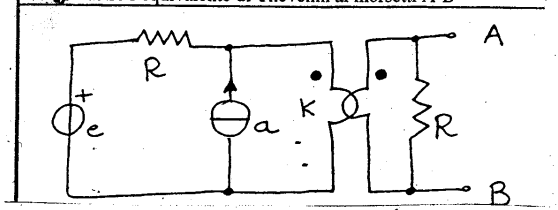
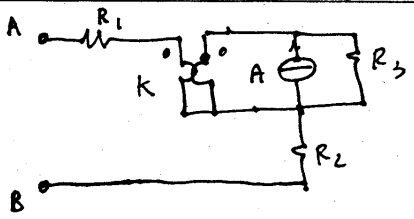
Determinare l'equivalente di Thevenin ai morsetti A-B



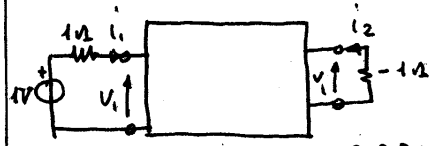
① $\left(R_{eq} = \frac{R}{1+k^2},\ V_0 = \frac{k(e+Ra)}{1+k^2}\right)$

Determinare l'equivalente Thevevnin del bipolo di morsetti A-B



$R_1 = 1\ \Omega$
$R_2 = 2\ \Omega$
$R_3 = 3\ \Omega$
$A = 2\ A$
$K = 3$

② $(R_e = 30\ \Omega,\ V_0 = 18\ V)$



EQUAZIONE DEL D.B.P:

③ $Av + Bi + C = 0$

$A = \begin{pmatrix} 1 & 0 \\ 0 & 2 \end{pmatrix}$, $B = -\begin{pmatrix} 0 & 3 \\ 0 & 1 \end{pmatrix}$

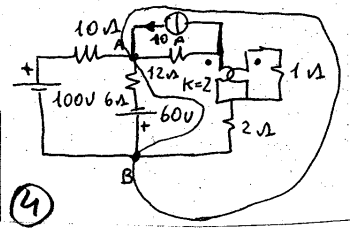
$C = -\begin{pmatrix} 2 \\ 1 \end{pmatrix}$

CALCOLARE

V_1, V_2, i_1, i_2

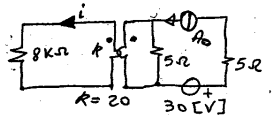
$(V_1 = 5V,\ V_2 = 1V,\ i_1 = 4A,\ i_2 = 1A)$

Calcolare la tensione v_{AB} nella rete indicata in figura



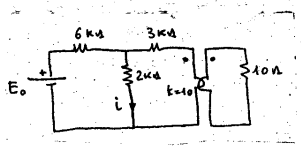
④ $\left(V_{AB} = \frac{600}{29}\ V\right)$

Nella rete in figura calcolare il valore della corrente A_0 in modo che la corrente i valga 10 [mA]. Calcolare anche la potenza erogata dal generatore di corrente.



⑤ $(A_0 = 1\ A,\ P = -21\ W)$

Nella rete in figura calcolare il valore della tensione E_0 in modo che la corrente i valga 10 mA. Calcolare anche la potenza fornita al carico di 10 Ω

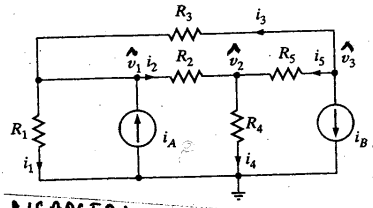


$\left(E_0 = 110\ V,\ P = \frac{1}{40}\ W\right)$

⑥

III ESERCITAZIONE

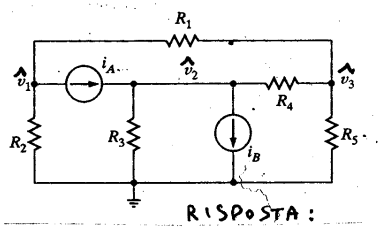
SCRIVERE PER ISPEZIONE LE EQUAZIONI AI NODI



RISPOSTA:

⑦

$$\begin{bmatrix} \frac{1}{R_1}+\frac{1}{R_2}+\frac{1}{R_3} & -\frac{1}{R_2} & -\frac{1}{R_3} \\ -\frac{1}{R_2} & \frac{1}{R_2}+\frac{1}{R_4}+\frac{1}{R_5} & -\frac{1}{R_5} \\ -\frac{1}{R_3} & -\frac{1}{R_5} & \frac{1}{R_3}+\frac{1}{R_5} \end{bmatrix} \begin{bmatrix} \hat{v}_1 \\ \hat{v}_2 \\ \hat{v}_3 \end{bmatrix} = \begin{bmatrix} i_A \\ 0 \\ -i_B \end{bmatrix}$$



