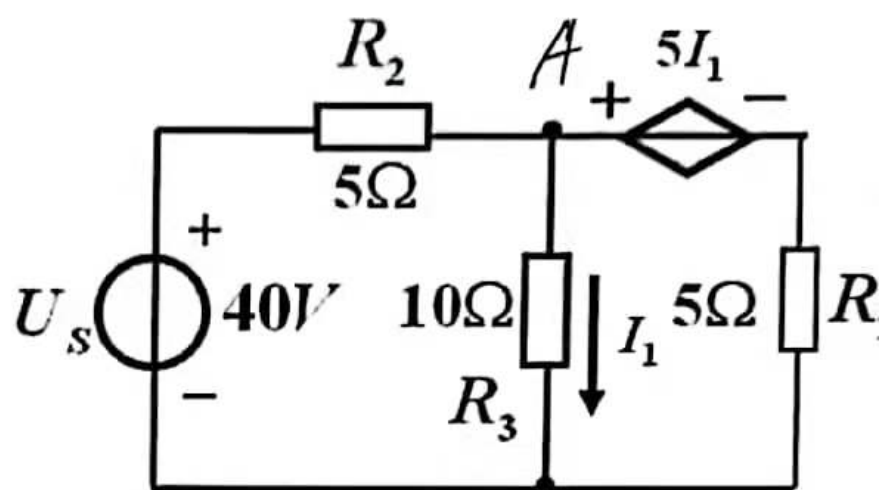


题号	1	2	3	4	5	6	7	8	9	总分
题分	10	10	10	10	10	12	12	14	12	100
得分										

(10 分) 求如图所示电路中受控源的功率。



$$\left(\frac{1}{5} + \frac{1}{5} + \frac{1}{10}\right) U_A = \frac{40}{5} + \frac{5I_1}{5}$$

$$\frac{1}{2} U_A = 8 + I_1$$

$$10I_1 = U_A$$

$$I_1 = 2A$$

$$U_A = 20V$$

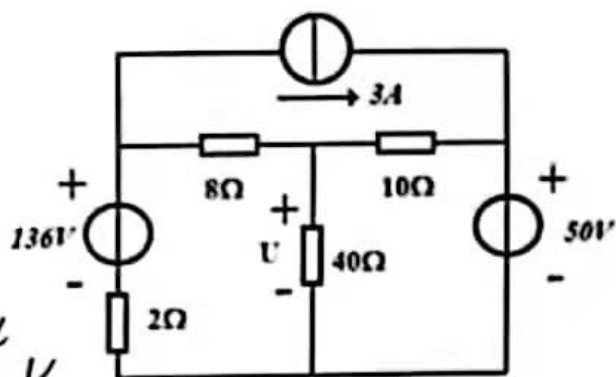
$$I_2 = \frac{U_A - 5I_1}{5} = 2A$$

$$P = 5I_1 \times 2 = 20W$$

2. (10分) 应用叠加定理求图示电路中的  $U$ 。

① 3A 单独作用

$$U' = -3 \times \frac{2}{18} \times \frac{1}{5} \times 40 = -\frac{24}{9} \text{ V}$$



②  $136\text{V}$

$$U'' = 136 \times \frac{8}{18} = \frac{544}{9} \text{ V}$$

③  $50\text{V}$

$$U''' = 50 \times \frac{8}{18} = \frac{200}{9}$$

$$U = -\frac{24}{9} + \frac{544}{9} + \frac{200}{9} = 80 \text{ V}$$

3、(10分) 用节点分析法求图示电路中受控源的功率。

$$(1 + \frac{1}{2})U_A - \frac{1}{2}U_B = -4$$

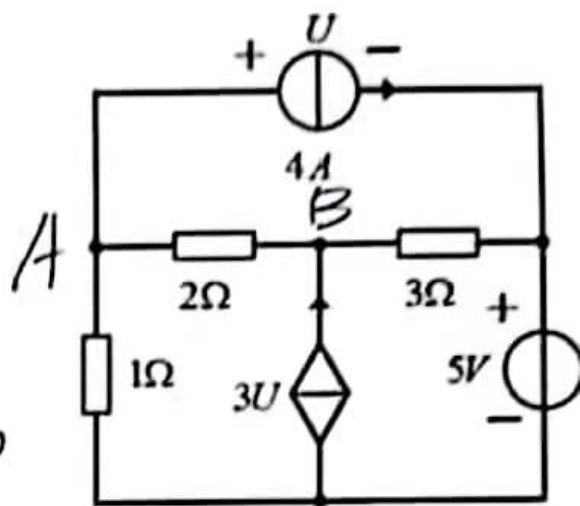
$$-\frac{1}{2}U_A + (\frac{1}{2} + \frac{1}{3})U_B - \frac{1}{3}U_C = 3V$$

