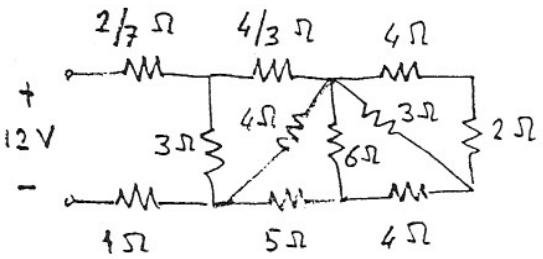
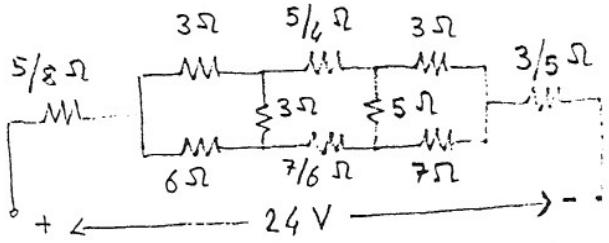
METU/EEED Fall 2008

EE 201/ ZPS II

1) Find all the branch currents.

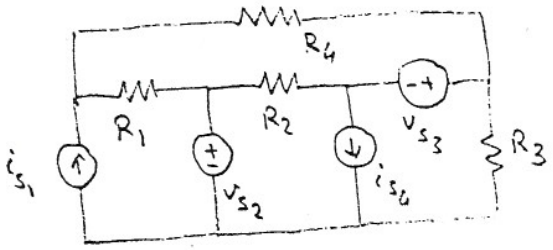


(a)

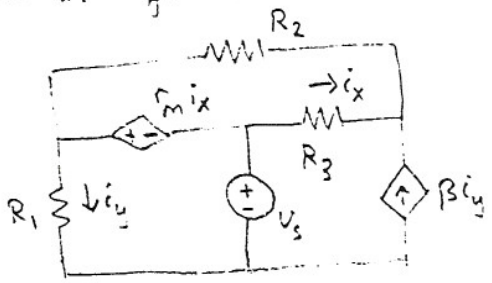


(b)

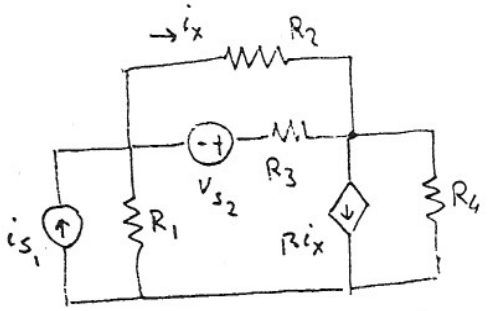
2) Obtain the node and mesh equations in matrix form.



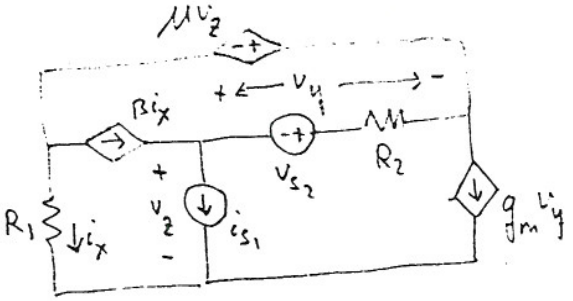
(a)



(b)

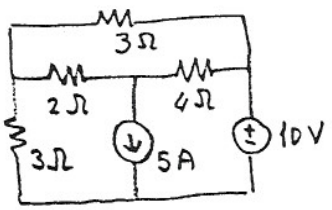


(c)

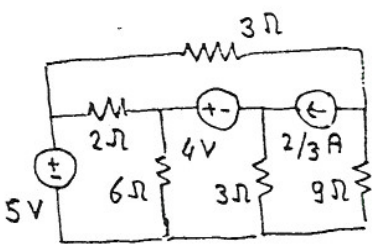


(d)

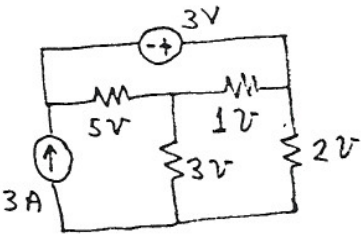
3) Find the branch voltages and currents. Verify that the instantaneous power is conserved.



