EC 1010: Electrical and Magnetic circuits.

Note Title 1/28/2013

Problem set #1 (Due on 2 Feb. 2013)

HKD: Hayt, Kemmerly, and Durbin

Engineering circuit analysis, 7th Edition

Tata McGraw Hill 2010, 2006

Chapter Problem

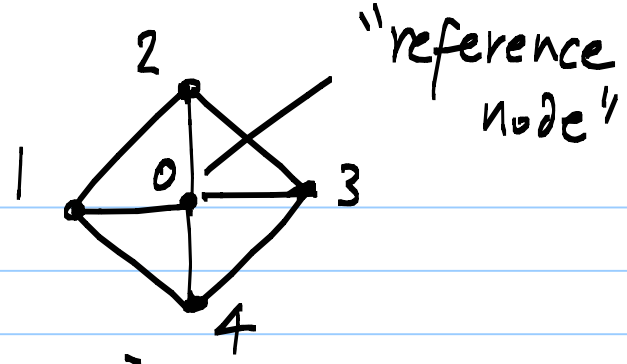
① HKD 4.13 (Fig. 4.43)

(label the nodes 1, 2, 3, ... starting from the left)

* Set up the nodal analysis eqn. $[G]\underline{V} = \underline{I}$
* Solve for $\underline{V}$
* Answer the given question
* Setup the MNA equations

MNA: modified nodal analysis

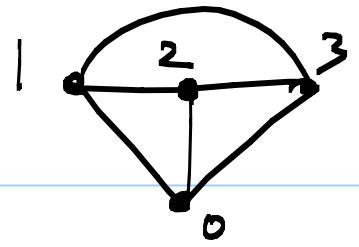
(2) HKD 4.16 (Fig. 4.46)



(label the nodes as shown here:)

* Set up the nodal analysis eqn. $[G]\underline{V} = \underline{I}$
* Solve for $\underline{V}$
* Answer the given question
* Setup the MNA equations

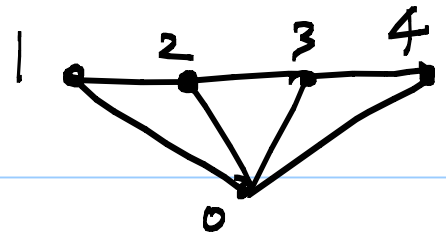
(3) HKD 4.17 (Fig. 4.46)



(label the nodes as shown here:)

* Set up the nodal analysis eqn. $[G]\underline{V} = \underline{I}$
* Solve for $\underline{V}$
* Answer the given question
* Setup the MNA equations

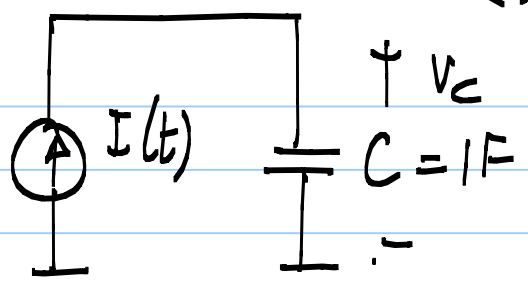
④ HKD 4.19 (Fig. 4.49)



(label the nodes as shown here:)

* Set up the nodal analysis eqn. $[G]\underline{V} = \underline{I}$
* Solve for $\underline{V}$
* Answer the given question
* Setup the MNA equations

(5)



(initially discharged)

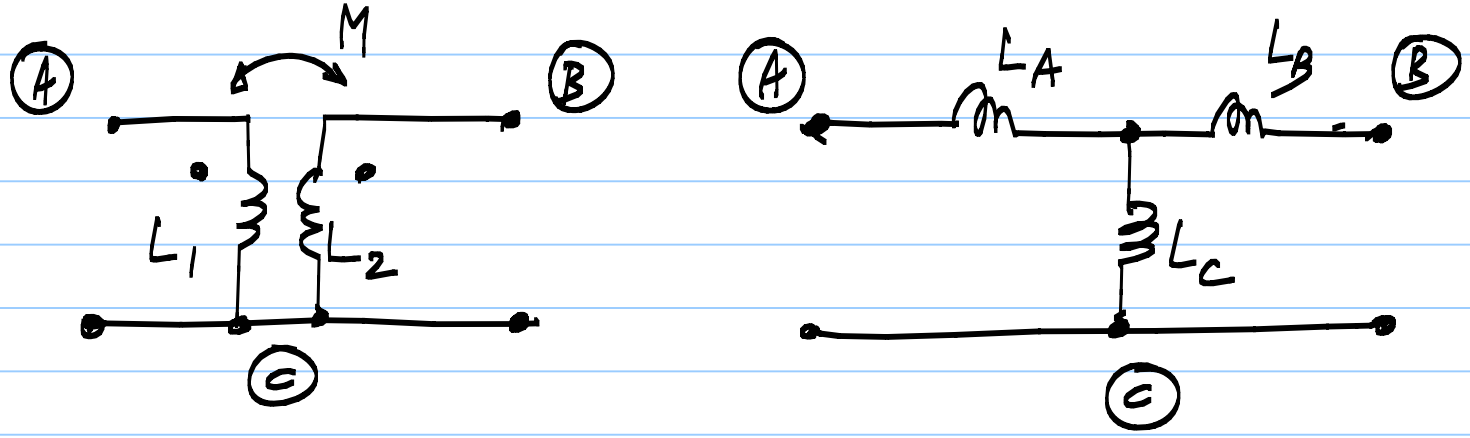
(a) $I(t) = \begin{cases} 0 & t < 0 \\ 1A \cdot \cos(2\pi t) & t \geq 0 \end{cases}$