RISPOSTA:

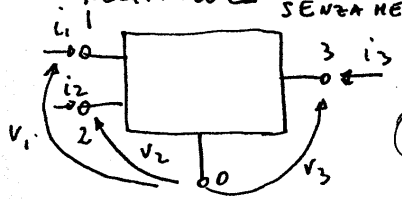
⑧

$$\left(\frac{1}{R_1}+\frac{1}{R_2}\right)\hat{V}_1 - \frac{1}{R_1}\hat{V}_3 = -i_A$$

$$\left(\frac{1}{R_3}+\frac{1}{R_4}\right)\hat{V}_2 - \frac{1}{R_4}\hat{V}_3 = i_A - i_B$$

$$-\frac{1}{R_1}\hat{V}_1 - \frac{1}{R_4}\hat{V}_2 + \left(\frac{1}{R_1}+\frac{1}{R_2}+\frac{1}{R_5}\right)\hat{V}_3 = 0$$

INERTE ☒ PASSIVO ☐
RECIPROCO ☐ LINEARE ☒
SENZA MEMOR. ☒



(9)

LE TRE EQUAZIONI DEL QUADRIPOLO SONO:

$V_1 - V_2 = 0$, $i_1 = 0$, $i_2 = 0$.

POSTE ESSE NELLA FORMA

$A\,V + B\,i + C = 0$, (Ok)

DETERMINARE A, B e C

È RAPPRESENTABILE CON MATRICE DI RESISTENZE? NO

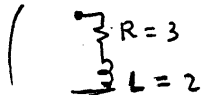
È RAPPRESENTABILE CON MATRICE DI CONDUTTANZE? NO

$$\begin{cases} A = \begin{pmatrix} 1 & -1 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}, \quad B = \begin{pmatrix} 0 & 0 & 0 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}, \quad C = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix} \end{cases}$$

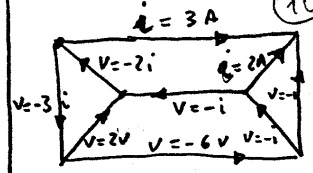
UN BIPOLO HA LA RELAZIONE COSTITUTIVA:

$$V = 3i + 2\frac{di}{dt}$$ (12)

RAPPRESENTARLO CIRCUITALMENTE



(Ok)



(10)

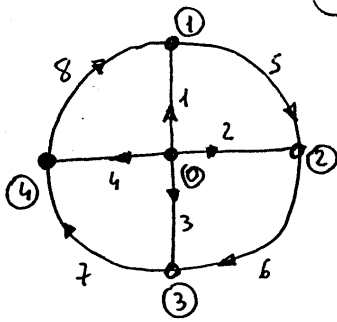
NEL GRAFO ORIENTATO LE FRECCE INDICANO I VERSI CONVENZIONALI DELLE TENSIONI E DELLE CORRENTI. I BIPOLI HANNO LE RELAZIONI COSTITUTIVE INDICATE.

QUANTE SONO L'EQUAZIONI KI INDIPENDENTI? (4) Ok (5)

QUANTE SONO L'EQUAZIONI KV INDIP.? (4) Ok

QUANTE SONO LE INCOGNITE NEL METODO DEL TABLEAU SPARSO? (18) Ok

SCRIVERE L'EQUAZIONI CHE SI OTTENGONO CON IL METODO DEL TABLEAU SPARSO, DOPO AVERE INDIVIDUATO I NODI INDIPENDENTI E LE MAGLIE INDIP.



(13)

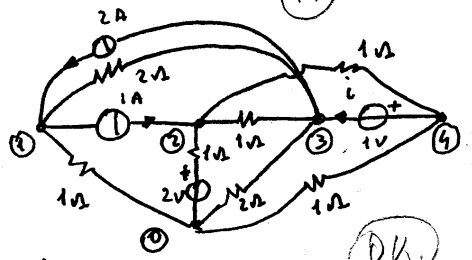
SCRIVERE LA MATRICE DI INCIDENZA A DEL GRAFO

(Ok)

$$\begin{cases} A = \begin{bmatrix} 1 & 0 & 0 & 0 & -1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & -1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 1 & -1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 1 & -1 \end{bmatrix} \end{cases}$$

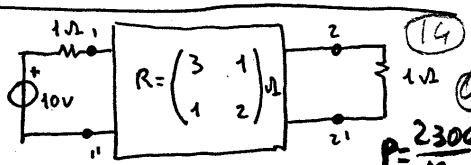
SCRIVERE L'EQUAZIONI DELLE TENSIONI AI NODI.