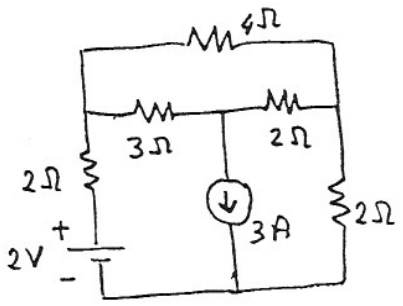
(a)



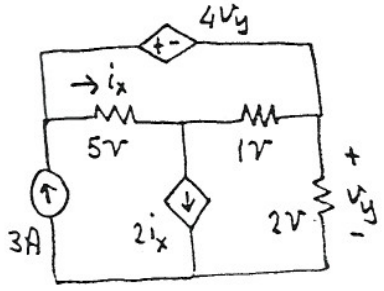
(b)



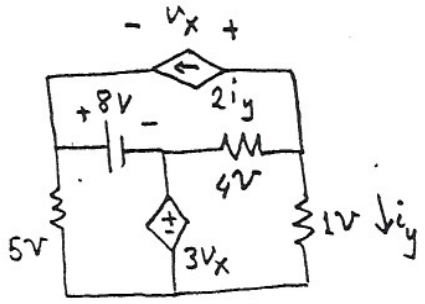
(c)



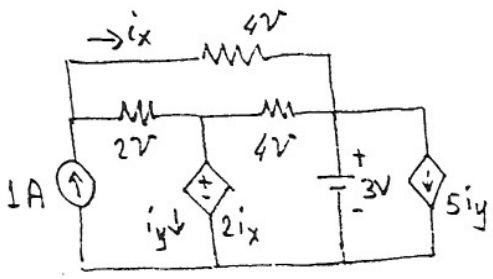
(d)



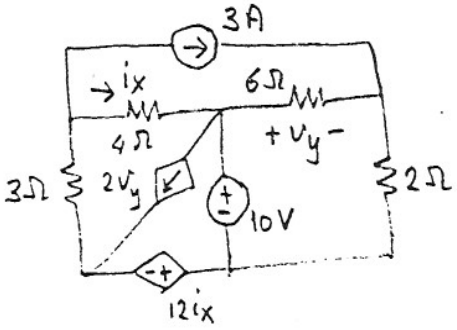
(e)



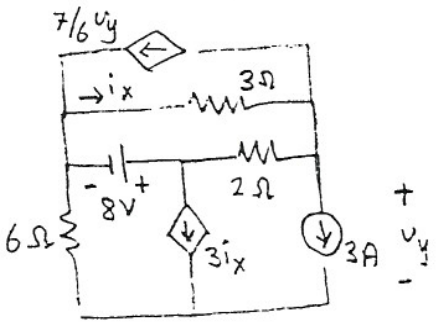
(f)



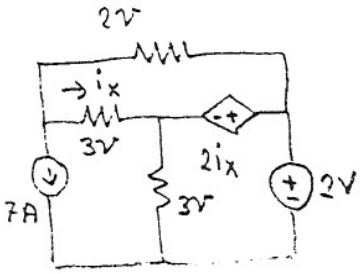
(g)



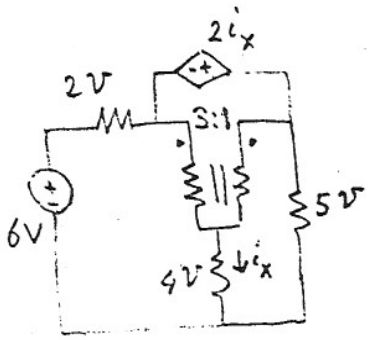
(h)



(i)

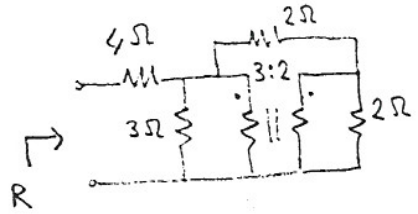


(j)

