Elektrik Devre Temelleri

2024-2025 Bahar Dönemi

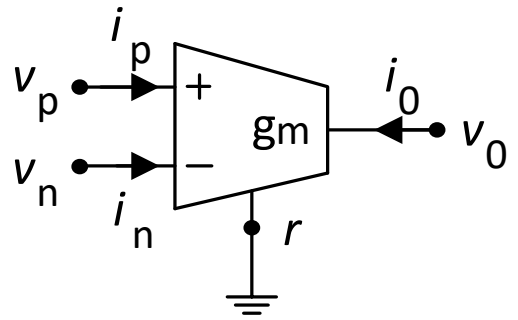
Hafta 9

18 Nisan 2025

Sibel ÇİMEN

Umut Engin AYTEN

2. İşlemsel Transfer İletkenliği Kuvvetlendiricisi (OTA)



g_m: geçiş iletkenliği.

$p(+)$: non-inverting input.

$n(-)$: inverting input.

o: output.

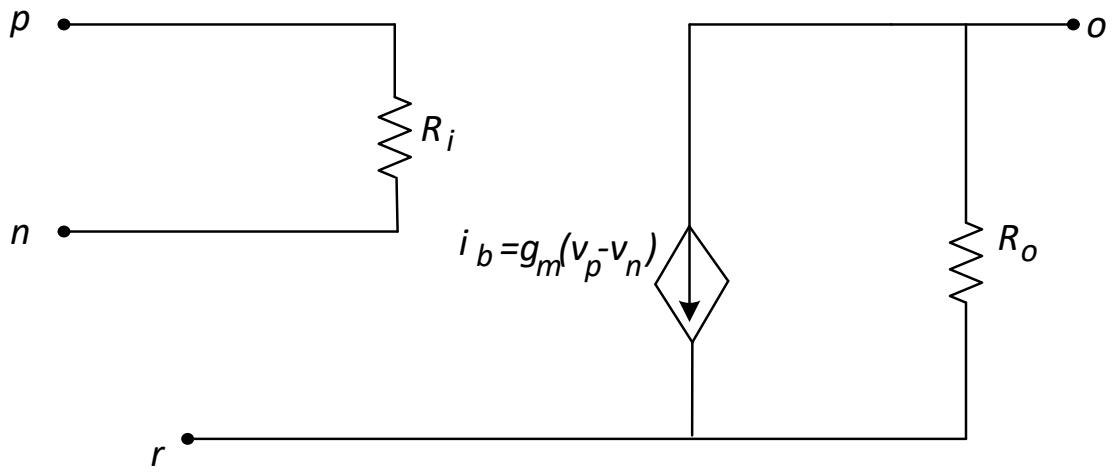
İdeal OTA:

$$i_p = i_n = 0$$

$$i_0 = g_m(v_p - v_n)$$

2. İşlemsel Transfer İletkenliği Kuvvetlendiricisi (OTA)

Lineerleştirilmiş devre modeli:



$$i_b = g_m(v_p - v_n)$$

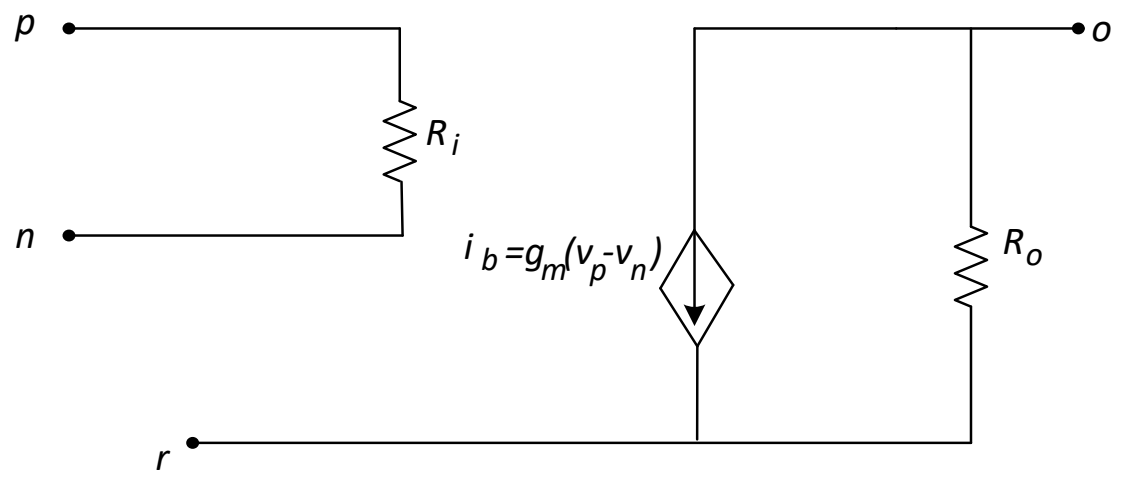
İdealde:

$$R_i = \infty$$

$$R_o = \infty$$

2. İşlemsel Transfer İletkenliği Kuvvetlendiricisi (OTA)

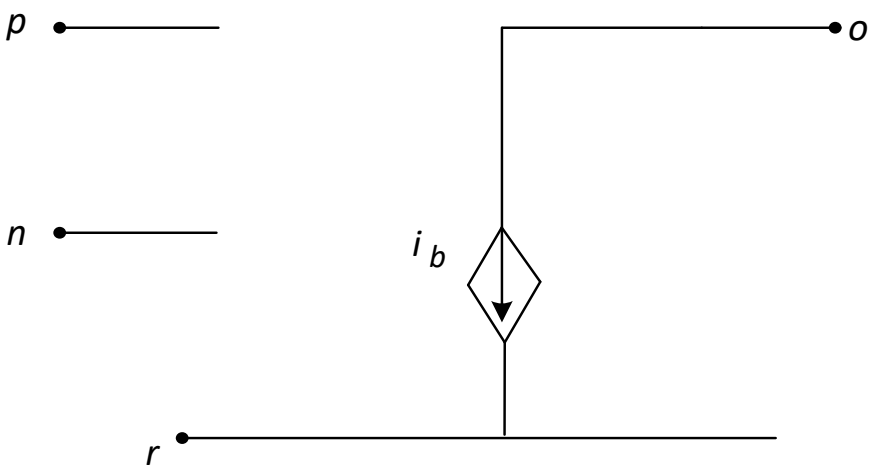
Lineerleştirilmiş devre modeli:



İdealde:

$$R_i = \infty$$

$$R_o = \infty$$



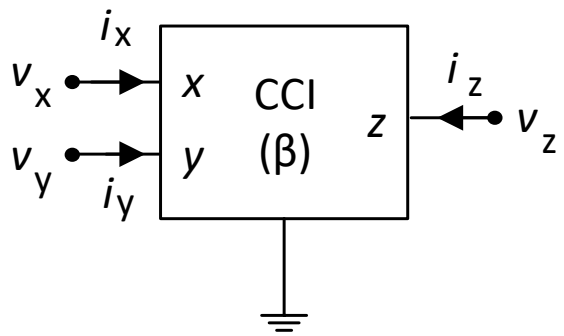
İdeal OTA:

$$i_p = i_n = 0$$

$$i_o = g_m\,(v_p - v_n)$$

3. Akım Taşıyıcılar (Current Conveyors)

Birinci Nesil Akım Taşıyıcı:



$$i_y = i_x$$

$$v_x = v_y$$

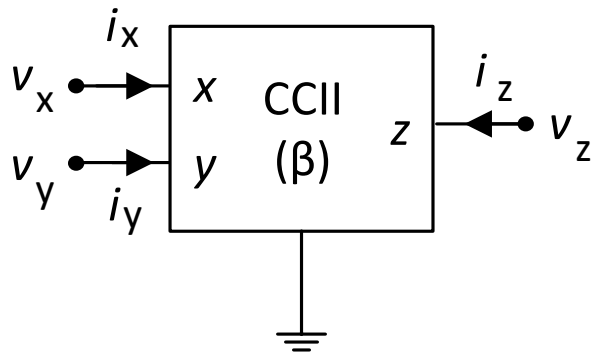
$$i_z = \beta i_x$$

$$\beta = +1 \rightarrow CCI+$$

$$\beta = -1 \rightarrow CCI-$$

3. Akım Taşıyıcılar (Current Conveyors)

İkinci Nesil Akım Taşıyıcı:



$$i_y = 0$$

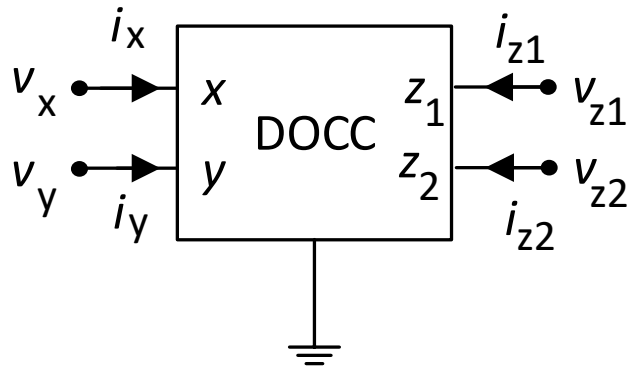
$$v_x = v_y$$

$$i_z = \beta i_x$$

$$\beta = +1 \rightarrow CCII+$$

$$\beta = -1 \rightarrow CCII-$$

5-Uçlu Elemanlar
1. Çift Çıkışlı Akım Taşıyıcılar (DO-CC)



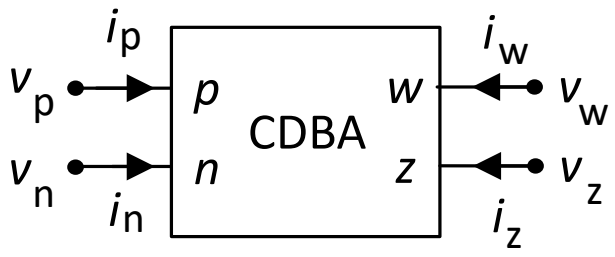
$$i_y = 0$$

$$v_x = v_y$$

$$i_{z1} = i_x$$

$$i_{z2} = -i_x$$

2. Current Differencing Buffer Amplifier (CDBA)



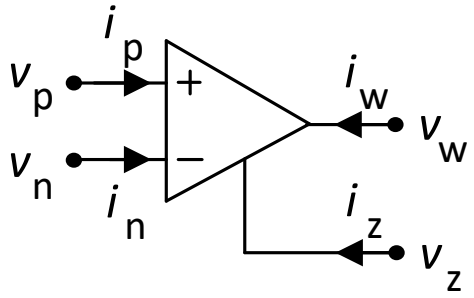
$$v_p = 0$$

$$v_n = 0$$

$$v_w = v_z$$

$$i_z = -(i_p - i_n)$$

3. Current Feedback Amplifier (CFA)



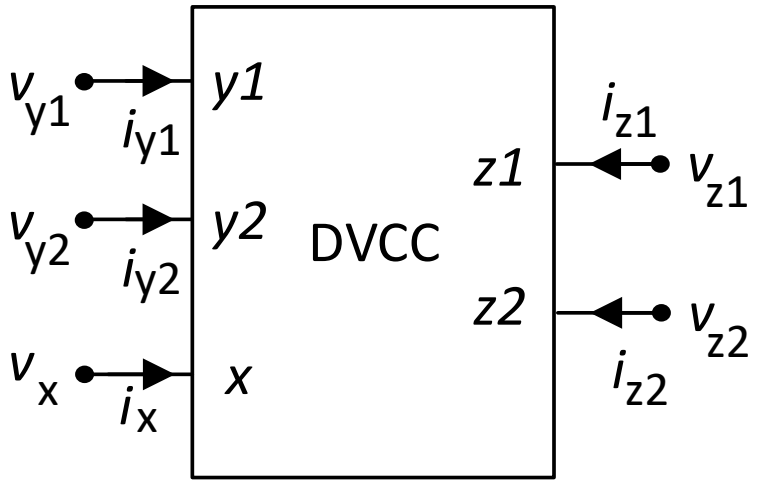
$$i_p = 0$$

$$v_n = v_p$$

$$i_z = i_n$$

$$v_z = v_w$$

6-Uçlu Elemanlar
1. Differential Voltage Current Conveyor (DVCC)



