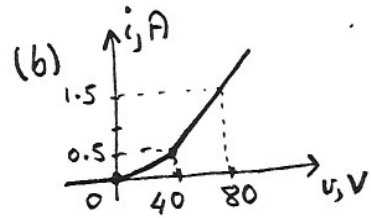
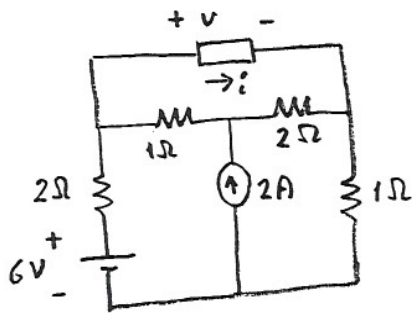


Find i .

(a) $v = 50i$



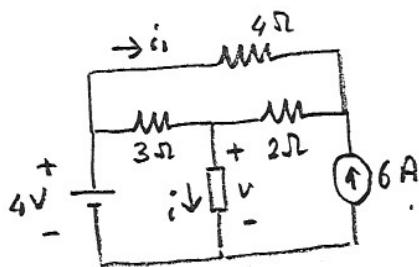
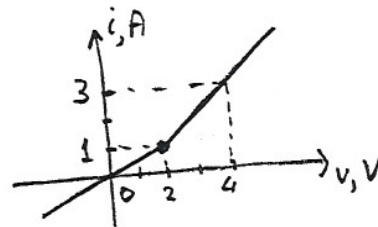
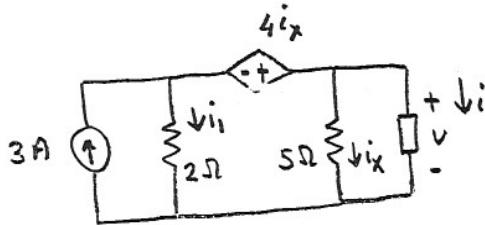
2)



$$i = \begin{cases} v^2, & v \geq 0 \\ 0, & v < 0 \end{cases}$$

Find the instantaneous powers supplied by/delivered to the independent sources.

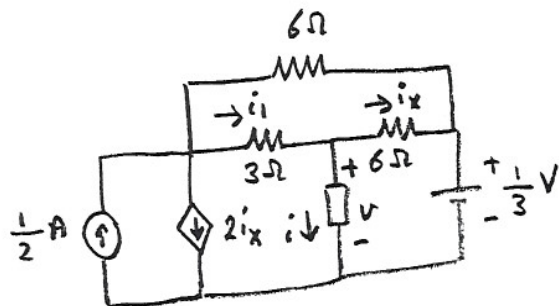
3) Find i .



(a)

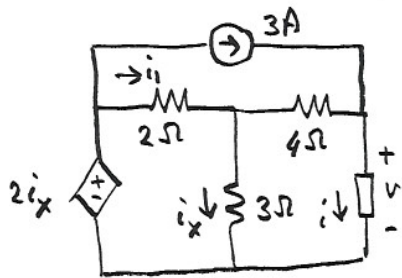
$$v = \begin{cases} 4i^2, & i \geq 0 \\ -4i^2, & i < 0 \end{cases}$$

(b)



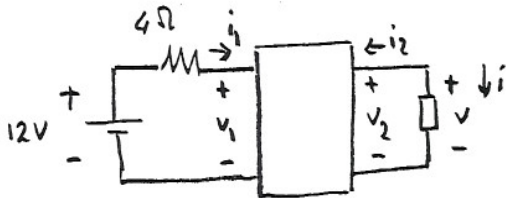
(c)

$$i = \begin{cases} \frac{8}{3}v^2, & v \geq 0 \\ 0, & v < 0 \end{cases}$$

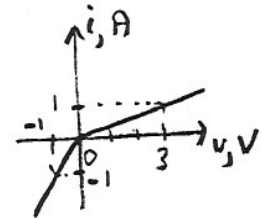


$$i = \begin{cases} \frac{1}{2}v^2 + \frac{1}{3}v, & v \geq 0 \\ 0, & v < 0 \end{cases}$$

(d)

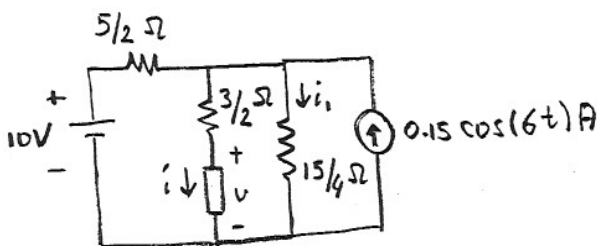


$$\begin{bmatrix} v_1 \\ v_2 \end{bmatrix} = \begin{bmatrix} 4 & 2 \\ 2 & 2 \end{bmatrix} \begin{bmatrix} i_1 \\ i_2 \end{bmatrix}$$



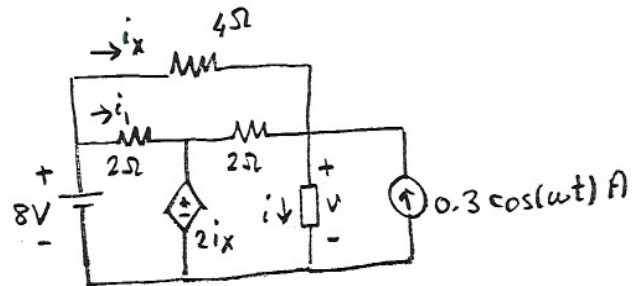
(e)

4) Find i_1 .



