

國立臺灣科技大學九十九年度電力電子產業研發碩士專班招生(春)試題

系所組別：電力電子領域

科目：電路學

(總分爲 100 分)

1. For the steady state analysis in Fig. P1,  $v_s(t) = 100\sqrt{2} \sin 1000t$  V,  $L_1 = 10$  mH and  $R_1 = 10 \Omega$ . Find the steady state  $i_L(t)$  and  $v_R(t)$ . (20%)

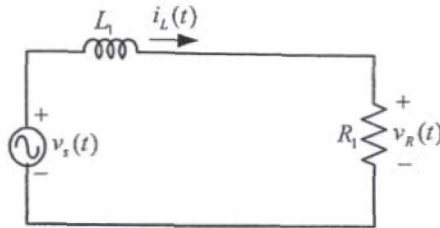


Fig. P1

2. In Fig. P2, the impedance  $\hat{Z}_L$  is adjusted until it absorbs the maximum average power. If the  $\hat{V}_s = 200\angle 0^\circ$  V (rms), calculate the  $\hat{Z}_L$  and the maximum average power absorbed by it. (15%)

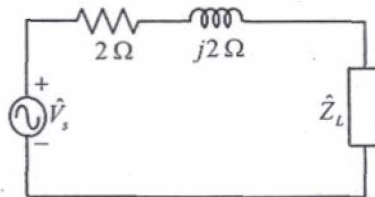


Fig. P2

3. In the circuit of Fig. P3, let  $R = 100 \Omega$ ,  $L = 10$  mH, and  $C = 100 \mu$  F. Find the resonant frequency, the quality factor and the bandwidth of the circuit. (15%)

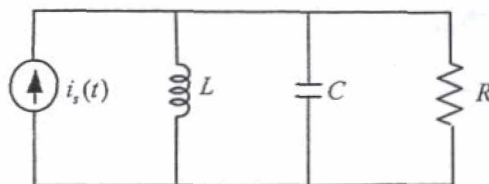


Fig. P3



國立臺灣科技大學九十九年度電力電子產業研發碩士專班招生(春)試題

系所組別：電力電子領域

科目：電路學

4. Find the Thevenin equivalent circuit of the circuit shown in Fig. P4,  $R_{th}$  and  $V_{th}$ , to the left of the terminals a-b. Then find the current through  $R_L=16\Omega$

(15%)

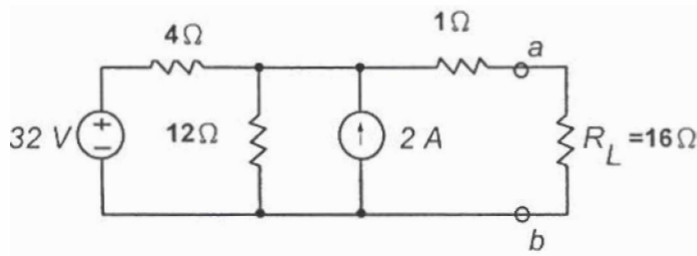


Fig. P4

5.(a) Find the current through a 5-H inductor if the voltage across it is

$$v(t) = \begin{cases} 30t^2, & t > 0 \\ 0, & t < 0 \end{cases}$$

(b) Find the energy stored at  $t=5$  s. Assume  $i(v) > 0$ .

(15%)

6. Find the following currents in the circuit of Fig. P6 for  $t > 0$ . Assume that the switch has been closed for a long time.

(a)  $i(0^-)$

(b)  $i(\infty)$

(c)  $i(t)$

(20%)

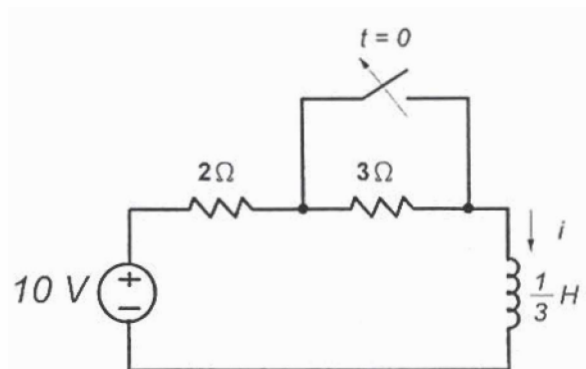


Fig. P6