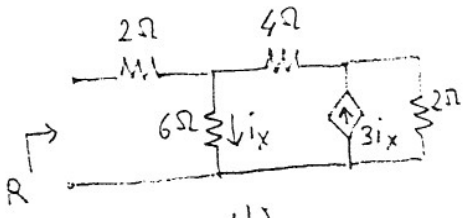


(k)

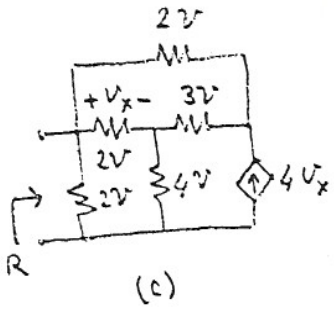
4) Find the input resistance R.



(a)

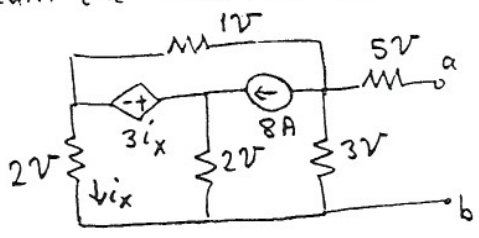


(b)

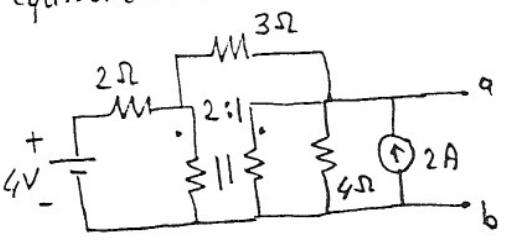


(c)

5) Obtain the Thevenin and Norton equivalents.

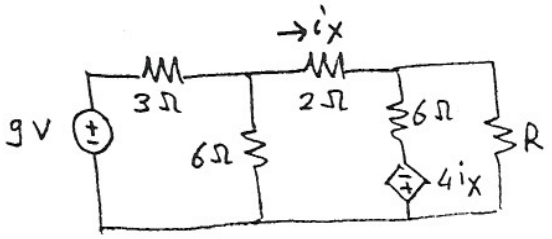


(a)



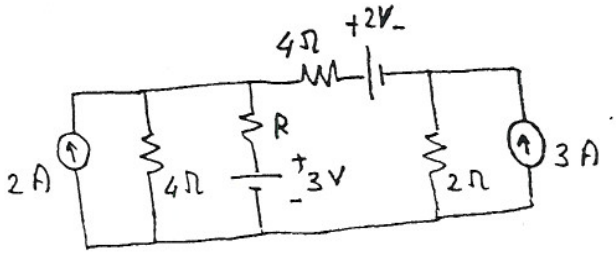
(b)

6) Find R.



$P_R = 2/9$ W

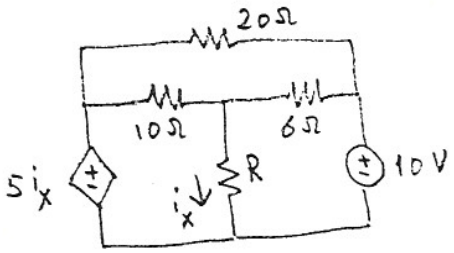
(a)



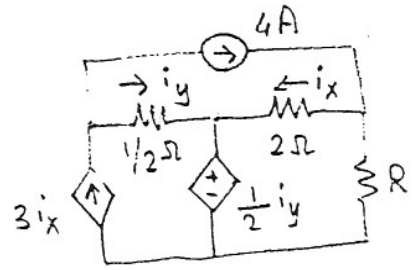
$P_R = 5/3$ W

(b)

7) Determine the value of R so that it absorbs the maximum power.
Also determine this power.
Compute the powers absorbed/supplied by the other elements and verify that the power is conserved.

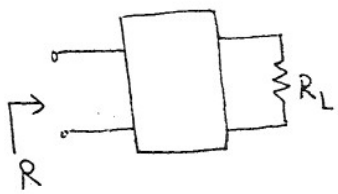


(a)



(b)

8)



The two-port is made of LTI resistive elements.

