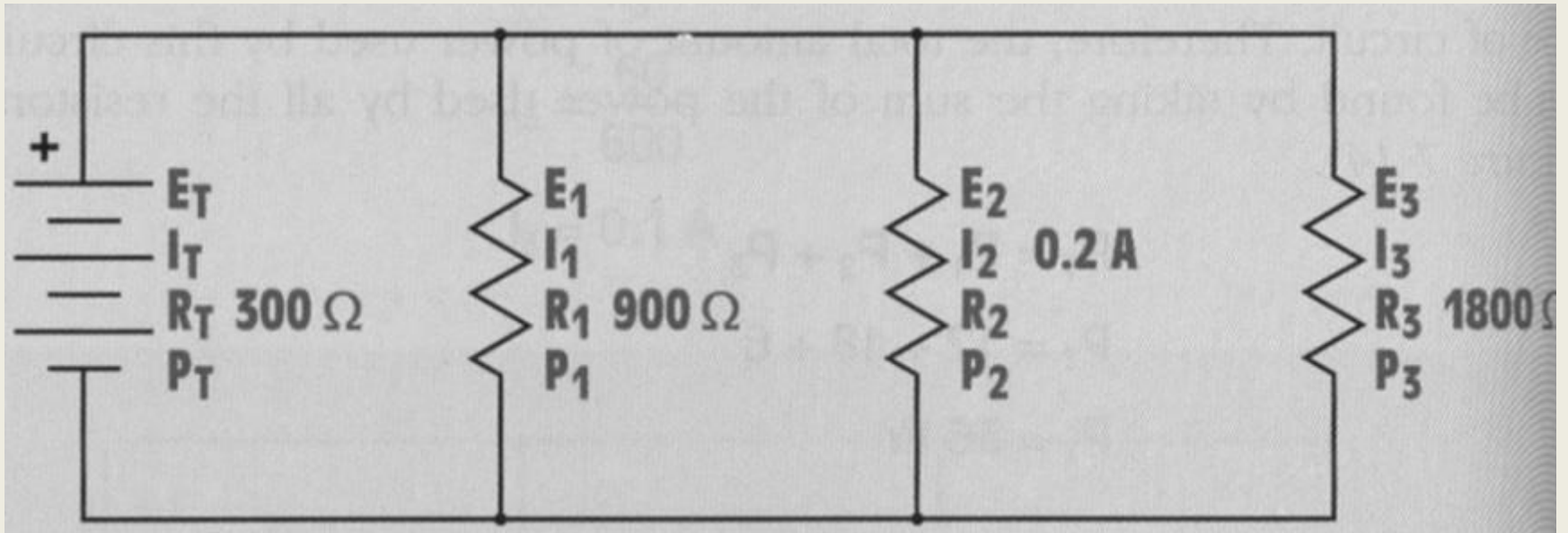
$$I_1 = \frac{U}{R_1} = \frac{1,36\text{V}}{220\Omega} = 0,00618\text{A} = 6,18\text{mA}$$

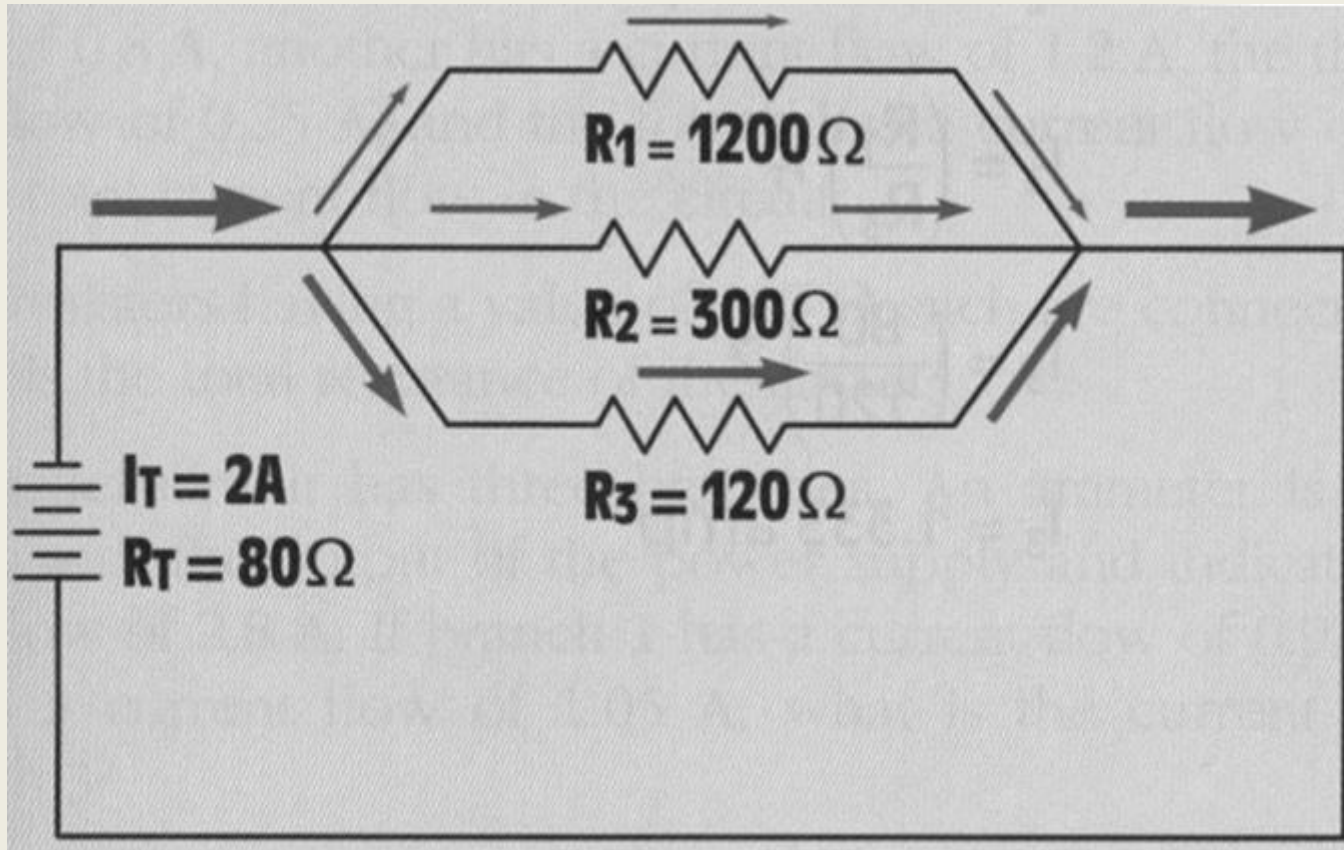
$$I_2 = \frac{U}{R_2} = \frac{1,36\text{V}}{560\Omega} = 0,0024\text{A} = 2,4\text{mA}$$

$$I_3 = \frac{U}{R_3} = \frac{1,36\text{V}}{1\text{k}\Omega} = \frac{1,36\text{V}}{1 \cdot 10^3} = 0,00136\text{A} = 1,36\text{mA}$$









# Paralel Devrede Güç

- Paralel devrede elemanlar üzerinde harcanan güçlerin toplamı devredeki kaynakların harcadığı güce eşittir.

$$P_T = P_1 + P_2 + P_3 + \dots + P_N$$

$P_T$  = Kaynaktan çekilen güç

$P_1, P_2, P_3, \dots, P_N$  : Paralel bağlı dirençlerin harcadıkları güç