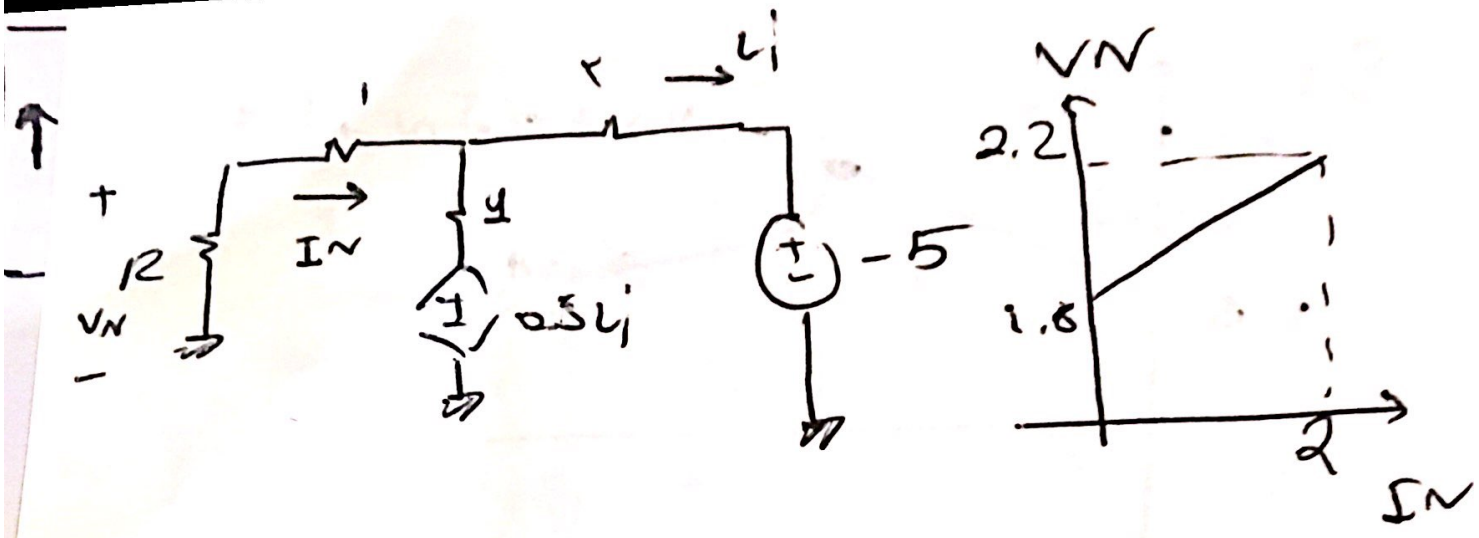


الحل

1/ $V_N = I_N + (I_N - i_1) + 0.5 i_1$

$V_N = I_N + I_N - i_1 + 0.5 i_1$

$V_N = 2I_N - 0.5 i_1$

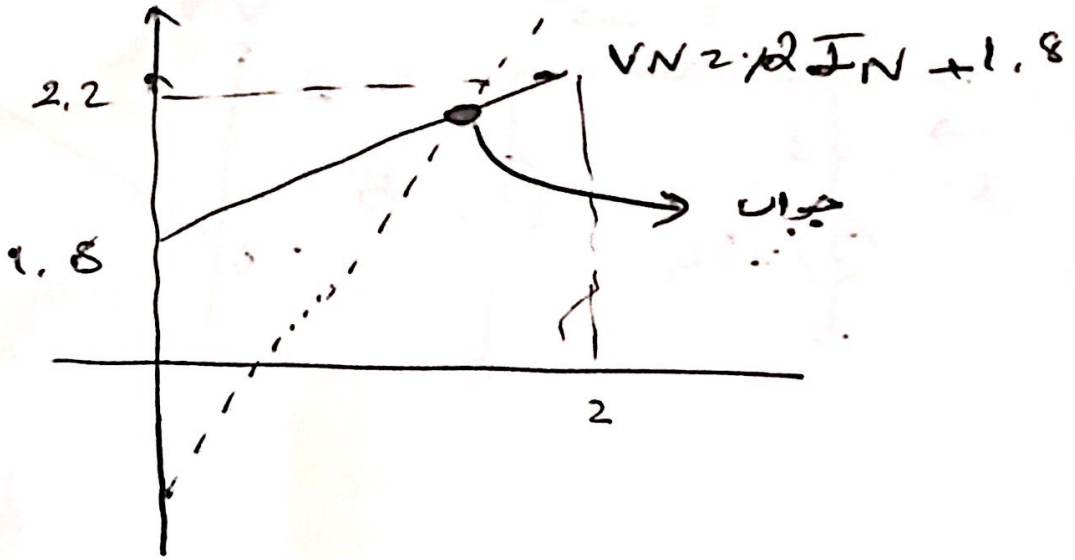
$\Rightarrow 0.5 i_1 = 2I_N - V_N$

$$\boxed{i_1 = 4I_N - 2V_N}$$

$V_N = I_N + 2i_1 - 5$

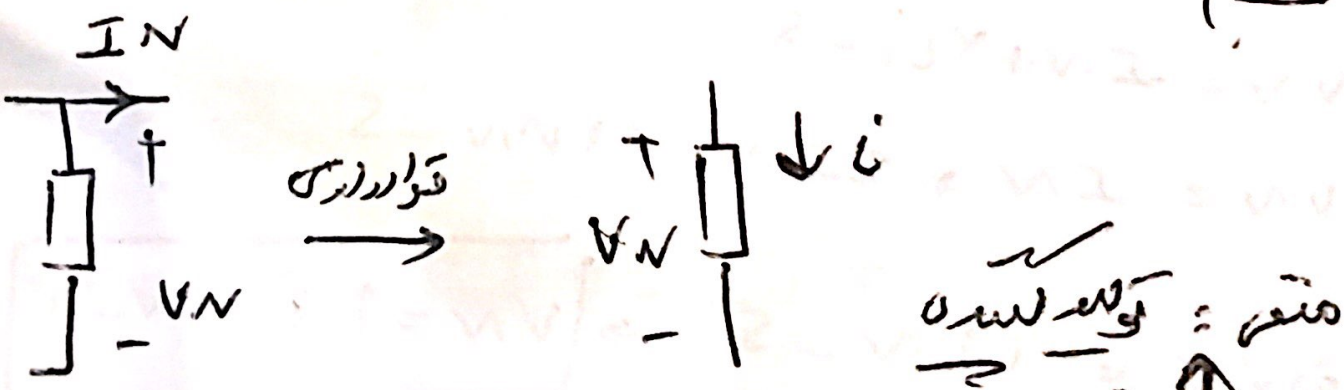
$V_N = I_N + 8I_N - 4V_N - 5$

