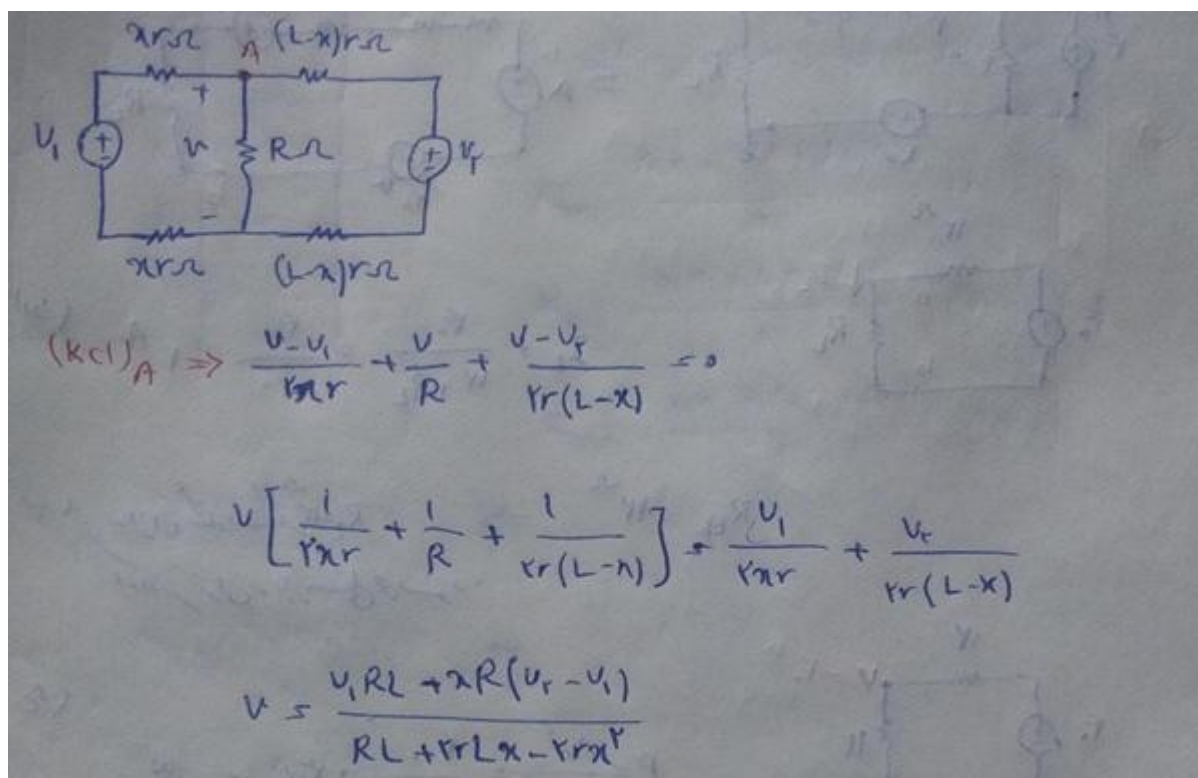
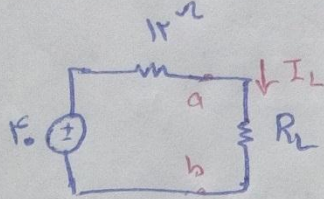
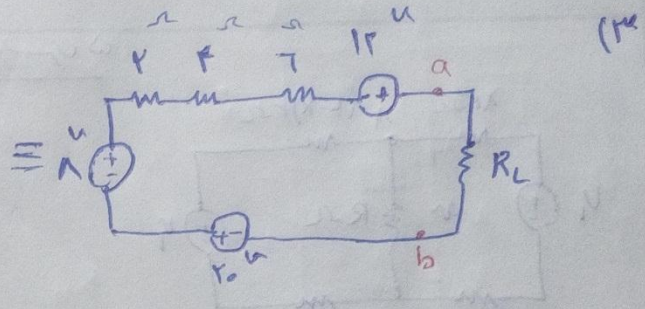
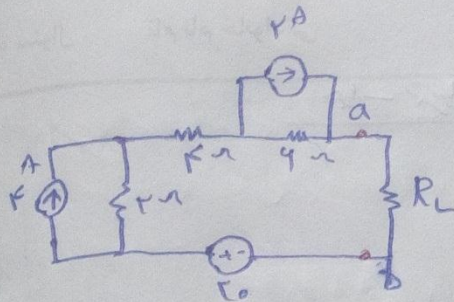