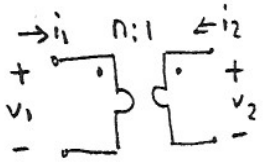
Express R in terms of R_L and

(a) the resistance parameters,

(b) the hybrid-I parameters,

(c) the chain parameters

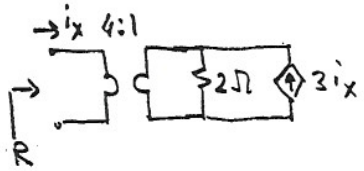
of the two-port.

9) 

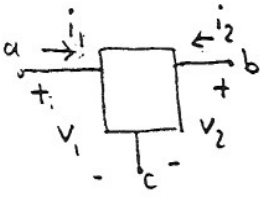
The terminal equation of a 2-branch element called a gyrator is

$$\begin{bmatrix} v_1 \\ v_2 \end{bmatrix} = \begin{bmatrix} 0 & n \\ -n & 0 \end{bmatrix} \begin{bmatrix} i_1 \\ i_2 \end{bmatrix}$$

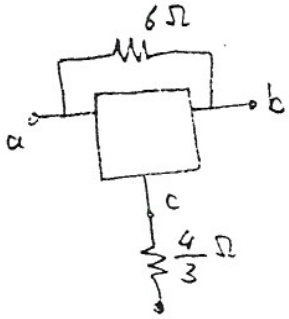
(a) Show that the gyrator is a lossless passive LTI resistive element.

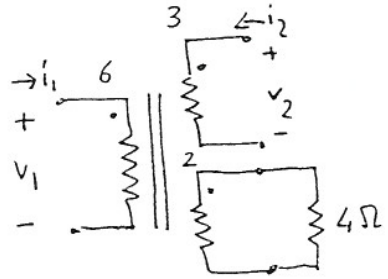
(b) 

Find R.

10) Given  : $\begin{bmatrix} v_1 \\ v_2 \end{bmatrix} = \begin{bmatrix} 8 & 6 \\ 6 & 10 \end{bmatrix} \begin{bmatrix} i_1 \\ i_2 \end{bmatrix}$

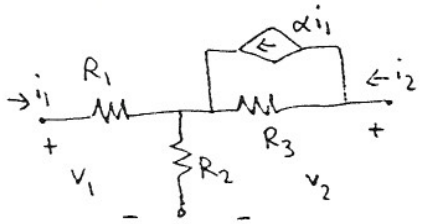
Obtain the resistance parameters for the 3-terminal two port given below.



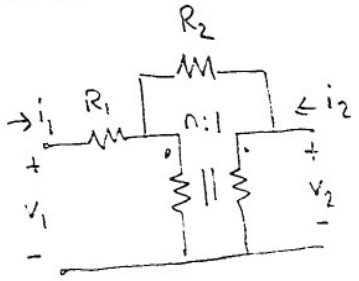
11) 

Obtain the resistance parameters.

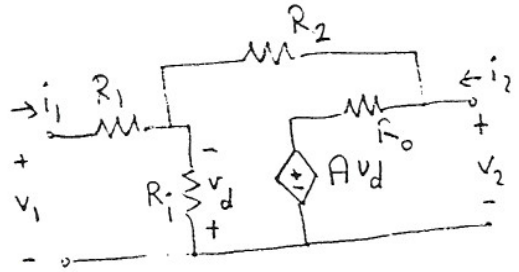
12) Obtain the hybrid-I parameters.



(a)

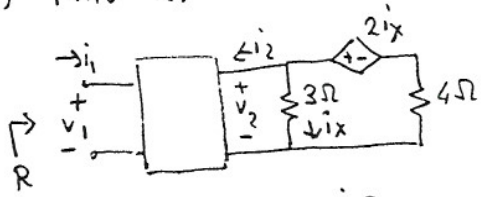


(b)

13) 

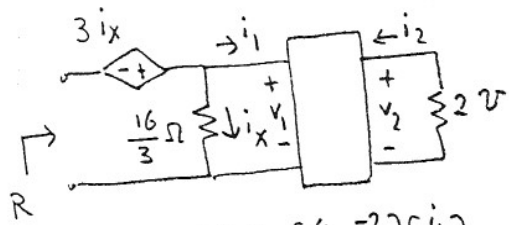
Obtain the hybrid-II parameters.