$$i = \begin{cases} \frac{1}{9}v^2, & v \geq 0 \\ 0, & v < 0 \end{cases}$$

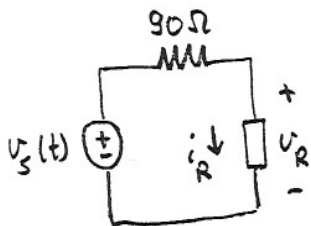
(a)



$$i = \begin{cases} \frac{1}{2}v^2, & v \geq 0 \\ 0, & v < 0 \end{cases}$$

(b)

5)



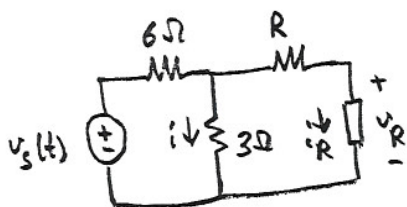
$$i_R = 0.5(e^{v_R/10} - 1) \text{ A}$$

$$v_s(t) = V_0 + 0.3 \cos(\omega t) \text{ V}$$

$$v_R(t) \approx V_m + 0.03 \cos(\omega t) \text{ V}$$

Find V_0 and V_m .

6)



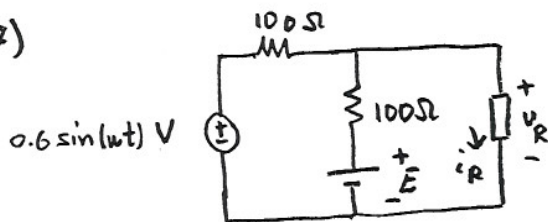
$$v_s(t) = 24 + 0.6 \cos(\omega t) \text{ V}$$

$$v_R(t) \approx 2 + V_m \cos(\omega t) \text{ V}$$

$$i_R = \frac{1}{4}v_R^3$$

Find R , V_m and i .

7)

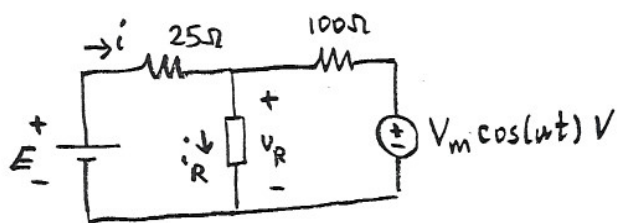


$$i_R = \begin{cases} 0.01 v_R^2, & v_R > 0 \\ 0, & v_R < 0 \end{cases}$$

$$v_R(t) \approx V_0 + 0.05 \sin(\omega t) \text{ V}$$

Find E .

8)

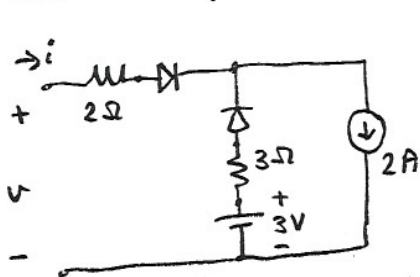


$$i_R = \begin{cases} 0.005 v_R^2, & v_R > 0 \\ 0, & v_R < 0 \end{cases}$$

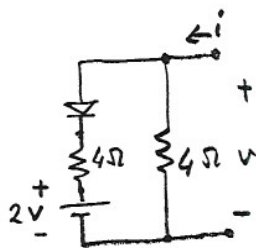
$$i(t) \approx 0.6 + 0.04 \cos(\omega t) \text{ A}$$

Find E and V_m .

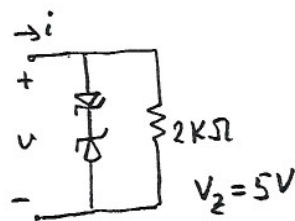
9) Sketch the port characteristics.



(a)

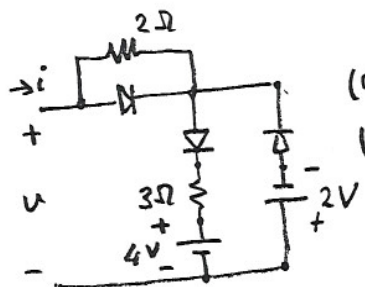


(b)



(c)

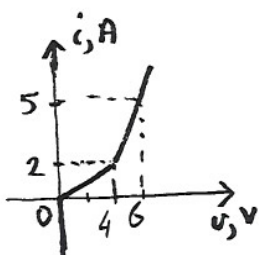
10)



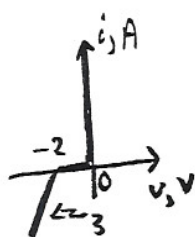
(a) Obtain the port characteristics.

(b) Design a one-port circuit having the same port characteristics using LTI passive resistors, constant independent sources and two ideal diodes.

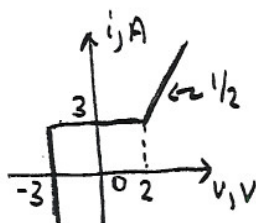
11) Design a one-port circuit realizing the v - i characteristics given below using LTI passive resistors, constant independent sources and ideal diodes.



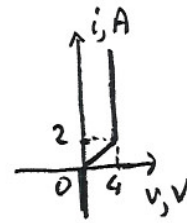
(a)



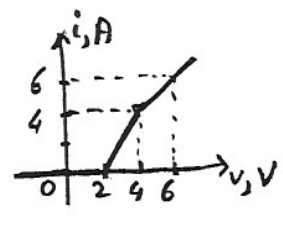
(b)



(c)



(d)



(e)