(11)



(Ok)

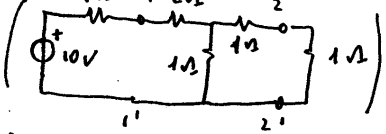
$$\begin{cases} \frac{3}{2}\hat{V}_1 - \frac{1}{2}\hat{V}_3 = 1 \\ 3\hat{V}_2 - \hat{V}_3 - \hat{V}_4 = 3 \\ 2\hat{V}_3 - \frac{1}{2}\hat{V}_1 - \hat{V}_2 = i - 2 \\ 2\hat{V}_4 - \hat{V}_2 = -i \end{cases} \qquad \hat{V}_4 - \hat{V}_3 = 1$$



(14) (Ok)

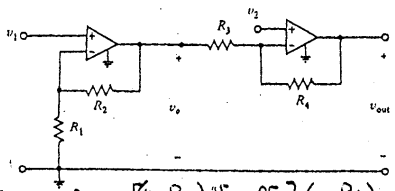
$P = \frac{2300}{121}$ W

- Calcolare la potenza entrante nel doppio bipolo 11'–22'
- RAPPRESENTARE CON UNA RETE DI BIPOLI DOPO AVER GIUSTIFICATO LA POSSIBILITA' DI TALE RAPPRESENTAZ.



RICALCOLARE LA POTENZA COME SOMME DELLE POTENZE DISSIPATE SUL T.

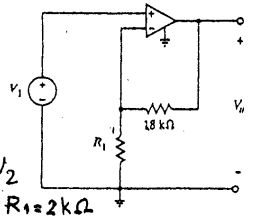
3.59 Find the expression for the output voltage in the op-amp circuit shown in Fig. P3.59.



$v_- = v_+ = v_1$, $i_- = i_+ = 0$, and nodal analysis to obtain v_o. Obtain v_{out} in a similar manner.

$$v_{out} = \left[\left(1 + \frac{R_2}{R_1}\right)v_1 - v_2\right]\left(-\frac{R_4}{R_3}\right) + v_2$$

3.57 For the circuit in Fig. P3.57 find the value of R_1 that produces a voltage gain of 10.

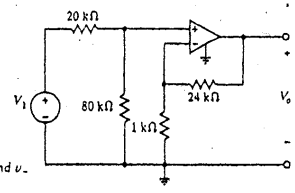


$R_1 = 2\,k\Omega$

Figure P3.57

3.56 Find the voltage gain of the op-amp circuit shown in Fig. P3.56.

$\frac{v_o}{v_1} = 20$

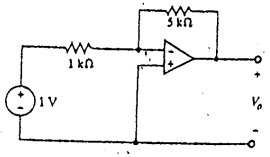


Find v_+ using $i_+ = 0$. Find v_- using $i_- = 0$, and use $v_- = v_+$ to find v_o.

Figure P3.56

3.52 Find V_o in the circuit in Fig. P3.52 assuming the op-amp is ideal.

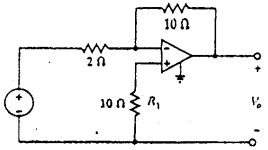
$V_o = -5$ V



Use $v_- = v_+ = 0$, $i_- = i_+ = 0$, and nodal analysis to find v_o.

Figure P3.52

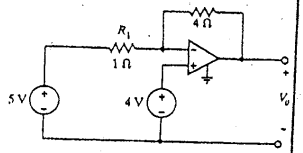
3.54 Find v_o in the network in Fig. P3.54 and explain what effect R_1 has on the output.



$V_o = -10$ V

Figure P3.54

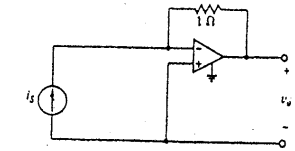
3.55 Find V_o in the network in Fig. P3.55.



$V_o = -4$

Figure P3.55

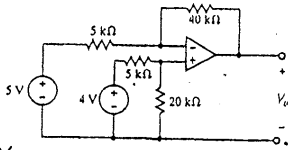
3.53 The network in Fig. P3.53 is a current-to-voltage converter or transconductance amplifier. Find v_o/i_s for this network.



$\frac{V_o}{i_s} = -1$

Figure P3.53

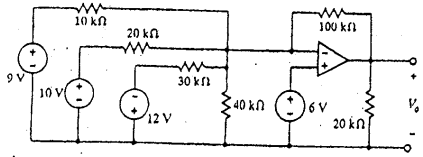
Find V_o in the circuit in Fig. P3.80.



