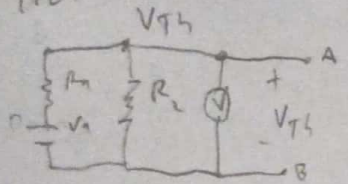
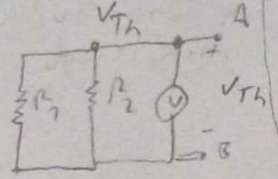
Konuralp BOL 22011613 ICAD

Soru 1

Thevenin ve Norton teoremleri ile bir devreyi daha basite indirgeyebiliriz. Bunu yapmak için gerilim kaynaklarını kısa devre, akım kaynaklarını ise açık devre yaparız. Daha sonra 2 açık uçun arasındaki gerilimi buluruz. Bu gerilim Thevenin gerilimidir.

1. Devre



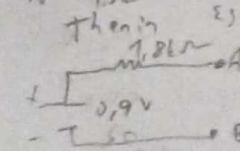


$R_{Th} = R_1 // R_2 = \frac{10k \cdot 2,2k}{12,2k} \cong 1,8k\Omega$

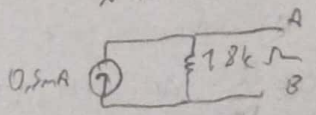
$\frac{V_{Th}-5}{10k} + \frac{V_{Th}}{2,2k} = 0$, $11V_{Th} - 55 = -50V_{Th}$, $V_{Th} = \frac{5}{67} = 0,9V$

$I_N = \frac{0,9}{1,8k} = 0,5mA$

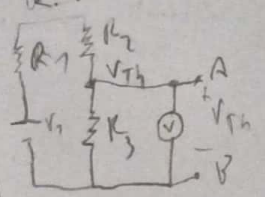
Thenin Eşdeğer

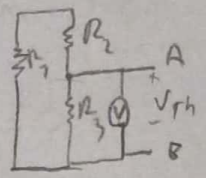


Norton Eşdeğer

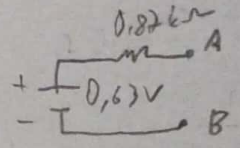


2. Devre

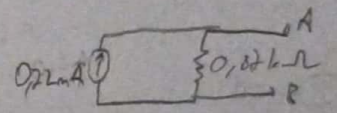




Thenin Eşdeğer



Norton Eşdeğer



$R_{Th} = (R_1 + R_2) // R_3 = \frac{(6,9k) \cdot 7k}{7,9k} \cong 0,82k\Omega$

$\frac{V_{Th}-V_1}{R_1+R_2} + \frac{V_{Th}}{R_3} = 0$, $\frac{V_{Th}-5}{6,9k} = -\frac{V_{Th}}{7k}$

$-6,9V_{Th} = V_{Th} - 5$, $V_{Th} = \frac{5}{7,9} \cong 0,63V$

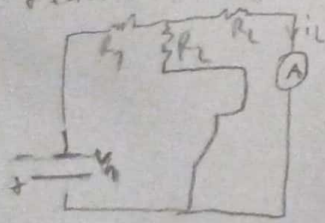
$I_N = \frac{0,63}{0,82k} = 0,72mA$

Ölçümler

	V_{Th} (V)	R_{Th} (kΩ)	I_N mA	R_L (kΩ)	V_{AB} (V)		I (mA)	
					Gerçek	Eşdeğer	Gerçek	Eşdeğer
Devre 1	0,9	1,8	0,5	1,8	0,9		0,14	0,14
Devre 2	0,63	0,82	0,72	0,82	0,63		0,11	0,11

Soru 2

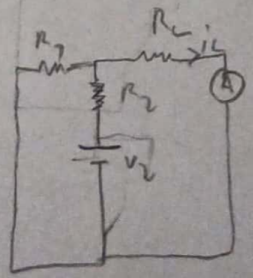
Birden fazla üreteç bulunan devreleri ele almak için süperpozisyon teoremini kullanırız. Her üretecin ürettiklerinin toplamı toplam akımı verir.



$R_1 // R_L = \frac{100 \cdot 220}{320} = 68,75$

$i_L = i_1 \cdot \frac{R_2}{R_2+R_L} = -0,029 \cdot \frac{100}{320} \cong +9,26mA$

$i_1 = \frac{V_1}{R_1 + (R_2 // R_L)} = \frac{-5}{168,75} = -0,029A$



$i_2 = \frac{3,3}{R_2 + (R_L // R_1)}$

$= \frac{3,3}{168,75}$

$= 0,01955A$

$i_L = 0,01955 \cdot \frac{700}{320} \cong 6,11mA$

R_L'den geçen toplam akım:

$6,11 - 9,26 = -3,15mA$

ölçümler

	V_1 (V)	V_2 (V)	I (mA)
Hesap	-5		-9,26
ölçme	-5		-9.26
Hesap		3.3	6,11
ölçme		3.3	6,11
Hesap	-5	3.3	-3,15
ölçme	-5	3.3	-3,15