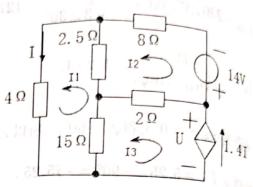
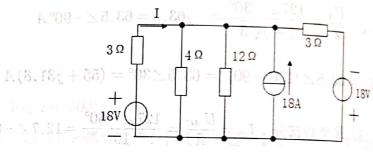
2015-2016 学年第一学期期末考试试卷

1、(10分) 求受控源的功率。并说明是吸收功率还是发出功率。



 $min_{\alpha} = 5.25 \times 30^{\circ} = (4.55 + j2.63) A$. 1.

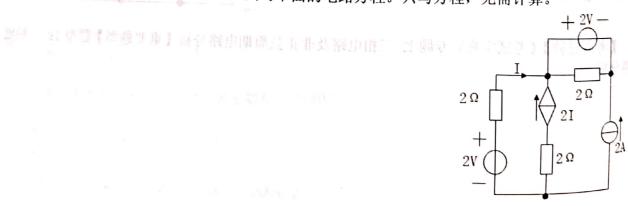
2、(10分)应用叠加定理求图示电路中的 I。



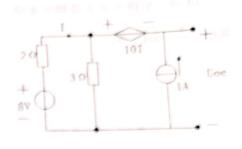
 $I_{A2} + I_{A} = 88.5 \angle -82.86^{\circ} A$

 $I_{cd} + I_{cd} - I_{R} = 72.23 \angle 47.77^{\circ}$

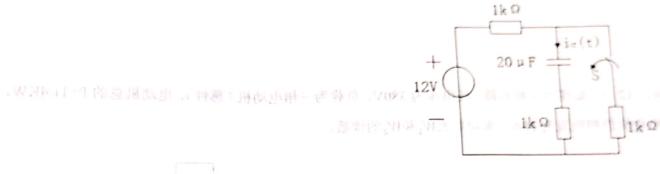
3、(10分)用节点分析法和回路分析法列写下面的电路方程。只写方程,无需计算。



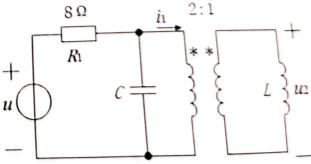
4、(10分) 电路如图所示, 求戴维南等效电路



5、(10分)图示电路已处于稳态,t=0时开关S打开。求 $t\geq 0$ 时的 $i_c(t)$ 。

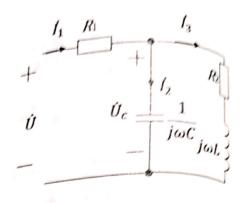


6、(12 分)已知u(t) = $12\sqrt{2}\sin(\omega t)$ V, $\omega = 2\pi \times 10^3 rad/s$, $L = \frac{1}{2\pi}mH$, $C = \frac{125}{\pi}uF$,求理想变压器原边电流 $i_1(t)$ 及输出电压 $u_2(t)$ 。

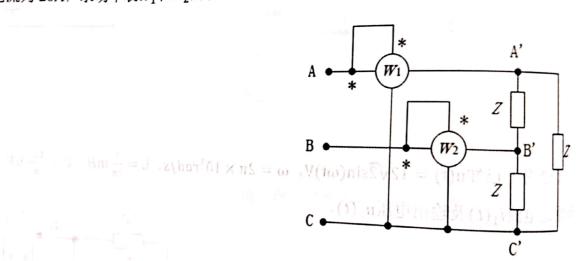


7、(14 分) 如图所示正弦稳态电路,已知U = 200V, I_2 = 10A, I_3 = $10\sqrt{2}A$, R_1 = 5Ω , R_2 %。 求 I_3 = $10\sqrt{2}A$, I_4 = $10\sqrt{2}A$ 。 $10\sqrt{2$

求 I_1 , $\frac{1}{\omega c}$, ω L, R_2 .



