

國立臺灣科技大學 104 年度電力電子產業碩士專班招生(春)試題

系所組別：電力電子領域

科目：電路學

(總分為 100 分)

不得使用計算器

1. Determine v_o and i in the circuit shown in Fig. P1. (18 分)

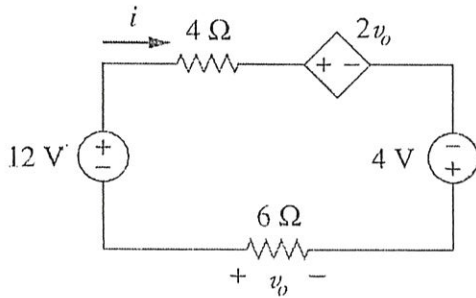


Fig. P1

2. (a) Find the value of R_L so that it consumes maximum power in the circuit of Fig. P2. (10 分)
 (b) Find the maximum power. (10 分)

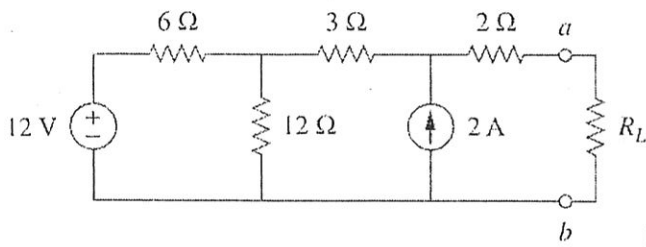


Fig. P2

3. The switch in Fig. P3 is closed for $t < 0$, and assume that the circuit has reached steady state at $t = 0^-$.
 (a) Find $i(0^-)$. (4 分)
 (b) If the switch is opened at $t = 0$, find $i(0^+)$ and $i(t)$. (8 分)

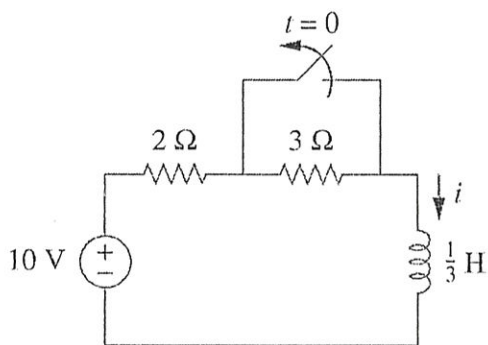


Fig. P3



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4. For the circuit shown in Fig. P4, find $i(t)$ and plot $v_{in}(t)$ and $i(t)$ (The frequency f of $v_{in}(t)$ is 60 Hz) (15 分)

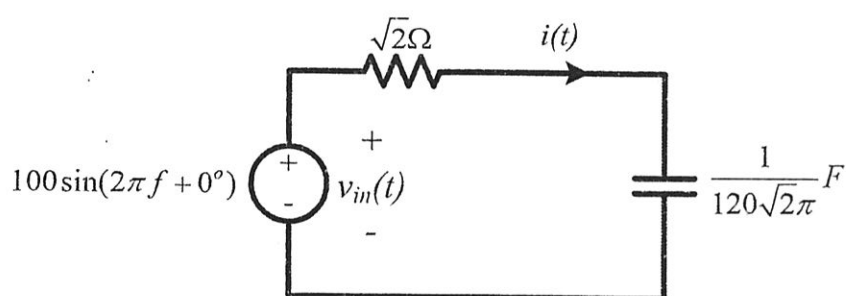


Fig. P4

5. For the ideal transformer circuit shown in Fig. P5, find: (共 15 分)

- (a) the source current I_1 (5 分)
 (b) the output voltage V_o (5 分)
 (c) the real power supplied to the 135Ω load (5 分)

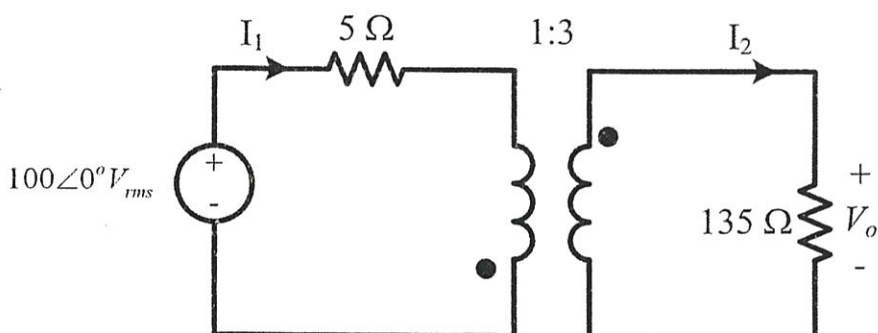


Fig. P5

6. For the compensation circuit shown in Fig. P6 (20 分)

- (a) find the transfer function $\frac{V_o(s)}{V_i(s)}$ (10 分)
 (b) design a highpass filter with a high-frequency gain of 5 and a corner frequency of 2 kHz. Use a $0.1 \mu\text{F}$ capacitor in your design. (10 分)

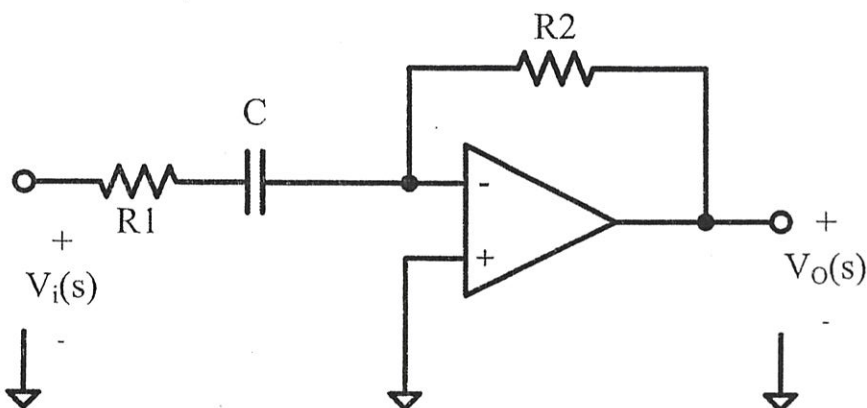


Fig. P6