$$U_C = 5V$$

$$U_A - U_C = U$$

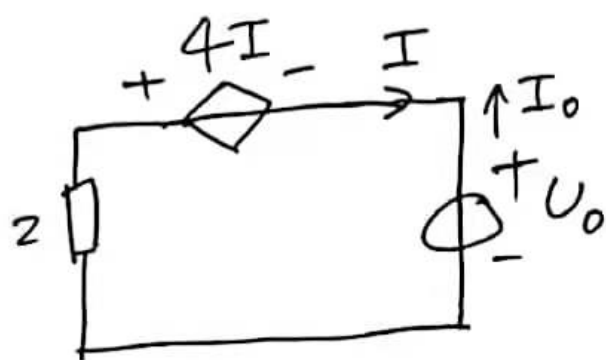
$$U_A = 20V \quad U = 15V$$

$$P = 15 \times 4 = 60W$$



1、(10 分) 电路如图所示, 负载  $R_L$  等于多少可以获得最大功率, 并求此最大功率。

$$U_{oc} = 2 \times 4 + 8 = 16V$$

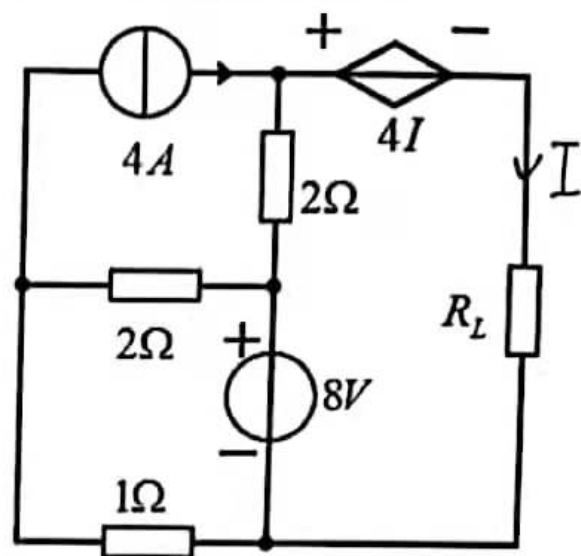


$$2I + 4I + U_0 = 0$$

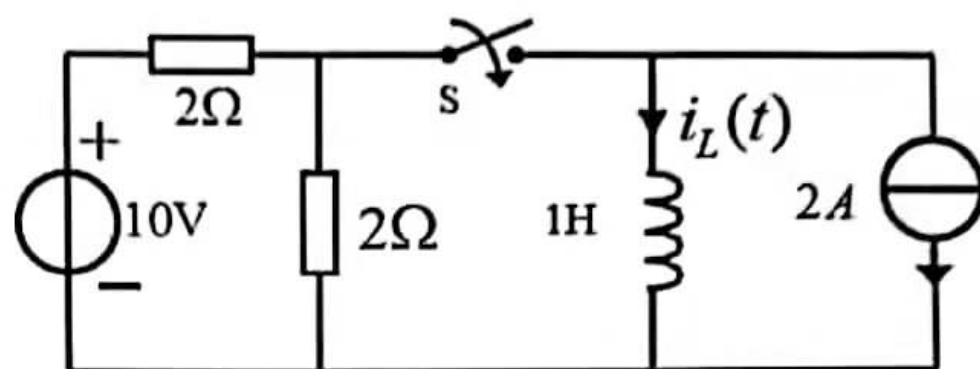
$$6I = -U_0$$

$$R_i = \frac{U_0}{I_0} = -\frac{U_0}{I} = 6\Omega$$

$$P = \frac{16 \times 16}{4 \times 6} = \frac{32}{3} W = 10.67 W$$



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



$$i_L(0^+) = -2A$$

$$i_L(\infty) = \frac{10}{2} - 2 = 3A$$

$$\tau = 1s$$

$$i_L(t) = 3 - 5e^{-t}$$

6. (12分) 电路如图所示, 为使  $R$  获得最大功率, 求  $n$  及此最大功率。

① 求  $\dot{U}_{oc}$  断开  $R$

$$n\dot{U}_1 = \dot{U}_2 \quad \dot{I}_1 = -n\dot{I}_2$$