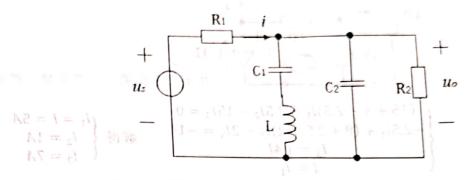
8、(12分)如图为三相电路,线电压为380V,负载为三相电动机(感性),电动机总的P=11.4KW, 电动机的相电流为 20A,求功率表 W_1 和 W_2 的读数。



9、(12 分) 已知: $R_2 = 50\Omega$, L = 0.3H, $u_s(t) = 10 + 20\sqrt{2}\sin 10^5 t +$

 $10\sqrt{2}sin2 \times 10^5 t$ V, $u_0(t) = 5 + 5\sqrt{2}sin2 \times 10^5 t$ V,

求 R_1 , C_1 , C_2 和电流i的有效值I。



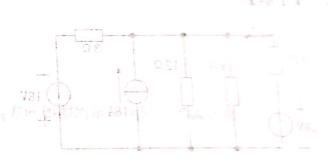
受急电流凝塞专电压方向如图所示, 则

$$U = 14 + 8I_2 + 4I_1 = 14 + 8 \times 1 + 4 \times 3 = 42V$$

重度的出贫其间

 $P = 1.4IU = 1.4 \times 5 \times 42 = 294W$

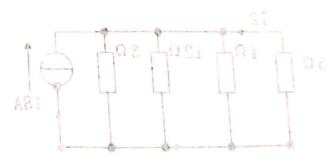
【李点位件】《考试安典》专题三 电路方程法【重要题型】题型 2: 回路电流法

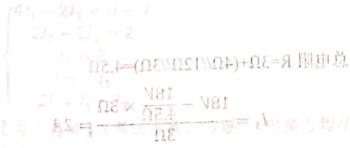


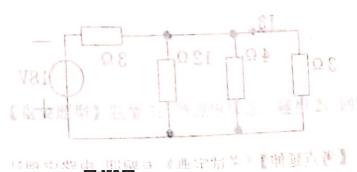
当左边电压频、电流频、右边电压源单独作用时,等效电路图如图 L图 3: 总电阻 R=3Ω+(4Ω/12Ω//3Ω)=4.5Ω

$$I_1 = \frac{18V}{4.5\Omega} = 4A$$

总电阻 $R=3\Omega//4\Omega//12\Omega//3\Omega=1\Omega$ 11
 $I_2 = -\frac{16A \times 1\Omega}{3\Omega} = -6A$



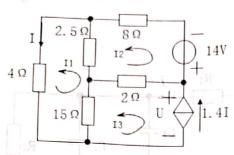




由発加定理科I=1,+1,+1,=4-6+2=63

2015-2016 学年第一

1、【学解】运用网孔电流法求解,网孔电流方向如图所示:



$$\begin{cases} (15+4+2.5)I_1 - 2.5I_2 - 15I_3 = 0\\ -2.5I_1 + (8+2.5+2)I_2 - 2I_3 = -14\\ I_3 = 1.4I\\ I = I_1 \end{cases}$$

解得
$$\begin{cases} I_1 = I = 5A \\ I_2 = 1A \\ I_3 = 7A \end{cases}$$

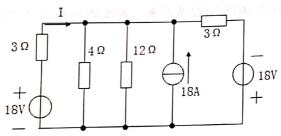
受控电流源参考电压方向如图所示,则

电压方向如图所示,则
$$U=14+8I_2+4I_1=14+8\times1+4\times5=42V$$

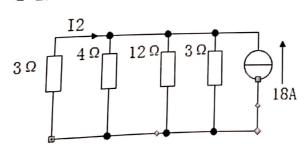
则其发出的功率

【考点延伸】《考试宝典》专题三 电路方程法【重要题型】题型 2: 回路电流法

2、【学解】

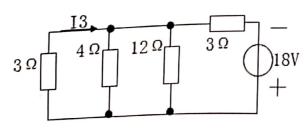


当左边电压源、电流源、右边电压源单独作用时,等效电路图如图 1~图 3: 总电阻 R=3Ω+(4Ω//12Ω//3Ω)=4.5Ω



$$I_1=rac{18V}{4.5\Omega}=4 ext{A}$$

总电阻 $R=3\Omega//4\Omega//12\Omega//3\Omega=1\Omega$
$$I_2=-rac{18A\times 1\Omega}{3\Omega}=-6 ext{A}$$