$5V_N = 9I_N - 5 \rightarrow \boxed{V_N = 1.8 I_N - 1}$



$$\begin{cases} V_N = 0.2 I_N + 1.8 \longrightarrow \text{خط بار سوال} \\ V_N = 1.8 I_N - 1 \longrightarrow \text{از مدار} \end{cases}$$

$$\begin{cases} V_N = 2.15 \quad (1) \\ I_N = 1.75 \quad (1) \end{cases}$$

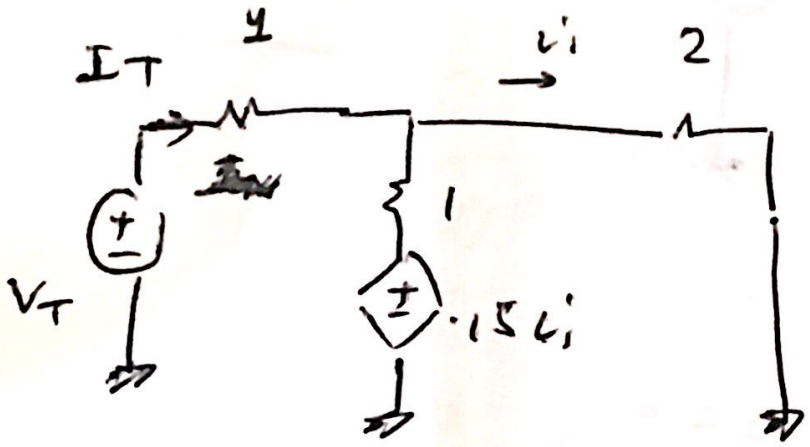


توان تحویلی منفی:

$$i = -I_N \;,\; P = V_N \cdot i = -3.7625 \text{ W}$$

۲) مقاومت معادل : مقاومت دیده شده از دو سر

R مقاومت



۱/ $V_T = I_T + 2i_1$

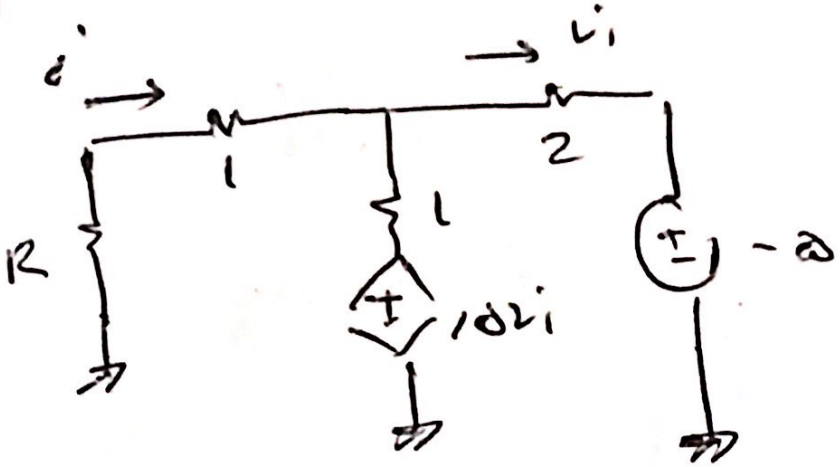
۲/ $V_T = I_T + (I_T - i_1) + 0.5 i_1$

$V_T = 2I_T - 0.5 i_1$

$i_1 = \frac{2I_T - V_T}{0.5} = 4I_T - 2V_T$

$V_T = I_T + 8I_T - 4V_T$

$5V_T = 9I_T \rightarrow \frac{V_T}{I_T} = \frac{9}{5} = 1.8\ \Omega$



(a) الحل

I/ $iR + i + 4i_1 - a = 0$

$\Rightarrow \boxed{(1+R)\,i + 4i_1 = a}$

II/ $iR + i + i - i_1 + 10i_1 = 0$

$\boxed{(2+R)\,i - 0.5\,i_1 = 0}$

$\Rightarrow \quad i_1 = (4+2R)\,i$ ← replace

$$(1+R)\,i + 4(2+R)\,i = a$$

$$i(1+R+8+4R) = 5$$

$$i(5R+9) = 5 \Rightarrow i = \frac{5}{5R+9}$$

$$\frac{i_2}{R} = \frac{-5}{5R+9} \qquad V_2 = \frac{-5R}{5R+9}$$

$$P = \frac{25R}{(5R+9)^2} \longrightarrow \frac{\partial P}{\partial R} = 0$$

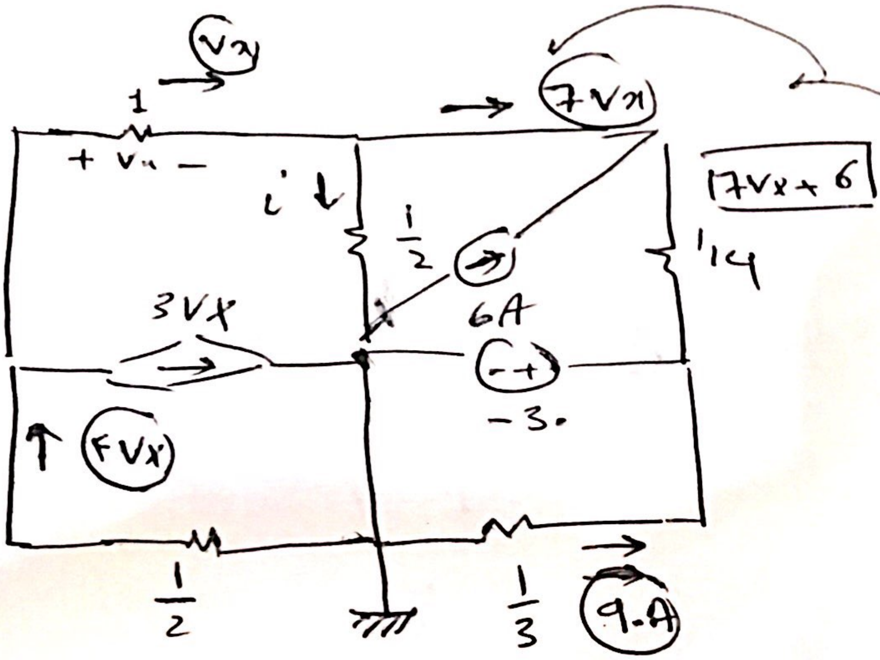
$$\rightarrow (5R+9)^2 - R(2)(5R+9)(5) = 0$$

$$(5R+9)\left[5R+9-1.R\right] = 0$$

$$(5R+9)(9-5R) = 0$$

$$R = \frac{9}{5} = 1.8\ \Omega$$

۲/۵۵



مقادیر چون ۶ و ۹ با علامت ○ مشخص شده‌اند.

KVL2 / $V_x + \frac{1}{2} i + 2V_x = 0 \rightarrow i = -6V_x$

مسیر چپ

KVL / $-3V_x = \frac{7V_x + 6}{4} - 30$

سمت راست

$-3V_x = \frac{7}{4}V_x + \frac{3}{2} - 30$

$\Rightarrow 30 - \frac{3}{2} = \frac{57}{2} = \frac{19}{4} V_x \rightarrow V_x = 6$