14) Find R.



$\begin{bmatrix} v_1 \\ v_2 \end{bmatrix} = \begin{bmatrix} 3 & 2 \\ 2 & 4 \end{bmatrix} \begin{bmatrix} i_1 \\ i_2 \end{bmatrix}$

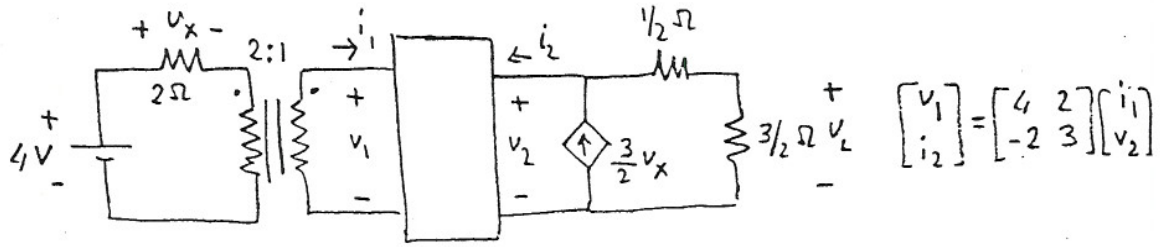
(a)



$\begin{bmatrix} v_1 \\ i_2 \end{bmatrix} = \begin{bmatrix} 4 & -2 \\ 2 & 3 \end{bmatrix} \begin{bmatrix} i_1 \\ v_2 \end{bmatrix}$

(b)

15) Find v_L.

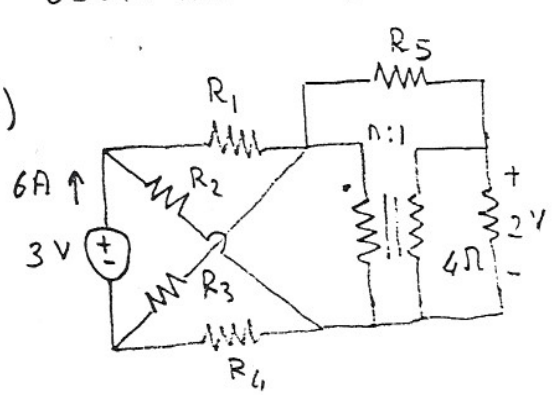


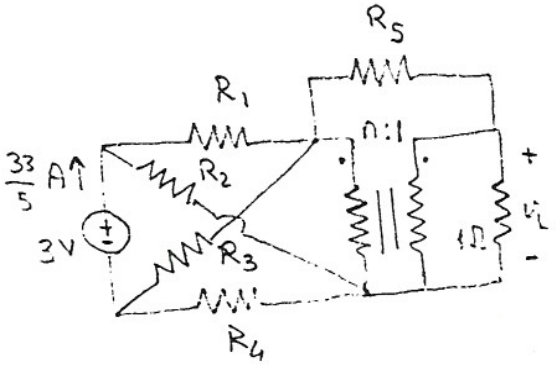
16) Given the hybrid-I parameters of a LTI resistive two-port:

$$\begin{bmatrix} v_1 \\ i_2 \end{bmatrix} = \begin{bmatrix} 1 & 3 \\ -3 & 4 \end{bmatrix} \begin{bmatrix} i_1 \\ v_2 \end{bmatrix}.$$

Obtain the resistance and chain parameters.