$$i_{y1} = 0$$

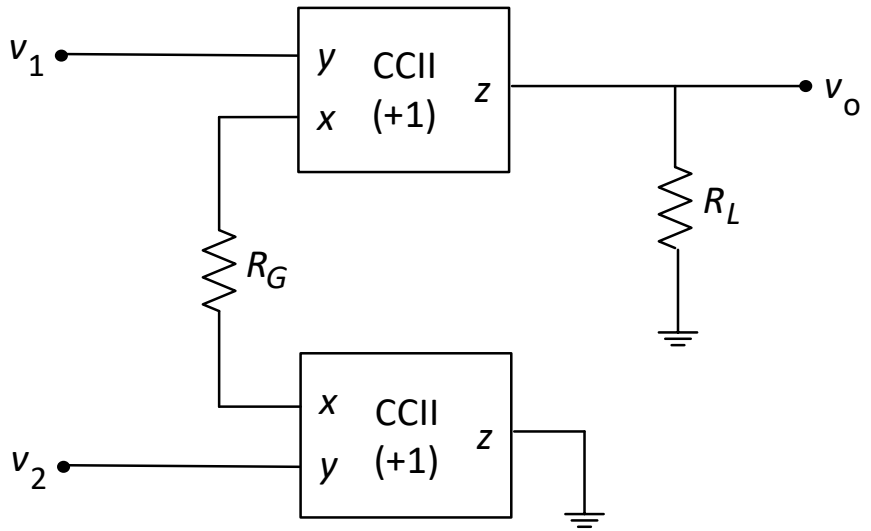
$$i_{y2} = 0$$

$$v_x = v_{y1} - v_{y2}$$

