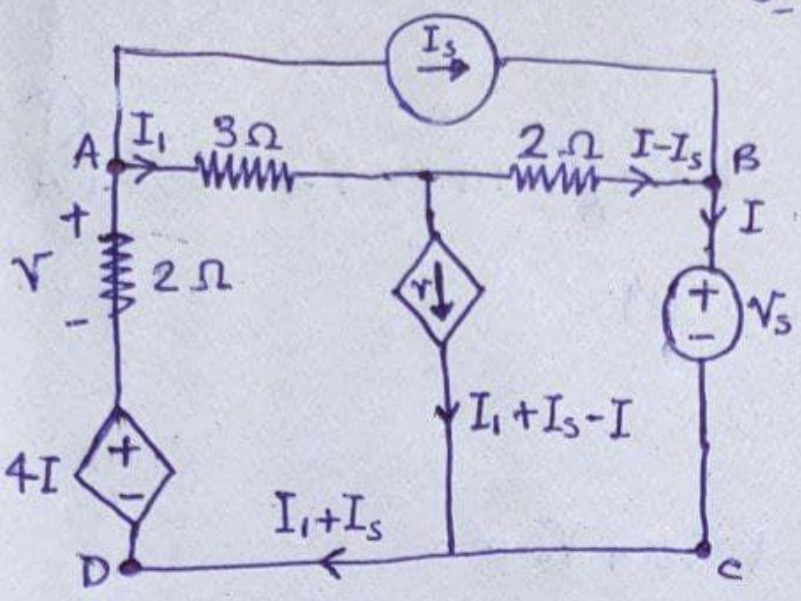
۹۹۳۱۰۳۰ اشکان شکیبا تمرین سری اول مدارهای الکتریکی و الکترونیکی

(۲)



$$V = -RI = -2(I_1+I_S)$$

$$I_1+I_S-I = V$$

$$\Rightarrow I_1+I_S-I = -2I_1-2I_S$$

$$\Rightarrow 3I_1+3I_S = I$$

$$I=2I_1 \Rightarrow I_S = \frac{1}{3}I_1$$

$$KVL_{ABCD}: 3I_1+2I-2I_S+V_S-4I+2I_1+2I_S=0$$

$$\Rightarrow V_S-2I+5I_1=0 \quad , \quad I=2I_1 \Rightarrow I_1=-V_S$$

$$\frac{V_S}{I_S} = \frac{-I_1}{\frac{-1}{3}I_1} = 3$$

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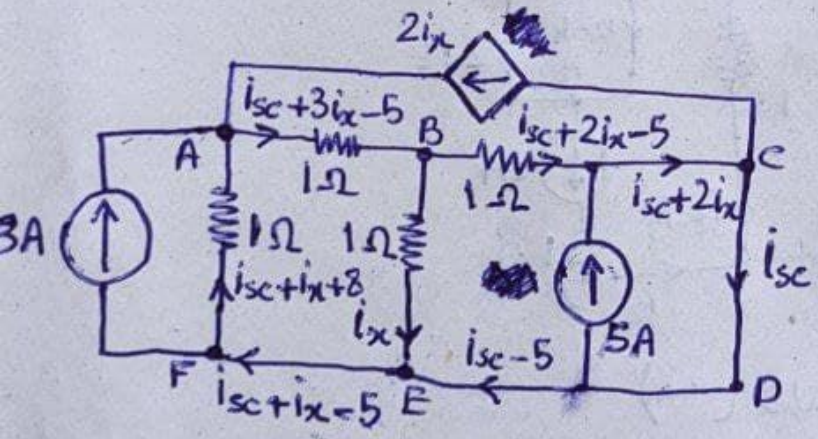
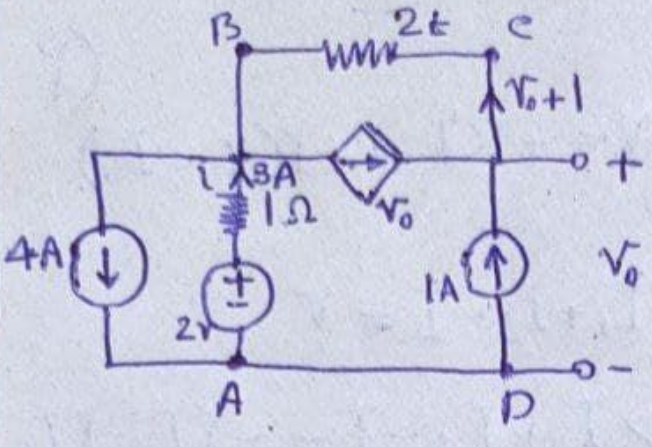


$$KVL_{ABEF}: i_{sc}+3i_x-5+i_x+i_{sc}+i_x-4=0$$

$$\Rightarrow 2i_{sc}+5i_x=12$$

$$KVL_{BCDE}: 2i_x+i_{sc}-5-i_x=0 \Rightarrow i_{sc}+i_x=5$$

$\Rightarrow i_x = 1A,\ i_{sc} = 4A$



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$KCL_A: i+1-4=0 \Rightarrow i=3A$

$KVL_{ABCD}: -4+4-2t-2v_0t+v_0=0$

$\Rightarrow (v_0+1)(1-2t)=0 \Rightarrow v_0=-1$

$P=VI=-2t(v_0+1)v_0=-2t(-1+1)(-1)=0$

$\Rightarrow$ بنابراین به ازای هر زمان $t\in R^+$، توان صفر است!