$$\dot{U}_{oc} = \dot{U}_2$$

$$10 = \dot{I}_1 + \dot{I}_2 + \dot{U}_1$$

$$\dot{U}_1 = 2\dot{I}_2 + \dot{U}_2$$

$$\dot{U}_{oc} = \frac{20n}{(1-n)^2 + 2}$$

② 求  $\dot{I}_{sc}$

$$n\dot{U}_1 = \dot{U}_2 \quad \dot{I}_1 = -n\dot{I}_2$$

$$\dot{U}_2 = 0 \quad 10 = \dot{I}_1 + \dot{I}_2 + \dot{I}_{sc} + \dot{U}_1$$

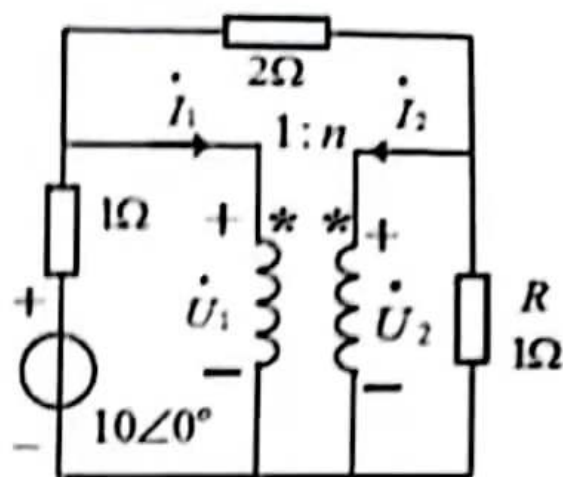
$$\dot{U}_1 = 0 \quad \dot{U}_1 + 2(\dot{I}_2 + \dot{I}_{sc}) = 0$$

$$\dot{I}_1 = 10 \quad \dot{I}_2 = -\frac{10}{n} \quad \dot{I}_{sc} = \frac{10}{n}$$

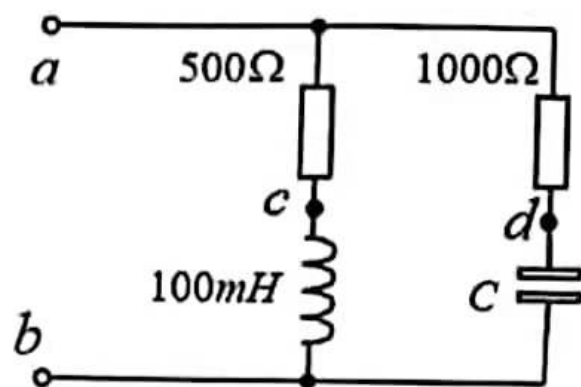
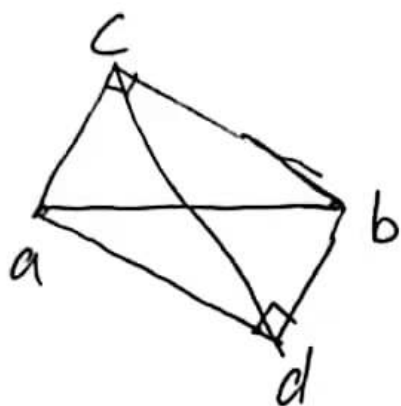
③  $Z = \frac{\dot{U}_{oc}}{\dot{I}_{sc}} = \frac{20n}{(1-n)^2 + 2} \times \frac{n}{10} = 1 \Omega \rightarrow n = 1$