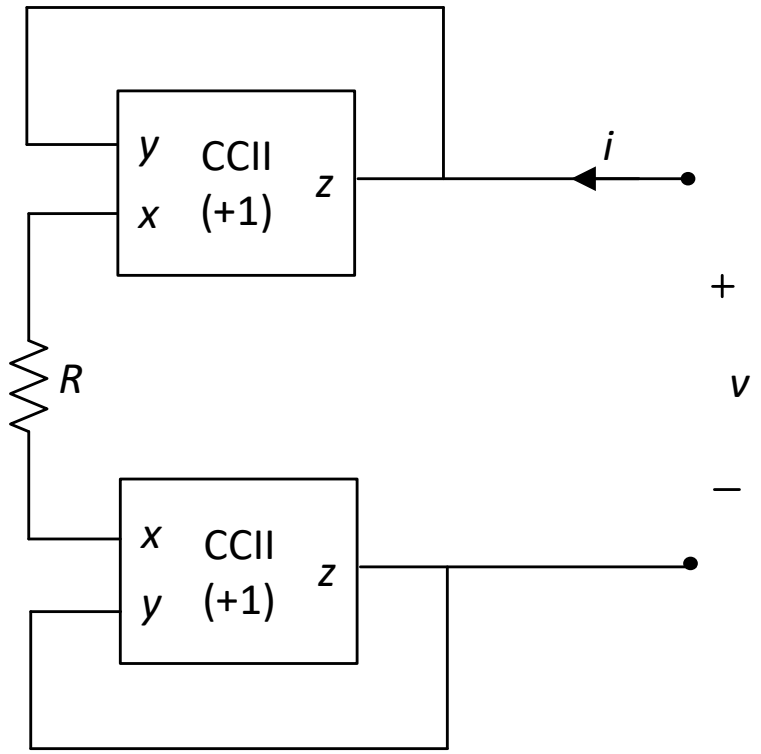
$$i_{z1} = i_x$$

$$i_{z2} = -i_x$$

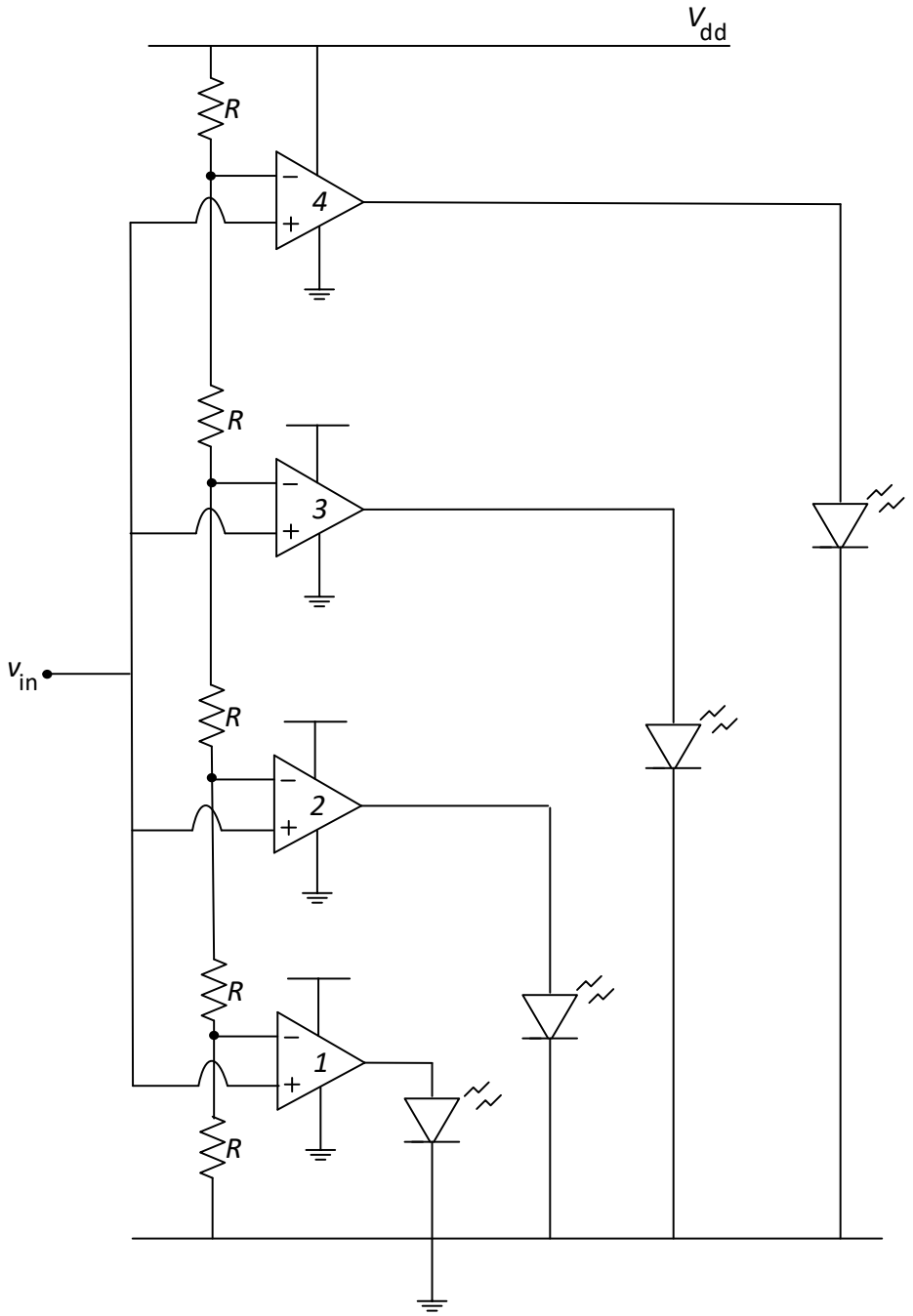
Örnek: v_o =?