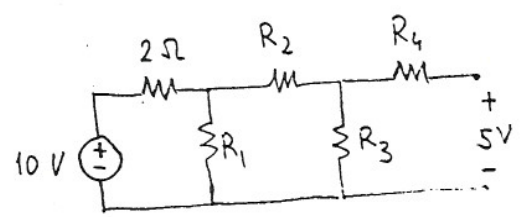
17)

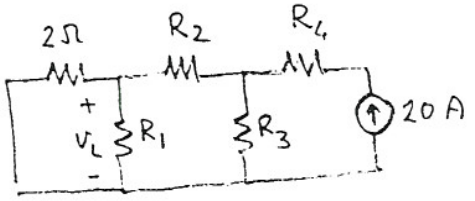




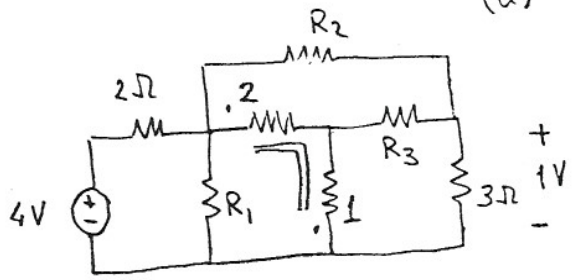
Find v_L.

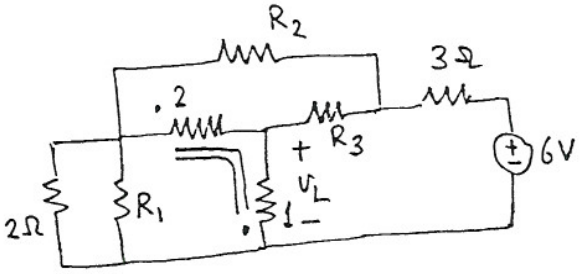
18) Find v_L.





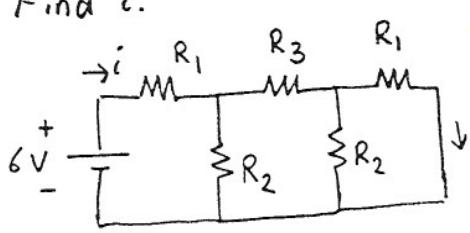
(a)

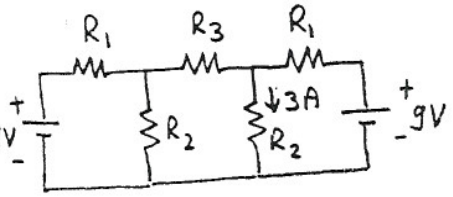




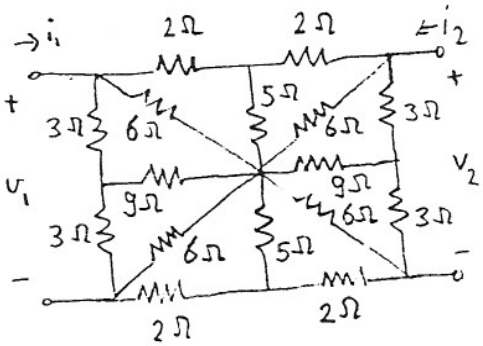
(b)

19) Find i.



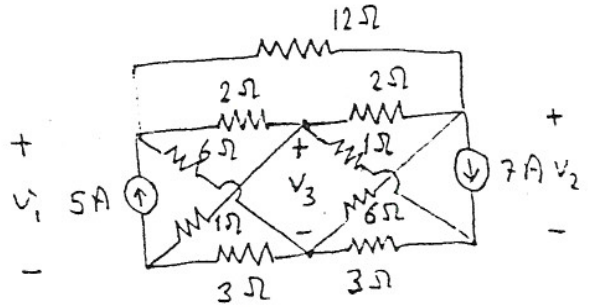


20)



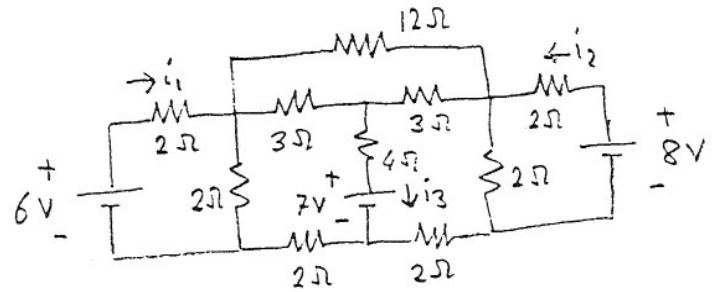
Obtaind the conductance parameters.

21)



Find v_1, v_2 and v_3.

22)



Find i_1, i_2 and i_3.