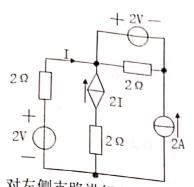
总电阻 R=3 Ω +(4 Ω //12 Ω //3 Ω)=4.5 Ω

$$I_3 = \frac{18V - \frac{18V}{4.5\Omega} \times 3\Omega}{3\Omega} = 2A$$

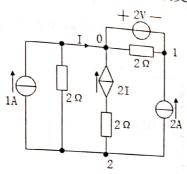
由叠加定理得 $I = I_1 + I_2 + I_3 = 4 - 6 + 2 = 0$ A

【考点延伸】《考试宝典》专题四 电路定理法【重要题型】题型 2: 叠加定理的应用

3、【学解】

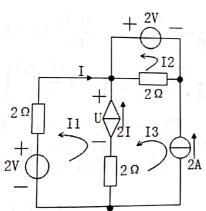


对左侧支路进行电源等效变换。参考节点下图所示,由节点电压法得:



$$\begin{cases} U_1 = -2 \\ \frac{1}{2}U_2 = -2I - 2 - 1 \\ I = 1 + \frac{U_2}{2} \end{cases}$$

设受控电流源端电压为U,网孔电流 I_1 、 I_2 、 I_3 方向如图所示,

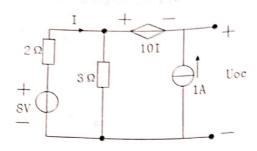


$$\begin{cases}
4I_1 - 2I_3 = U - 2 \\
2I_2 - 2I_3 = 2 \\
I_3 = 2 \\
I = -I_1 \\
2I = I_2 - I_3
\end{cases}$$

【考点延伸】《考试宝典》专题三 电路方程法【重要题型】题型 3: 节点电压法, 题型 2: 回路 电流法

【《声延伸》(考記宝典》专题二 等效电路法【重要题型】题型 1:

【学解】先求开路电压Uoc



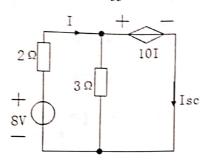
由 KVL 和 KCL 得

$$8I = 2I + 3(I + 1)$$

求得 I = 1A

再由 KVL 得
$$U_{oc} = 8 - 2I - 10I = 8 - 12I = -4V$$

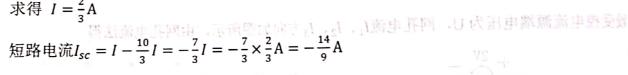
再求短路电流Isc



由 KVL 得

$$8 = 2I + 10I$$

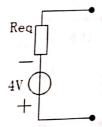
求得 $I = \frac{2}{3}A$

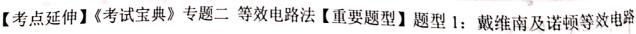


三,电路方程达《重要题型》题型3; 宣点电阻法, 愿型2; 回路

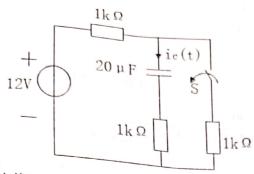
戴维南电路等效电阻
$$R_{eq} = \frac{U_{oc}}{I_{sc}} = \frac{-4V}{-\frac{14}{9}A} = \frac{18}{7}\Omega$$

所求戴维南电路:



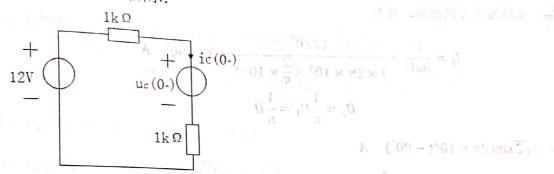


5、【学解】



由换路定则, $u_C(0_+) = \frac{1}{1+1} \times 12 = 6 V$

0+等效电路如下图所示:



$$i_{c}(0_{+}) = \frac{12 - u_{c}(0_{+})}{2 \times 10^{3}} = \frac{12 - 6}{2 \times 10^{3}} = \frac{$$