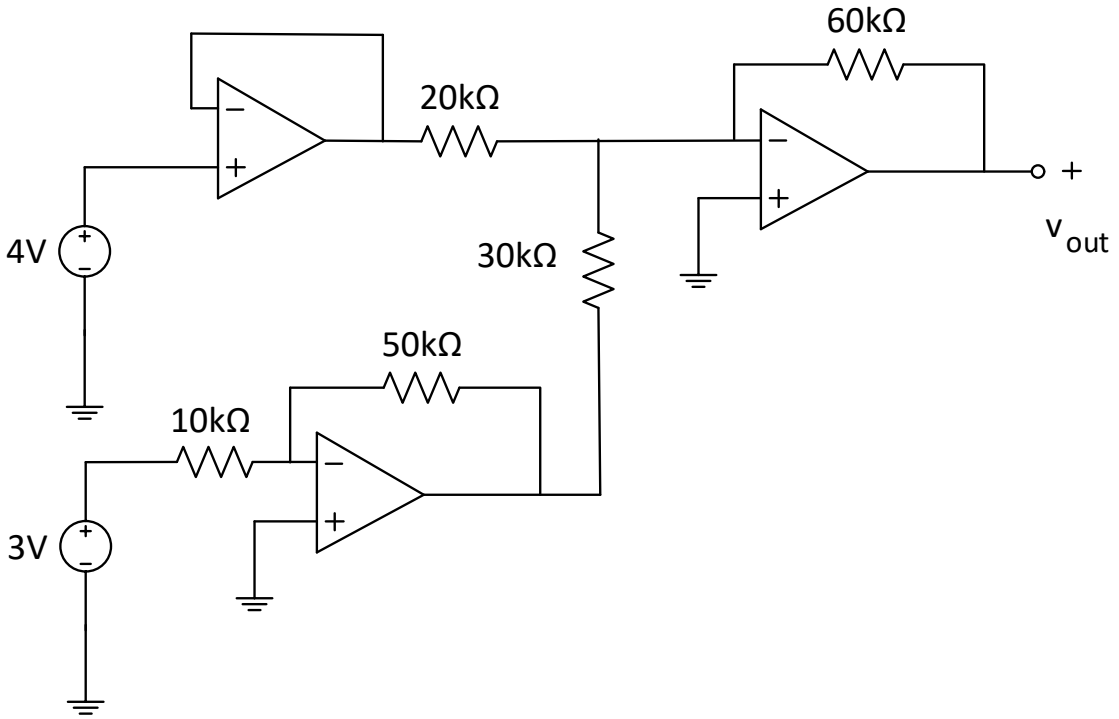
Örnek: Şekildeki 2-uçlu elemanın tanım bağıntısını bulunuz.



Örnek: Şekildeki devrenin nasıl çalıştığını açıklayınız.



Örnek: $v_{out} = ?$



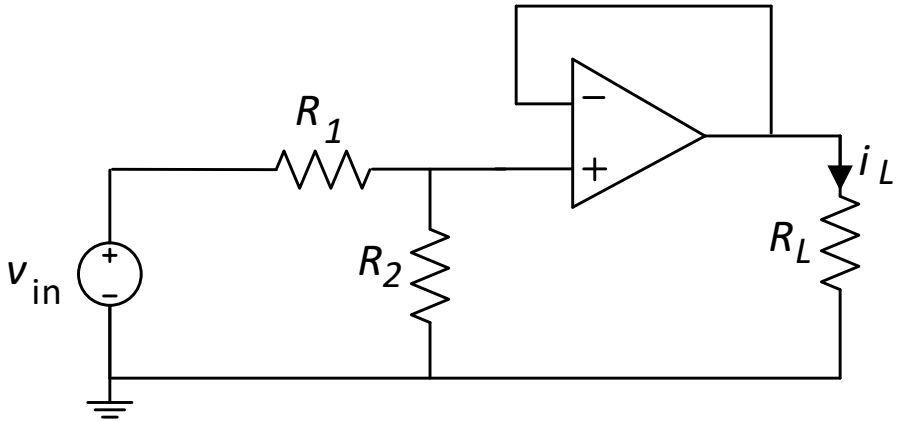
Örnek:

$v_L = ?$

$i_L = ?$

$p_L = ?$

$p_{opamp} = ?$



Örnek: Düğüm ve ek denklemlerini yazın, genelleştirilmiş düğüm denklemlerini yazın.