

# 上海电力大学

2021-2022 学年第 二 学期

课程号: 2600089 课程名: 电路分析 D 任务类型: 正常班

考生姓名: 曾道恩 学号: 20211991 班级: 2021391

考试时间: 2022 年 6 月 16 日 13:30 — 16:00 考试类型: 正考

题号	一	二	三	总分
分数				
阅卷人				

## 诚信考试承诺书

本人郑重承诺:

我已阅读且透彻理解了“上海电力大学考场规则”和“上海电力大学考试违纪及舞弊处理规定”,承诺在考试中自觉遵守,独立完成考试,诚信考试,如有违反,按有关条款接受处理。

承诺人签名: 曾道恩 日期: 2022-06-15

以下是答题区:

### 一、判断题 (每题 1 分, 共 10 分)

1	2	3	4	5	6	7	8	9	10
✓	X	X	X	✓	✓	✓	X	✓	✓

### 二、选择题 (每题 2 分, 共 20 分)

1	2	3	4	5	6	7	8	9	10
B	D	D	B	<del>D</del> C	D	B	A	A	B

以下为答题区：

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三、计算题（共 70 分）

1.  $P_1 = I_1 U_1 = 4 \times 100 = 400 \text{ W}$

$P_2 = U_2 I_2 = 60 \times 10 = 600 \text{ W}$

$100 - 40 + U_4 = 0 \therefore U_4 = -60 \text{ V} \therefore P_4 = U_4 I_4 = -240 \text{ W}$

$I_2 - I_1 - I_3 = 0 \therefore I_3 = 6 \text{ A}$

$\therefore P_3 = U_3 I_3 = 40 \times 6 = 240 \text{ W}$

$U_3 + U_5 + U_2 = 0 \therefore U_5 = -100 \text{ V} \quad P_5 = U_5 I_5 = -100 \times 10 = -1000 \text{ W}$

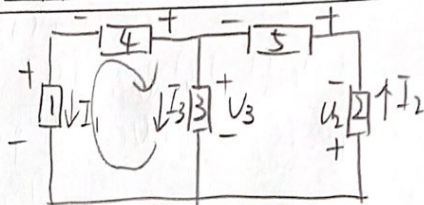
1: 电源

3: 电源

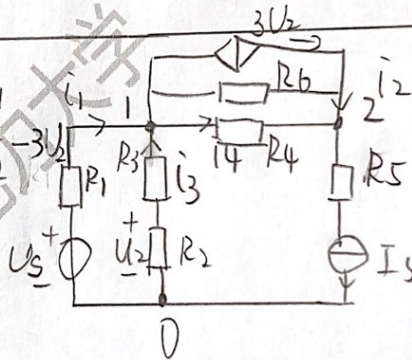
5: 负载

2: 电源

4: 负载



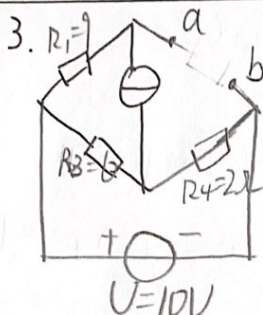
2. 
$$\begin{cases} (\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \frac{1}{R_4} + \frac{1}{R_6}) U_{n1} - (\frac{1}{R_4} + \frac{1}{R_6}) U_{n2} = \frac{U_5}{R_1} + \frac{U_3}{R_2} - 3I_1 \\ (\frac{1}{R_4} + \frac{1}{R_6} + \frac{1}{R_5}) U_{n2} - (\frac{1}{R_4} + \frac{1}{R_6}) U_{n1} = 3U_2 - I_5 \end{cases}$$





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开路电压  $V_{ab0}$

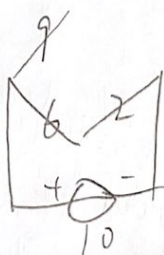
$$V_{ab0} = V - IR_1 = 10 - 2 \times 9 = -8V$$

将电流源置零

$$R_{eq} = R_1 = 9\Omega$$

$\therefore R_2$  支路电流为

$$I_2 = \frac{V_{ab0}}{R_{eq} + R_2} = \frac{-8}{9 + 4} \approx -0.62A$$



4. 由换路定律

$$i_L(0+) = i_L(0-) = 8A$$

$$i_L(\infty) = 6A$$

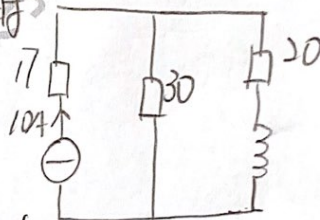
$$\tau = \frac{L}{R} = 0.02s$$

$$i_L(t) = i_L(\infty) + [i_L(0+) - i_L(\infty)]e^{-\frac{t}{\tau}}$$

$$= 6 + [8 - 6]e^{-\frac{t}{0.02}}$$

$$= 6 + 2e^{-50t} (A)$$

$t > 0$  时



5.  $V = 10$ ,  $I = 2$ ,  $\varphi = 36.8^\circ$

$$\text{端口阻抗 } Z = \frac{V}{I} = 5\Omega$$

$$\text{无功功率 } Q = VI \sin \varphi = 20 \times 0.6 = 12 \text{ var}$$

$$\text{有功功率 } P = VI \cos \varphi = 20 \times 0.8 = 16 \text{ var}$$

$$\text{视在功率 } S = VI = 20 \text{ VA}$$

$$\text{复功率 } \bar{S} = \dot{U} \dot{I}^* = 10 \angle 0^\circ \cdot 2 \angle 36.8^\circ = 16.0 + j11.98 \text{ VA}$$

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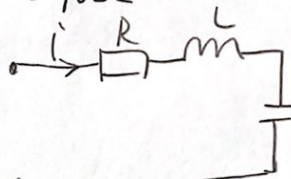
87.  $u(t) = u_1 + u_2 = 100\sqrt{2} \cos(2t) + 50\sqrt{2} \cos(6t - 60^\circ) \text{ V}$

$i(t) = 10\sqrt{2} \cos(2t) + 2\sqrt{2} \cos(6t + \theta)$

1) 在基波发生谐振,  $R = \frac{U_{m1}}{I_{m1}} = \frac{100}{10} = 10 \Omega$

且  $X_L = X_C = X_1$

$\omega_1 L = \frac{1}{\omega_1 C} = X_1, \omega_1 = 2$



$Z_3 = R + j3\omega_1 L - j\frac{1}{3\omega_1 C} = 10 + j\frac{8}{3}X_1$

$|Z_3| = \sqrt{100 + (\frac{8}{3}X_1)^2} = \frac{U_{m3}}{I_{m1}} = 25 \Omega$

$\therefore X_1 = \frac{47.5}{64} \quad \therefore L = \frac{X_1}{\omega_1} = \frac{47.5}{128} = 36.7 \text{ H}$

$C = \frac{1}{X_1 \omega_1} = 6.77 \times 10^{-3} = 6.77 \text{ mF}$

(2)  $\varphi_3 = \arctan \frac{\frac{8}{3}X_1}{10} = 87^\circ$

$\therefore \varphi_3 = \varphi_{u3} - \varphi_{i3} = -60^\circ - \theta \quad \therefore \theta = -147^\circ$

(3)  $P_2 = \frac{1}{2} \times 50 \times 10 \times \frac{1}{2}$   
 $= 250 \text{ W}$

6.  $\frac{I_1}{I_2} = -\frac{1}{2} \therefore i = -\frac{1}{2}i_2$