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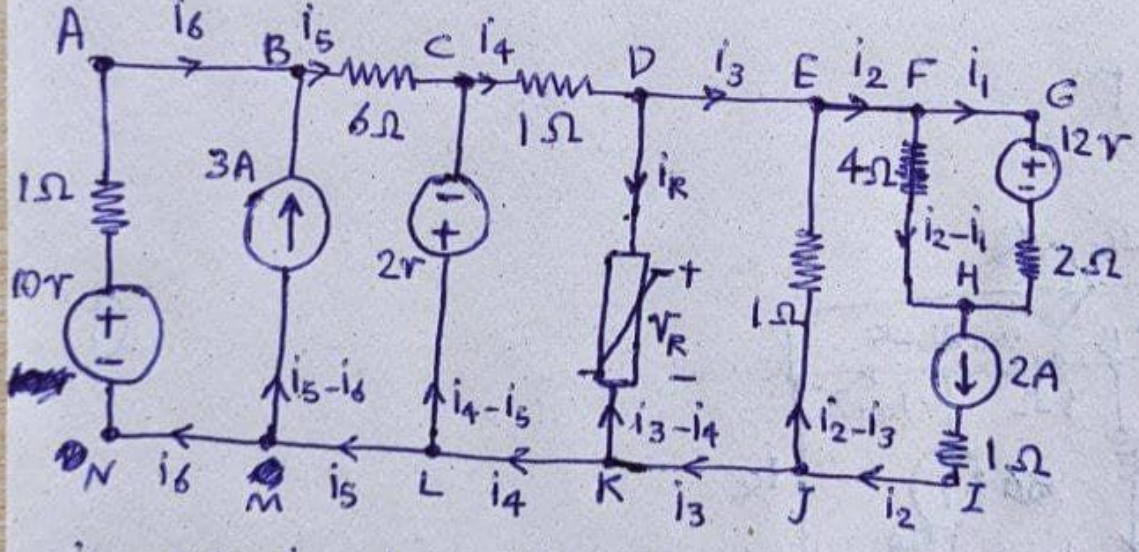

$i_2=2A,\ i_5-i_4=3A$ (منابع جریان مستقل)

$KVL_{ACLN}: 9i_5-2-10+i_4=0 \Rightarrow i_5=\frac{12}{V}A,\ i_4=\frac{-7}{V}A$

$KVL_{CDKL}: i_4+v_R+2=0$

$KVL_{DEJK}: -i_2+i_3-v_R=0$

$\Rightarrow 2v_R+i_2+i_4-i_3+2=0$

$\Rightarrow 2v_R+i_R+4=0$

$KVL_{FGH}: 12 + 2i_1 - 2i_R + 2i_1 = 0 \Rightarrow 4i_1 = -2 \Rightarrow i_1 = \frac{-1}{2}\ A$

$V_R = \frac{3}{2} i_R^2$, $2V_R + i_R + 2 = 0 \Rightarrow 3i_R^2 + i_R + 2 = 0$

$\Rightarrow (i_R + 1)(3i_R^2 - 3i_R + 2) = 0 \Rightarrow i_R = -1\ A$

$P = VI = \frac{3}{2} i_R^2 = \frac{3}{2}\ W$

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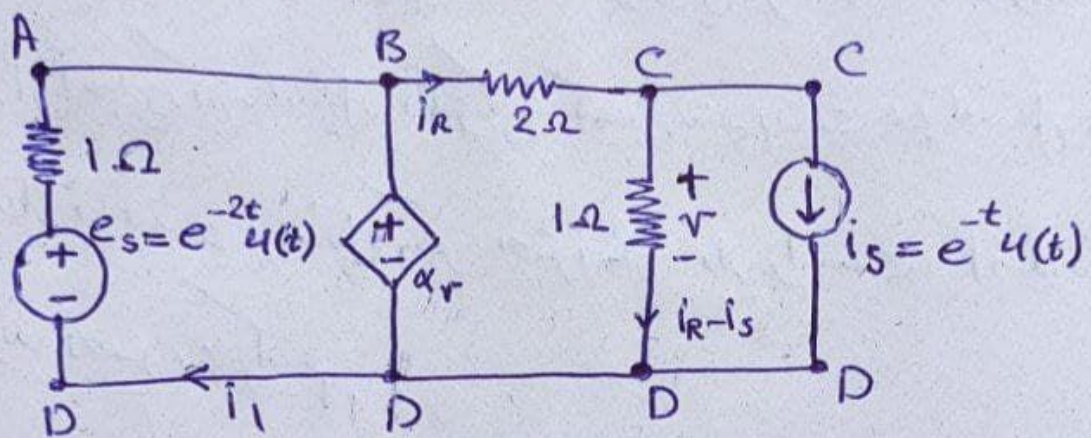

$KVL_{BCD}: -\alpha V + 2i_R + i_R - i_s = 0$

$\Rightarrow \alpha V = 2i_R - i_s = \frac{3}{2} e^{-t}u(t) - e^{-t}u(t) = \frac{1}{2} e^{-t}u(t)$

$V = RI = i_R - i_s \Rightarrow \alpha(i_R - i_s) = \frac{1}{2} e^{-t}u(t)$

$\Rightarrow \alpha\left(\frac{1}{2} e^{-t}u(t) - e^{-t}u(t)\right) = \frac{1}{2} e^{-t}u(t)$

$\Rightarrow \alpha = -1$