## جواب تمرینات سری سوم

-۲

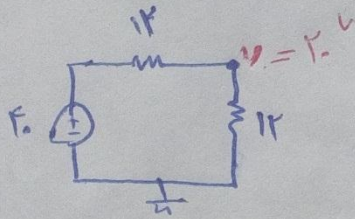




$$I_L = \frac{V_0}{12 + R_L} = \frac{V_0}{12} = 2 \text{ A} \quad (الف)$$

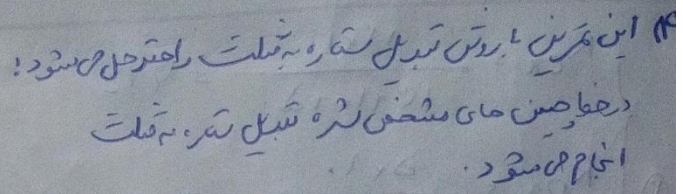
$$R_{th} = 12 \Omega \Rightarrow R_L = 12 \Omega$$

به ازای مقادیر  $R_L = 12 \Omega$  توان بیشترین می شود.



$$P = \frac{V^2}{R} = \frac{V_0^2}{12} = 33.33 \text{ W}$$

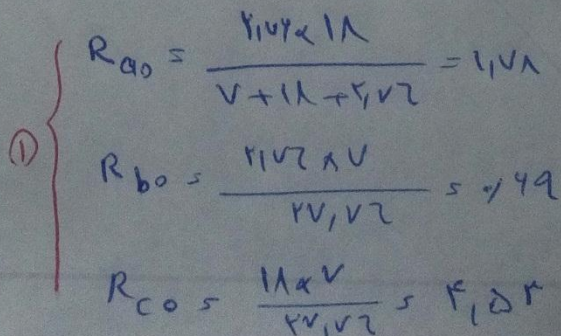
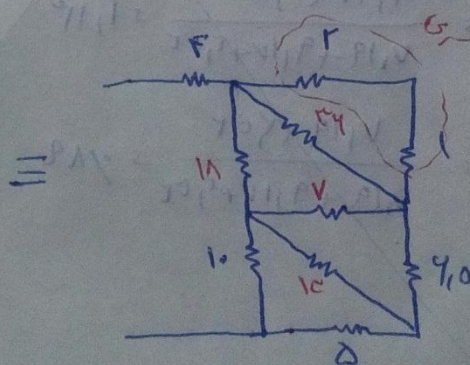




$$R_{ac} = \frac{4 \times 11 + 4 \times 1 + 1 \times 15}{1} = 57 \Omega$$

$$R_{CD} = \frac{r_1 K + r_1 M + r_1 Z}{r} = \frac{r_1}{r}$$

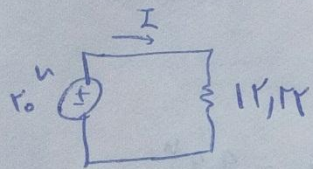
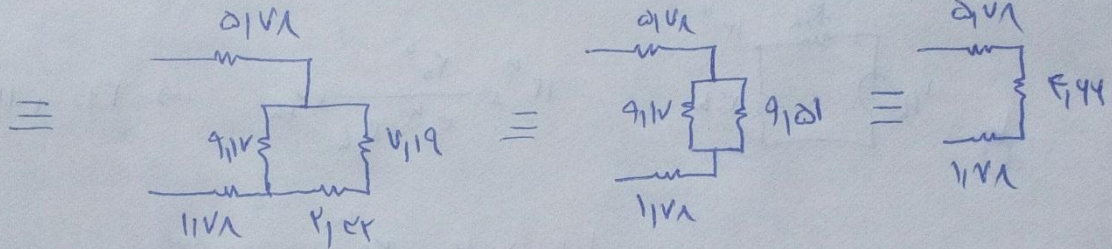
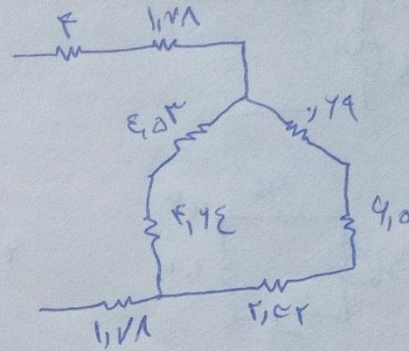
$$R_{Dg} = \frac{r_{L2} + r_{L1} + r_{L3}}{r} = 1.32 \Omega$$



$$R_{C2} = \frac{15 \times 1.}{15 + 1. + 0.5} = 1.42$$

$$R_{on} = \frac{\Delta V_L}{I_L} = 1,1 \Omega$$

$$R_{En} = \frac{K \times d}{r_n} = r_j \times r$$

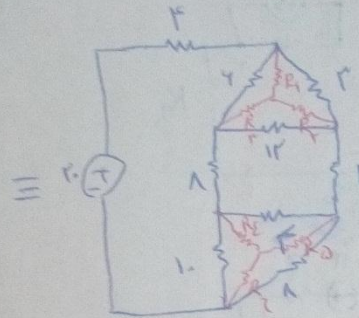
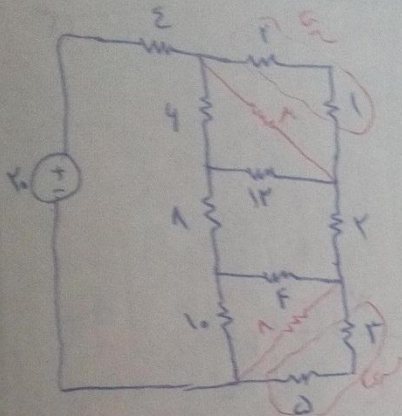