换路后,由 KVL 得

$$12 = 2 \times 10^3 i_C(t) + u_C(t)$$

两边对t求导

$$2 \times 10^{3} \frac{di_{C}(t)}{dt} = -\frac{i_{C}(t)}{C} = -\frac{i_{C}(t)}{2 \times 10^{-5}}$$

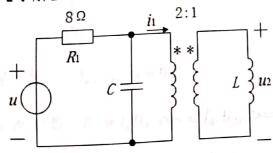
$$\int_0^t \frac{di_C(t)}{i_C(t)} = -\int_0^t \frac{dt}{2 \times 10^{-5} \times 2 \times 10^3}$$

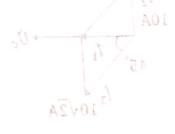
 $\ln i_C(t) - \ln i_C(0_+) = -25t$

$$i_C(t) = i_C(0_+)e^{-25t} = 3 \times 10^{-3}e^{-25t} A$$

【考点延伸】《考试宝典》专题八 暂态电路分析法【重要题型】题型 3: 一阶电路的响应

【学解】 6.





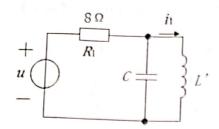
以心、为参考电压画相量图

由相重图可知, $I_1 = 10$ A ,且 I_1 I_2 I_3

 $R_2 + j\omega L = \omega L + j\omega L \text{ with all substitutes} \qquad \qquad P_1 = \rho + j\omega L + j\omega L \text{ with all substitutes}$

学解出品 31

字解 华中科技大学 (电路理论 (五)) 真颜



进行阻抗变换, $L' = n^2 L = 4 \times \frac{1}{2\pi} = \frac{2}{\pi} mH$

$$\frac{1}{\sqrt{L'C}} = \frac{1}{\sqrt{\frac{2}{\pi} \times 10^{-3} \times \frac{125}{\pi} \times 10^{-6}}} = 2\pi \times 10^3 \ rad/s$$

 $\omega = \frac{1}{\sqrt{L'C}}$ 电路发生并联谐振,故有

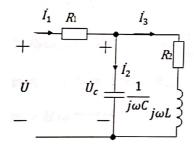
$$\dot{I}_{1} = \frac{\dot{U}}{j\omega L'} = \frac{12\angle 0^{\circ}}{j \times 2\pi \times 10^{3} \times \frac{2}{\pi} \times 10^{-3}} = 3\angle -90^{\circ} \quad A$$

$$\dot{U}_{2} = \frac{1}{n}\dot{U}_{1} = \frac{1}{n}\dot{U}$$

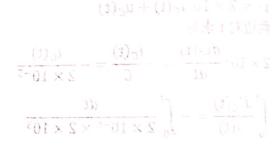
故 $i_1(t) = 3\sqrt{2}\sin(2\pi \times 10^3 t - 90^\circ)$ A

$$u_2(t) = \frac{1}{2}u(t) = 6\sqrt{2}\sin(2\pi \times 10^3 t)$$
 V

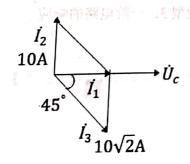
【考点延伸】《考试宝典》专题六 谐振电路与互感耦合电路分析【重要题型】题型 1: 谐振电路 7、【学解】



以 \dot{U}_c 为参考电压画相量图



 $z(t) = i_C(0...)e^{-22t} = 3 \times 10^{-3}e^{-22t} A$ 考点证件 $I \in S$ 武氣與》 步闊八 暫态电路分析法 I 重要题