(b) $I(t) = \begin{cases} 0 & t < 0 \\ 1A \cdot \sin(2\pi t) & t \geq 0 \end{cases}$

Determine $v_c(t)$ in the two cases

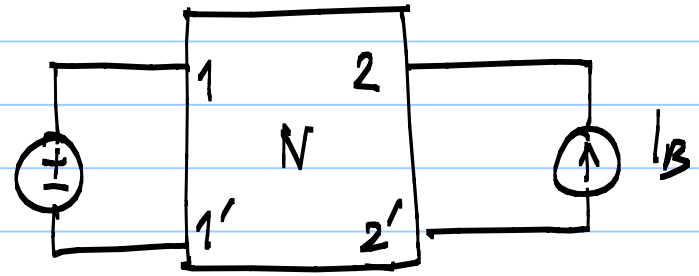
⑥ The following two networks are equivalent.

Determine L_A, L_B, L_C in terms of L_1, L_2, M

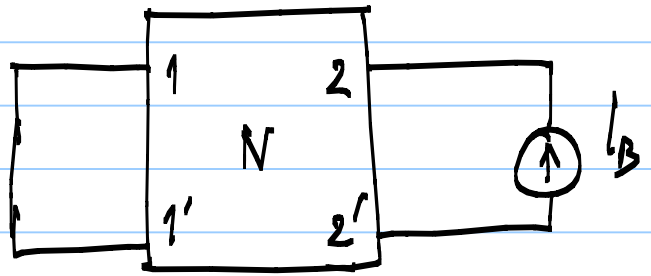


(7)

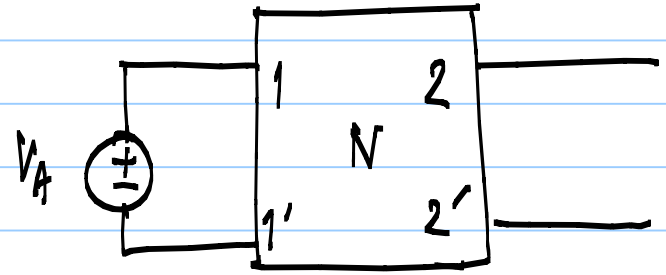
(a)



(b)

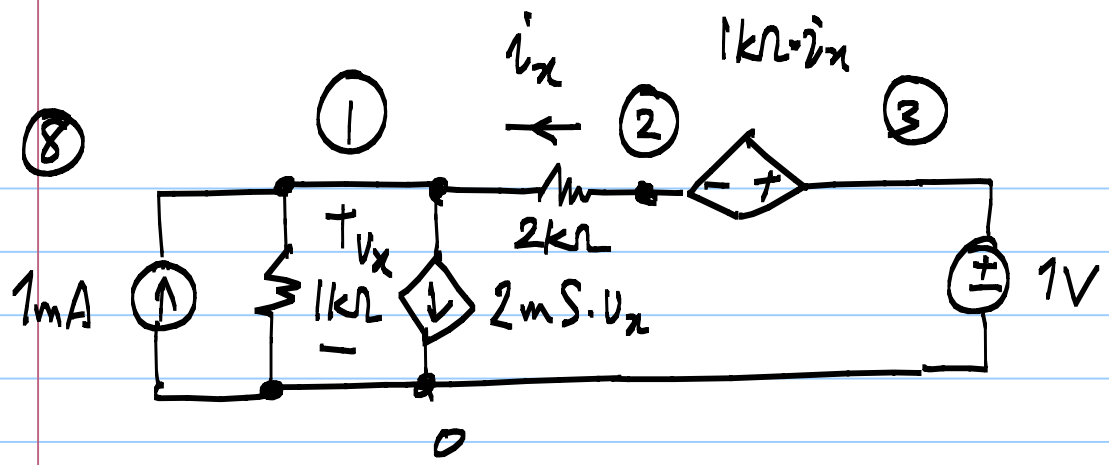


(c)



N consists only of resistors. Relate the power dissipated in the network N in (a) to that in (b) and (c).

Is this relationship true in general?



* write down the MNA equations

* Are the 1mA and 1V sources dissipating or generating power? How much?