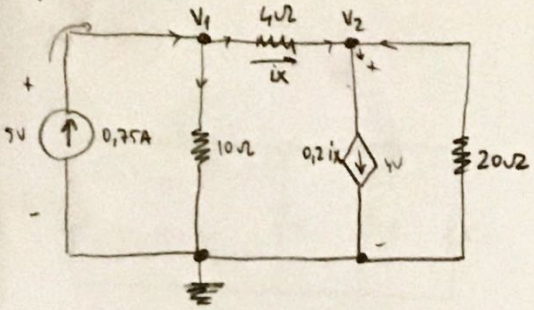
Soru (1,2,3,4,5,6)



1.düğüm : $\frac{V_1-0}{10} + \frac{V_1-V_2}{4} - 0,75 = 0$

2.düğüm : $\frac{V_2-V_1}{4} + \frac{V_2}{20} + 0,2\,i_x = 0$

$i_x = \frac{V_1-V_2}{4}$

$i_x = \frac{5-4}{4} = 0,25A$

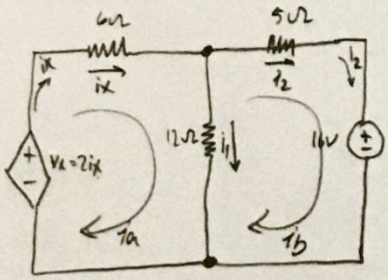
$V_1 = 5V$, $V_2 = 4V$

$P_{20\Omega} = \frac{V_2^2}{20} = \frac{16}{20} = 0,8W$ (tüketir) (20Ω'luk direncin harcadığı güç)

$P_{0,75A} = v.i = -5 \times 0,75 = -3,75W$ (üretir) (Bağımsız akım kaynağının gücü)

$P_{0,2ix} = +v.i = 4 \times 0,2x\ 0,25 = 0,2W$ (tüketir) (Bağımlı akım kaynağının gücü)

Soru (7,8,9,10,11)



ia-ib pozitif akımları:

$-V_x + 6i_a + 12(i_a - i_b) = 0$ (a göz denklemi)

$-2i_a$

$12(i_b - i_a) + 5i_b + 16 = 0$ (b göz denklemi)

$16i_a - 12i_b = 0$

$-12i_a + 17i_b = 0$

$i_a = -1,5A$, $i_b = -2A$

$V_x = 2i_a$

$V_x = 2i_x$, $i_a = i_x$, $i_2 = i_b$, $i_1 = i_{a-b}$

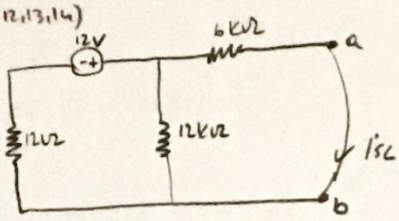
$P_{6\Omega} = i^2.R = i_x^2.6 = (-1,5)^2 \times 6 = 13,5W$ (6Ω'luk direncin harcadığı güç)

$P_{Vx} = -V_x.i_x = -2i_x.i_x = -2(i_x)^2 = -2 \times (-1,5)^2 = -4,5W$ (üretir) (Bağımlı gerilim kaynağının gücü)

$P_{16V} = +i_2.16 = -2 \times 16 = -32W$ (üretir) (Bağımsız gerilim kaynağının gücü)

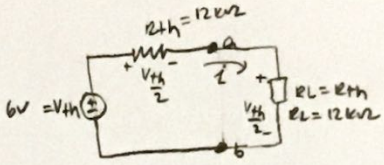
$P_{toplam} = 13,5 + (-2)^2 \times 5 + (0,5)^2 \times 12 = 36,5W$ (Devrede tüketilen toplam güç)

Soru (12,13,14)



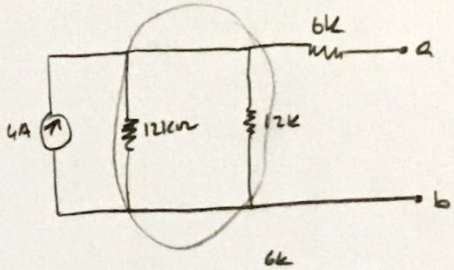
a-b açık devre ise $V_{ab} = V_{th}$ (Thevenin gerilimi)

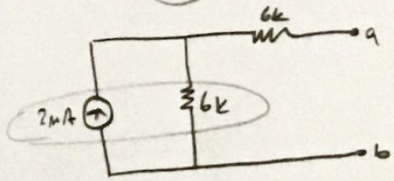
a-b kısa devre ise $R_{th} = \frac{V_{ab}}{I_{sc}}$ (Thevenin direnci)