由相量图可知, $I_1=10~A$,且 \dot{I}_1 与 \dot{U}_c 同相。

$$R_2 + j\omega L = \omega L + j\omega L$$
$$\therefore \frac{1}{\omega C} I_2 = \sqrt{2}\omega L \cdot I_3$$

$$10\frac{1}{\omega C} = \sqrt{2}\omega L \cdot 10\sqrt{2}$$

$$\therefore \frac{1}{\omega C} = 2\omega L$$
// $\frac{1}{\omega C} = 2\omega L$

由此计算得 $(R_2 + j\omega L)$ // $\frac{1}{j\omega c} = 2\omega L$

$$I_{1} = \frac{U}{R_{1} + (R_{2} + j\omega L) / / \frac{1}{j\omega C}} = \frac{200}{5 + 2\omega L} = 10$$

 $dx_2 = \omega L = 7.5\Omega, \frac{1}{\omega c} = 2\omega L = 15\Omega \text{ part of the state of th$ 【考点延伸】《考试宝典》专题五。正弦稳态电路分析【重要题型】题型 2: 相量法的应用。

$$\cos < \dot{U}_{AB}, \dot{I}_{A'B'} > = \frac{P}{3U_{AB}I_{A'B'}} = \frac{11.4 \times 10^{3}}{3 \times 380 \times 20} = 0.5$$

$$\therefore < \dot{U}_{AB}, \dot{I}_{A'B'} > = 60^{\circ}$$

由于
$$<\dot{U}_{AB},\dot{U}_{A}>=30^{\circ}, <\dot{U}_{A},\dot{U}_{AC}>=30^{\circ}$$

$$=\frac{30^{\circ}AB^{\dagger}A'B'}{30^{\circ}AB}, \dot{A}'B'} = \frac{3\times380\times20}{60^{\circ}} = \frac{3\times380\times20}{60^{\circ}AB} = \frac{3\times380\times20}{60^{\circ}AB}$$

所以
$$=0$$
°, 气而 $i_{A}=\sqrt{3}i_{A'B'}^{101\times 2miz\Xi}\sqrt{2-1^201\times 2miz\Xi}\sqrt{01}=0$ 1 — $(1)_{2M}-2M$ 2 — $(0)_{2M}-2M$ 3 — $(0)_{2M}-2M$ 3 — $(0)_{2M}-2M$ 4 — $(0)_{2M}-2M$ 5 — $(0)_{2M}-2M$

故< \dot{I}_A , $\dot{U}_{AC}>=30^\circ$

相量图如下图所示:

Ù

載
$$C_1$$
、 C_2 上发生電振。 $(j\omega L + \frac{1}{j\omega C_1})//\frac{1}{j\omega C_2} = \infty$

$$(j\omega L + \frac{1}{j\omega C_1}) = j2 \times 10^5 \times 0.3 - j \frac{1}{2 \times 10^5 \times \frac{1}{3} \times 10^{-9}} = j4.5 \text{ BAUY}$$

$$\left(j\omega L + \frac{1}{j\omega C_1}\right) + \frac{1}{j\omega C_2} = j(4.5 \times 10^4 - \frac{1}{\omega C_2}) = 0$$

$$C_2 = \frac{1}{4.5 \times 10^4 \times 2 \times 10^5} = \frac{1}{9} \times 10^{-9} \text{M p}^{(2)} \text{ (SFF BPI of MI)}$$

$$I(t) = \frac{v_s(t) - v_o(t)}{R_1} = \frac{5 + 20\sqrt{2}sin10^5t + 5\sqrt{2}sin2 \times 10^5t}{50}$$

$$= 0.1 + 0.4\sqrt{2}sin10^5t + 0.1\sqrt{2}sin2 \times 10^5t$$
 A

$$49/41 = \sqrt{0.1^2 + 0.4^2 + 0.1^2} = 0.424$$
 A.