$V_o = -11.2$ V

Figure P3,80

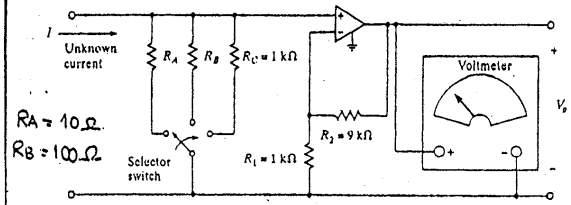
3.81 Find V_o in the circuit in Fig. P3.81.



$V_o = 31$ V

Figure P3.81

3.83 The electronic ammeter in Example 3.23 has been modified and is shown in Fig. P3.83. The selector switch allows the user to change the range of the meter. Using values for R_1 and R_2 from Example 3.23, find the values of R_A and R_B that will yield a 10-V output when the current being measured is 100 mA and 10 mA, respectively.

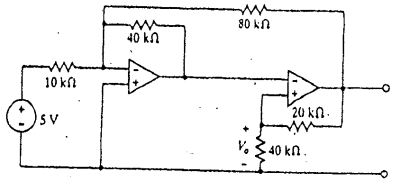


$R_A = 10\,\Omega$

$R_B = 100\,\Omega$

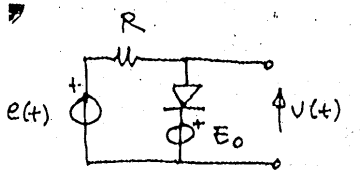
Figure P3.83

3.82 Find V_o in the circuit in Fig. P3.82.



$V_o = -11.43$ V

Figure P3.82



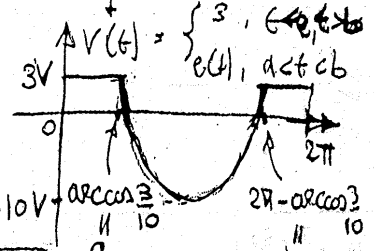
$e(t) = 10 \cos \omega t$ (volt)

$E_0 = 3$ volt

$R = 10$ kΩ

per $\omega = 1$ $\quad t \in [0, 2\pi]$

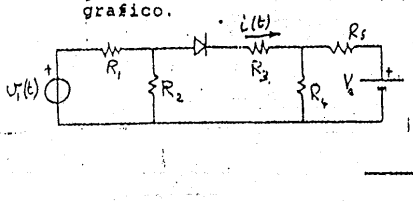
$$V(t) = \begin{cases} 3, & t \in [a, b] \\ e(t), & a < t < b \end{cases}$$

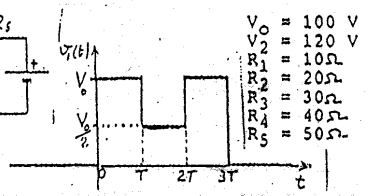


Nel circuito in figura il diodo è ideale. Determinare $V(t)$.

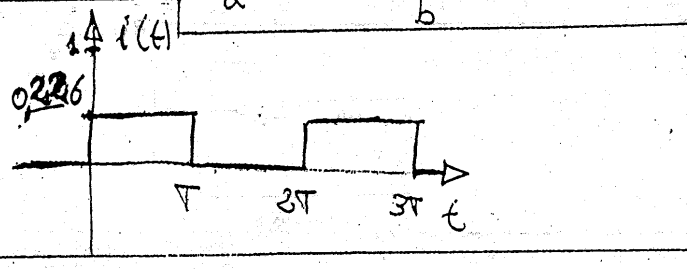
---

2) Il generatore produce la tensione indicata. Disegnare il grafico della corrente i(t). Quotare entrambi gli assi del grafico.





$V_0 = 100$ V
$V_2 = 120$ V
$R_1 = 10\Omega$
$R_2 = 20\Omega$
$R_3 = 30\Omega$
$R_4 = 40\Omega$
$R_5 = 50\Omega$



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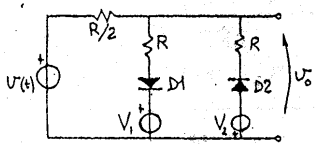
2) Determinare l'andamento di $v_o(t)$ per un periodo della sinusoide d'ingresso.



$v(t) = 20 \sin(10^4 t)$ V
$R = 12$ kΩ
$V_1 = 12$ V
$V_2 = 10$ V

$$V_0(t) = \begin{cases} \frac{2}{3} V(t) + \frac{V_1}{3}, & V(t) > V_1 \\ V(t), & V_2 < V(t) < V_1 \\ \frac{2}{3} V(t) + \frac{V_2}{3}, & V(t) < V_2 \end{cases}$$