國立臺灣科技大學105年度電力電子產業碩士專班（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. In Fig. P1, if $i_3 = 1A$, please find i_2, i_1, V_X. (15分)

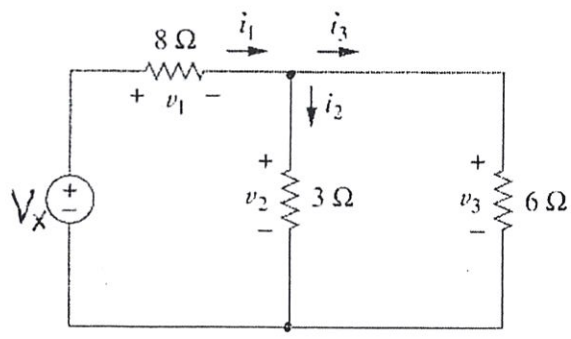

Fig. P1

2. Find I in the circuit of Fig. P2. (15分)

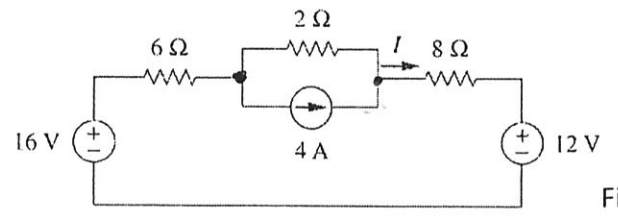

Fig. P2

3. Find $i(t)$ in the circuit of Fig. P3 for $t > 0$. Assume that the switch has closed for a long time. (20分)

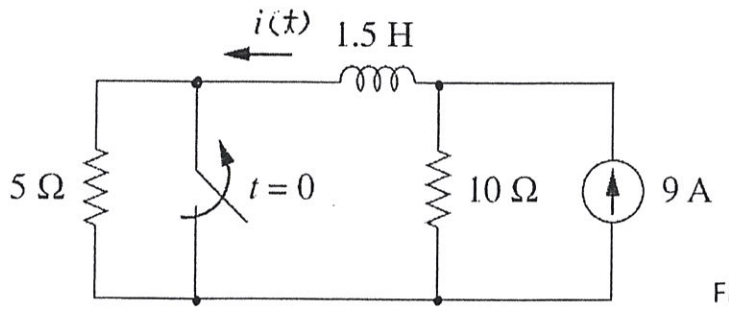

Fig. P3

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4. For the ideal transformer circuit shown in Fig. P4, find the output voltage V_o (共 10 分)

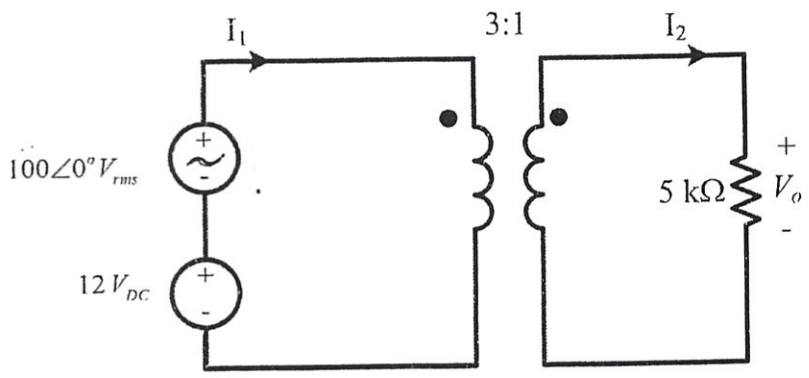

Fig. P4

5. For the RLC circuit shown in Fig. P5 (共 20 分)
   (a) Find the resonant frequency ω_0 and the quality factor Q (10 分)
   (b) Find the value of C so that the input current $i_s(t)$ is in phase with the input voltage $v_s(t)$, given that $v_s(t)=100\cos(2000t)$, R=2 Ω and L=1 mH (10 分)

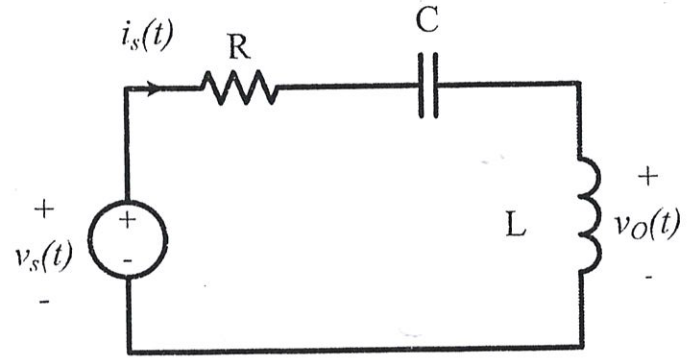

Fig. P5

6. For the filter circuit shown in Fig. P6 (共 20 分)
   (a) Find the transfer function $\frac{V_O(s)}{V_I(s)}$ (15 分)
   (b) Identify what type of filter this circuit is. (5 分)