【专资证值】《考试宝典》专题四 电路定理法【重要图型】题型 2: 由相量图知, $< I_B, U_{BC} >= 90$

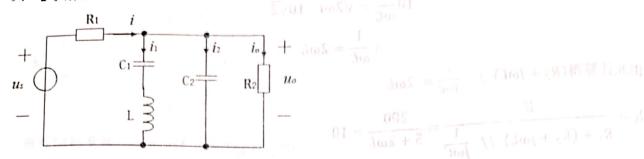
功率表 W_1 读数: $P_1 = I_A U_{AC} cos < \dot{I}_A, \dot{U}_{AC} >= 20\sqrt{3} \times 380 \times \cos 30^\circ = 11.4$ KW

功率表 W_2 读数: $P_2 = I_B U_{BC} cos < \dot{I}_B, \dot{U}_{BC} >= 0$ W

【考点延伸】《考试宝典》专题五 正弦稳态电路分析【重要题型】题型 2: 相量法的应用

学解《电科技大学

9、【学解】



由于 $u_o(t)=5+5\sqrt{2}sin2\times10^5t$ 不含频率为 $10^5rad/s$ 的正弦分量,故当正弦分量 $u_{s2}(t)=20\sqrt{2}sin10^5t$ 单独作用时, C_1 、L发生串联谐振, $\omega_2=\frac{1}{\sqrt{LC_1}}$, $C_1=\frac{1}{\omega_2^2L}=\frac{1}{(10^5)^2\times0.3}=\frac{1}{3}\times10^{-9}$ F 当直流分量 $u_{s1}(t)=10$ V 单独作用时, $u_{o1}(t)=\frac{R_2}{R_1+R_2}u_{s1}(t)=\frac{50}{R_1+50}\times10=5$ V $\therefore R_1=50\Omega$ 当正弦分量 $u_{s3}(t)=10\sqrt{2}sin2\times10^5t$ 单独作用时,

$$i_o(t) = \frac{u_{03}(t)}{R_2} = \frac{5\sqrt{2}sin2 \times 10^5 t}{50} = 0.1\sqrt{2}sin2 \times 10^5 t \quad A_{0.8} = 0.1\sqrt{2}sin2 \times 10^5 t$$

此时
$$i_1 + i_2 = i - i_o = \frac{u_{53} - u_{03}(t)}{R_1} - i_o = \frac{10\sqrt{2}sin2 \times 10^5 t - 5\sqrt{2}sin2 \times 10^5 t}{50} - 0.1\sqrt{2}sin2 \times 10^5 t$$

故
$$C_1$$
、 C_2 、 L 发生谐振, $\left(j\omega L + \frac{1}{j\omega C_1}\right)//\frac{1}{j\omega C_2} = \infty$

$$\left(j\omega L + \frac{1}{j\omega C_1}\right) = j2 \times 10^5 \times 0.3 - j\frac{1}{2 \times 10^5 \times \frac{1}{3} \times 10^{-9}} = j4.5 \times 10^4$$

$$\left(j\omega L + \frac{1}{j\omega C_1}\right) + \frac{1}{j\omega C_2} = j(4.5 \times 10^4 - \frac{1}{\omega C_2}) = 0$$

$$C_2 = \frac{1}{4.5 \times 10^4 \times 2 \times 10^5} = \frac{1}{9} \times 10^{-9}$$
 F

$$i(t) = \frac{u_s(t) - u_o(t)}{R_1} = \frac{5 + 20\sqrt{2}sin10^5t + 5\sqrt{2}sin2 \times 10^5t}{50}$$

$$= 0.1 + 0.4\sqrt{2}sin10^{5}t + 0.1\sqrt{2}sin2 \times 10^{5}t \quad A$$

有效值
$$I = \sqrt{0.1^2 + 0.4^2 + 0.1^2} = 0.424$$
 A。

【考点延伸】《考试宝典》专题四 电路定理法【重要题型】题型 2: 叠加定理的应用

力学表形 計畫 $\theta_1 = I_8 U_{AC} cos < I_A, \dot{U}_{AC} >= 20 \sqrt{3} \times 380 \times cos 30^\circ = 11.4$ KW

り字表W。 (Land Control of Control

【考点短伸】。当说宝典》专题五 正状稳态电路分析【重要题型】题型2: 相量法的应用