$$\left\{ I = \frac{V_r}{R_r} = 1,4 \mu A \right.$$

Req = 15, 22



سوال ۴: به طرق زیر ساده شود:



$$R_1 = \frac{2 \times 2}{2 + 2} = 1 \Omega$$

$$R_2 = \frac{2 \times 2}{2 + 2} = 1 \Omega$$

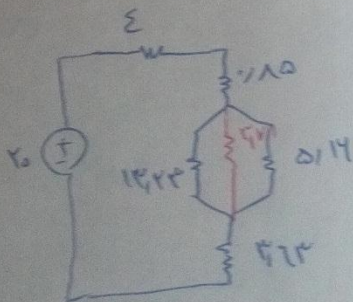
$$R_{12} = \frac{2 \times 2}{2 + 2} = 1 \Omega$$

$$R_3 = \frac{2 \times 2}{2 + 2} = 1 \Omega$$

$$R_4 = \frac{2 \times 2}{2 + 2} = 1 \Omega$$

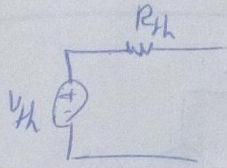
$$R_5 = \frac{2 \times 2}{2 + 2} = 1 \Omega$$

پس از این ساده سازی ها، مدار به صورت زیر در می آید.  $R_1, R_2, R_3, R_4, R_5$  به هم سری می شوند و مقدارهای  $R_1, R_2, R_3, R_4, R_5$  به هم سری می شوند.

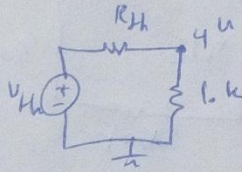


$$R_{eq} = 4 + 1 + 1 + 1 + 1 = 8 \Omega$$

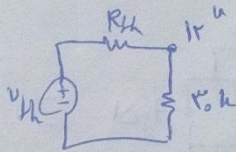
نقشه معادل تئری مدار به صورت مقابل باشد؟



(الف)

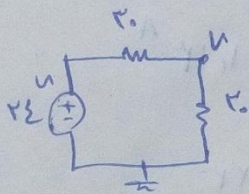


$$4 = \frac{10^4}{R_{th} + 10^4} \times V_{th} \Rightarrow 4 + 4R_{th} = 10V_{th} \quad (1)$$



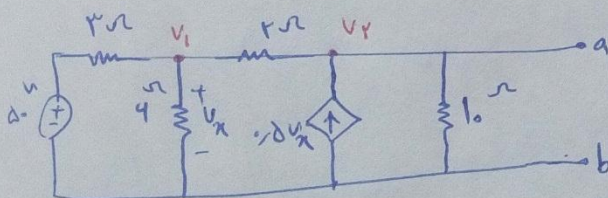
$$12 = \frac{30^4}{30^4 + R_{th}} \times V_{th} \Rightarrow 340 + 12R_{th} = 30V_{th} \quad (2)$$

1, 2)  $\Rightarrow V_{th} = 2V$ ,  $R_{th} = 30k\Omega$



$$V = \frac{30}{40 + 30} \times 2 = 4.14V$$

(ب)



(الف)

$\Leftarrow V_{th}$

$$(kcl)_V \Rightarrow \frac{V_1 - 20}{30} + \frac{V_1 - V_2}{4} + \frac{V_1}{10} = 0$$

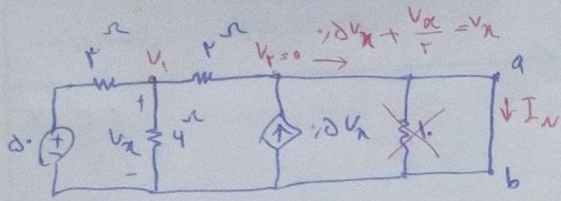
$$4V_1 - 3V_2 = 100 \quad (1)$$

$$(kcl)_{V_2} \Rightarrow \frac{V_2 - V_1}{4} - 0.5V_x + \frac{V_2}{10} = 0$$

$$V_1 = 2V_2 \quad (2)$$

1, 2)  $\Rightarrow V_2 = V_{th} = \underline{\underline{44.4V}}$



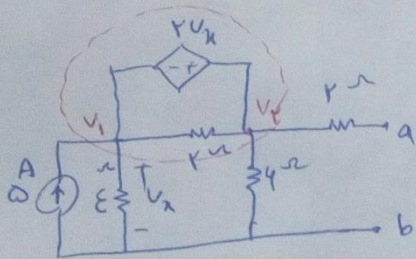


با اتصال کوتاه کردن a, b داریم:  
مقاومت معادل اتصال کوتاه، رشته داشته باشد و  
مقاومت همان مدارات قبلی است فقط به  
جای ۴ اهم برابر ۲ اهم داریم.