$$\dot{U}_{oc} = 10 \text{ V}$$

$$P = \frac{10 \times 10}{4 \times 1} = 25 \text{ W}$$



7、(12分) 如图所示正弦稳态电路，已知  $\omega = 100 \text{ rad/s}$ ， $U_{ab} = U_{cd}$ ，求电容  $C$  的值。



$$U_{ab} = U_{cd}$$

$$U_{ac} = U_{db}$$

$$U_{cb} = U_{ad}$$

$$\omega L = 10$$

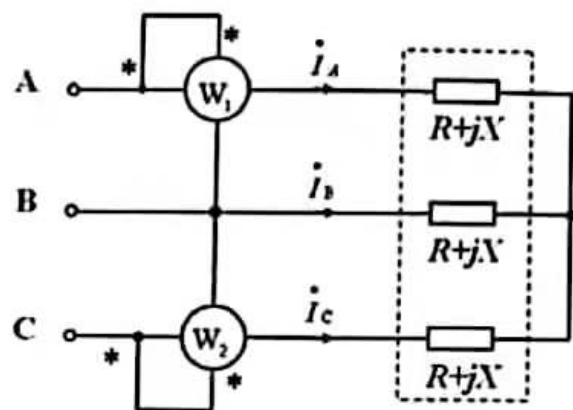
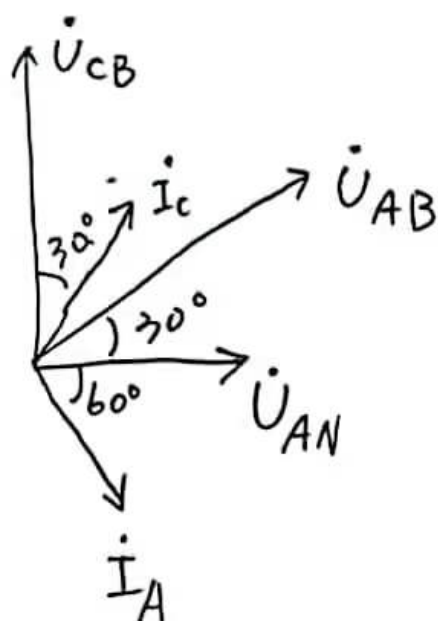
$$\frac{U_{ac}}{U_{cb}} = \frac{U_{db}}{U_{ad}}$$

$$\frac{500}{10} = \frac{X_C}{1000}$$

$$X_C = 5 \times 10^4$$

$$C = \frac{1}{\omega X_C} = \frac{1}{10^2 \times 5 \times 10^4} = 0.2 \mu\text{F}$$

8、(14 分) 图示为对称三相电路，已知线电压为 380V，两功率表的读数分别为： $P_1=0$ ， $P_2=1.65\text{KW}$ ，求负载的阻抗参数  $R+jX$ 。



20 分 (14 分)  $\cos \varphi = \cos 60^\circ = 0.5$

$$380 \times I_c \cos 30^\circ = 1650$$

$$I_A = I_B = I_c = 5 \text{ A}$$

$$|Z| = \frac{220}{5} = 44 \Omega$$

$$\begin{aligned} Z &= 44 \angle 60^\circ = 44 \cos 60^\circ + j 44 \sin 60^\circ \\ &= 22 + j 38 \Omega \end{aligned}$$



分 数	
评卷人	

九、(12分) 如图所示电路, 已知

$i_s = 10 + 15\sqrt{2} \sin t + 10\sqrt{2} \sin(2t - 30^\circ) A$ , 求图中电流表和电压

表的读数及  $i_1(t)$ 。

① 直流

$$A_0 = 0 \quad V_0 = 0$$

② 基波

$$A_1 = 15 A \quad V_1 = 15 V$$

③ 二次谐波

$$j\omega L = 2$$

$$\frac{1}{j\omega C} = -j1.5$$

$$\dot{I}_1(2) = \frac{2}{2 + j1.5} \times 10 \angle -30^\circ = 8 \angle -66.87^\circ$$

$$A_2 = 8 A \quad V_2 = 16 V$$

$$A = \sqrt{15^2 + 8^2} = 17 A$$

$$V = \sqrt{15^2 + 16^2} = 21.9 V$$

$$i_1(t) = \cancel{15\sqrt{2} \sin t} + 8\sqrt{2} \sin(2t - 66.87^\circ)$$