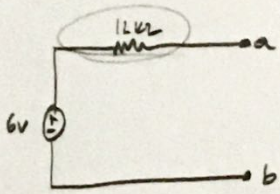


$P_{max} = \frac{(V_{th}/2)^2}{R_{th}} = \frac{V_{th}^2}{4R_{th}}$

(a-b yüklenen devreden max. güç transferi sağlayacak şekilde bir direnç bağlanıyor. Bu durumda bu direncin gücüne hesaplayınız)





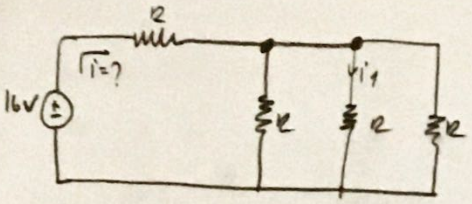


$P_{max} = \frac{6^2}{4 \times 12k} = 0,75mW$

Soru 7 (15,16)

16) 16V kaynağın devreye sağladığı güç 32 mW ise R=?

17) Bu durumda i_1=?



$32m = V.i$

$32m = 16.i$

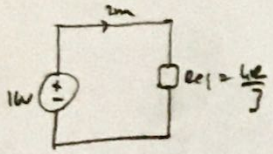
$i = \frac{32m}{16} = 2mA$

$i_1 = \frac{2mA}{3} = 0,67\,mA$

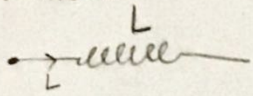
$R_{eş} = R + \frac{R}{3} = \frac{4R}{3}$

$32m = i^2 . R_{eş} = (2m)^2 . \frac{4R}{3} = \frac{32m}{1m^2}$

$R = \frac{32m \times 3}{4 \times 4m^2} = 6\,k\Omega$



6.1 Indiktör



$+ \quad v \quad -$

$$v = L \cdot \frac{di}{dt} \Longrightarrow \frac{1}{L}\int_{to}^{t} v(x)dx = \int_{i(to)}^{i(t)} di$$

$$\frac{1}{L}\int_{to}^{t} v(x)dx = i(t) - i(to)$$

$$i(t) = \frac{1}{L}\int_{to}^{t} v(x)dx + i(to)$$

* i sabit ise $v = 0$ olur. (kısa devre)
* i(t) sürekli fonksiyondur. (sıçrama yapmaz)

Genelde $t_o = 0$ s. verilir.

$$i(t) = \frac{1}{L}\int_{0}^{t} v(x)dx + i(0)$$

$$p = v \cdot i = L \cdot \frac{di}{dt} \cdot i = Li \cdot \frac{di}{dt}$$

$$p = \frac{dw}{dt}$$ w: enerji (joule), p: güç (watt)

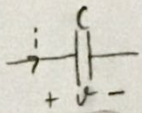
$$\int_{w(to)}^{w(t)} dw = \int_{to}^{t} p(x)dx$$

$w(to)$: başlangıç enerjisi

$$w(t) = \int_{to}^{t} p(x)dx \Rightarrow w(t) = \frac{1}{2}Li^2(t)$$

$$w(t) = L\int_{to}^{t} i.di = L\frac{i^2}{2}\Big|_{to}^{t} = \frac{1}{2}Li^2(t) \quad (i(to) = \text{sıfır ise})$$

6.2 Kapasitör



$$i = C \cdot \frac{dv}{dt} \Longrightarrow v(t) = \frac{1}{C}\int_{t(o)}^{t} i(x)dx + v(to)$$

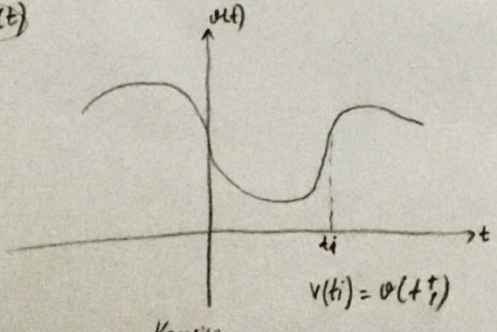
$$p = v\,i = v \cdot C \cdot \frac{dv}{dt}$$

$$p = C \cdot v \cdot \frac{dv}{dt}$$

$$W(t) = \int_{0}^{t} f(x)dx$$

$$w(t) = \frac{1}{2}Cv^2(t)$$

* v = sabit ise $\Rightarrow i = 0$ olur. (açık devre)
* v gerilmesi sürekli olmalıdır. (sıçrama)



Kapasitör