

北京工业大学 2021——2022 学年第一学期

《电路分析基础-2》 期末考试试卷 A 卷答案

考试时间：2022 年 1 月 5 日

一、是非题（每题 1 分，总分 10）

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二、单选题（每题 2 分，总分 20）

- |      |       |
|------|-------|
| 1. C | 6. D  |
| 2. B | 7. B  |
| 3. D | 8. B  |
| 4. B | 9. D  |
| 5. A | 10. C |

三、填空题（每题 2 分，总分 20）

- (1) 2 36.9 (2) 32.5 (3) 0.866 容性 (4) 5 (5) 432 12  
(6) 500 100 (7) 3-j4 (8) 11 (9) 26.46

(10)  $L_1 \frac{di_1}{dt} + M \frac{di_2}{dt} - L_2 \frac{di_2}{dt} - M \frac{di_1}{dt}$

四、计算题（每题 10 分，总分 50）

(1) .

设  $\dot{U}_S = 220 \angle 0^\circ \text{ V}$

$$\dot{I}_1 = \frac{\dot{U}_S}{R_1} = 22 \angle 0^\circ \text{ A} \quad \dot{I}_2 = \frac{\dot{U}_S}{R + jX_L} = 5.5\sqrt{2} \angle -45^\circ \text{ A}$$
$$\dot{I} = \dot{I}_1 + \dot{I}_2 = (27.5 - j5.5) \text{ A}, \quad P = I_1^2 R_1 + I_2^2 R_2 = 6050 \text{ W}$$

(2)

$$I = \frac{P_1}{U_1 \cos \varphi_1} = \left( \frac{80}{10 \times 0.8} \right) \text{ A} = 10 \text{ A}$$

设  $\dot{U}_1 = 10 \angle 0^\circ \text{ V}$ ,  $\dot{I} = 10 \angle -36.87^\circ \text{ A}$

$$\dot{U}_S = (4 + j3) \dot{I} + \dot{U}_1 = (50 \angle 0^\circ + 10 \angle 0^\circ) \text{ V} = 60 \angle 0^\circ \text{ V}$$

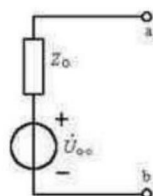
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(3)

$$Z_0 = \left[ \frac{(2 - j3)2}{4 - j3} + 5 \right] \Omega = 6.38 / -4.32^\circ \Omega$$

$$\dot{U}_{oc} = \left( -5 / 45^\circ + 20 / 0^\circ - \frac{2 \times 20 / 0^\circ}{4 - j3} \right) V$$

$$= (10.04 - j3.36) V = 13.1 / -39.9^\circ V$$



(4)

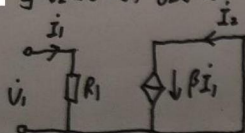
由于谐振，故有  $U_R = U_S = 100V$

$$R = 100\Omega, U_C = U_L = \omega LI = 314V$$

$$X_C = \frac{U_C}{I} = 314\Omega, C = \frac{1}{\omega X_C} = 10.1\mu F$$

(5)

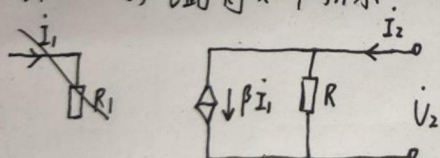
当  $U_2 = 0$  时，电路图如下图所示



$$\dot{U}_1 = \dot{I}_1 R_1 \Rightarrow Y_{11} = \frac{\dot{I}_1}{\dot{U}_1} \Big|_{\dot{U}_2 = 0} = \frac{1}{R_1}$$

$$\dot{I}_2 = \beta \dot{I}_1 \Rightarrow Y_{21} = \frac{\dot{I}_2}{\dot{U}_1} \Big|_{\dot{U}_2 = 0} = \frac{\beta \dot{I}_1}{\dot{U}_1} \Big|_{\dot{U}_2 = 0} = \frac{\beta}{R_1}$$

当  $U_1 = 0$  时，电路图如下图所示



$$Y_{12} = \frac{\dot{I}_1}{\dot{U}_2} \Big|_{\dot{U}_1 = 0} = 0$$

$$\dot{I}_2 = \beta \dot{I}_1 + \frac{\dot{U}_2}{R} \xrightarrow{\dot{I}_1 = 0} Y_{22} = \frac{\dot{I}_2}{\dot{U}_2} \Big|_{\dot{U}_1 = 0} = \frac{1}{R}$$

$$Y = \begin{bmatrix} \frac{1}{R_1} & 0 \\ \frac{\beta}{R_1} & \frac{1}{R} \end{bmatrix}$$

资料来源：公众号「电子大猫」收集整理并免费分享