(۱) از رابطه  $4V_1 = 100$   $V_1 = \frac{100}{4} = V_x$

$I_N = V_x = \frac{100}{7} = 14.44$

$R_{th} = \frac{144.4V}{14.44} = 10 \Omega$



(b)

$V_1 = V_x$

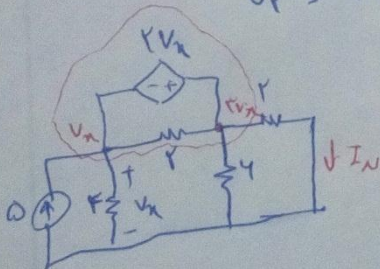
$V_2 = 2V_x$

$\Rightarrow -2 + \frac{V_x}{2} + \frac{2V_x}{7} = 0$

$\frac{(2+4)V_x}{12} = 2$

$V_x = 4.44V$

$V_2 = 2V_x = 8.88V$



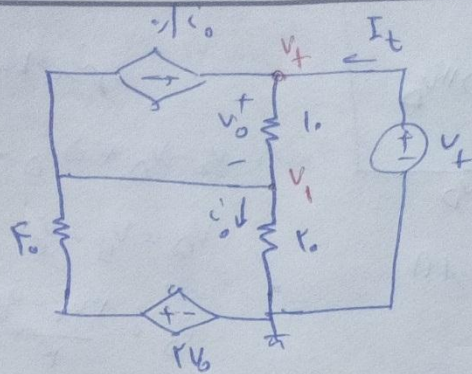
$\frac{V_x}{2} + \frac{2V_x}{7} + \frac{2V_x}{7} = 0$

$V_x = 2.22$

$\frac{(2+4+4)V_x}{12} = 0$

$I_N = \frac{2V_x}{2} = 2.22$

$R_{th} = \frac{4\Omega}{R_{th}} = \frac{2.22}{2.22} = 1 \Omega$



$$(KCL)_{V_t} \Rightarrow \frac{V_t - V_1}{r_0} = I_t - i_0 \quad , \quad i_0 = \frac{V_1}{r_0}$$

$$\frac{V_t - V_1}{r_0} = I_t - \frac{V_1}{r_0} \quad \Rightarrow$$

$$r_0 V_t - r_0 V_1 = r_0 I_t - V_1 \quad \Rightarrow \quad V_1 = \frac{r_0 V_t - r_0 I_t}{r_1} \quad (11)$$

$$(KCL)_{V_1} \Rightarrow \frac{V_1}{r_0} + \frac{V_1 - V_t}{r_1} + i_0 + \frac{V_1 - r_2 V_2}{r_2} = 0 \quad , \quad V_2 = V_t - V_1$$

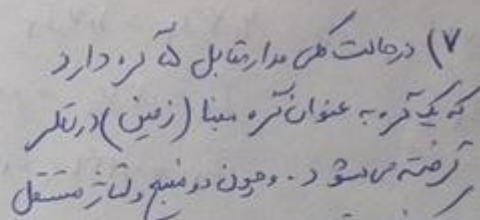
$$\frac{V_1}{r_0} + \frac{V_1 - V_t}{r_1} + \frac{V_1}{r_0} + \frac{V_1 - r_2 V_t + r_2 V_1}{r_2} = 0 \quad \Rightarrow \quad V_1 = \frac{r_0'}{r_4} V_t \quad (12)$$

$$(12) \Rightarrow \frac{r_0 V_t - r_0 I_t}{r_1} = \frac{r_0}{r_4} V_t$$

$$r_4 V_t - r_0 I_t = r_0 V_t$$

$$V_t = \underbrace{r_1}_{R_{th}} I_t + \underbrace{V_{th}}$$





در کربن سوخته، مشخص شده (خواجین) معمول مسئله بهر جهت است:

$\gamma = \gamma_0 - \gamma_{\infty}$

محمول مسئلہ بہت آسان ہے:

$$4 + \frac{V}{r_0} + 10 + 10 + \frac{V}{\lambda} - r_0 + \frac{v}{f_0} - 1450$$

$$V_{r.} = V - r_{0.} = 1.919 - r_{0.}$$

$$V_{r_2} = -9.19$$