大同大學 九十三 學年度 轉學考試 試題

科目名稱: 電路學　　系別: 電機工程學系　　第 1 頁，共 1 頁

註：本次考試 不可參考書籍及筆記　　不可使用計算器　　不可參使用字典

1. Consider the circuit shown in Fig. 1, where $v_c = 3v$.

   (a) Find the Thévenin equivalent circuit. (15%)

   (b) Find the value of a resistor connected across a, b to have the maximum power transferred and calculate the maximum power. (5%)

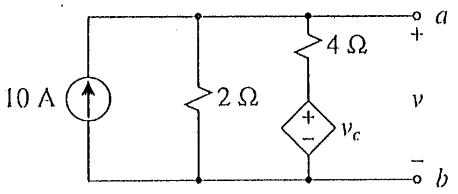

Fig. 1

2. Consider the network shown in Fig. 2, where $i_c = \frac{1}{2}v_2$.

   (a) Using node analysis only to obtain the node matrix for the network. (10%)

   (b) Then, calculate the voltages v_1 and v_2. (7%)

   (c) Determine the current i_1. (3%)

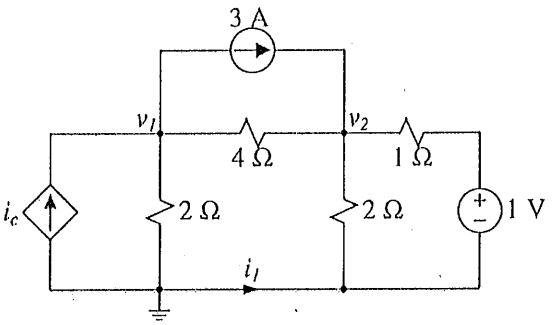

Fig. 2

3. Consider the circuit shown in Fig. 3(a), where $v_s(t)$ is illustrated in Fig. 3(b) and there are no energy stored in the inductor at $t = 0$. (Given $e^{-1/3} = 0.717$, $e^{-1/2} = 0.607$, $e^{-1} = 0.368$, $e^{-2} = 0.135$, $e^{-3} = 0.0498$)

   (a) Find $i_L(t)$ for $0 < t < 2$ s. (10%)

   (b) Find $i_L(t)$ for $t > 2$ s. (5%)

   (c) Sketch the plot of $v_L(t)$ for $t > 0$. (5%)

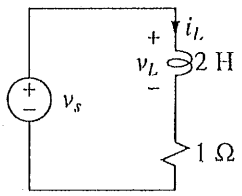

Fig. 3(a)

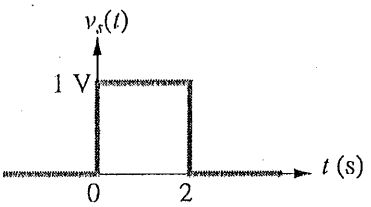

Fig. 3(b)

4. Using superposition property and ac circuit analysis to find $v_C(t)$ in the steady state for the circuit in Fig. 4, where $v_s(t) = 5\cos(2 \times 10^3 t)$ V and $i_s(t) = 1$ A. (20%) (Given $\tan^{-1} 1 = 45°$, $\tan^{-1} 2 = 63.4°$, $\tan^{-1} 3 = 71.6°$, $\tan^{-1} \frac{1}{2} = 26.6°$, $\tan^{-1} \frac{1}{3} = 18.6°$)

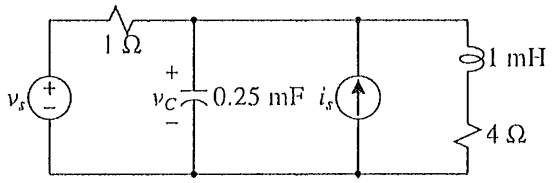

Fig. 4

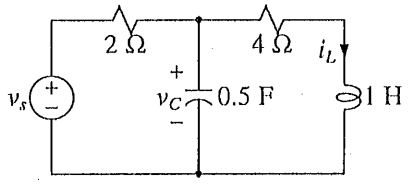

Fig. 5

5. Using Laplace transform method, determine $v_C(t)$ for $t > 0$ for the circuit shown in Fig. 5, where $v_s(t) = e^{-t}u(t)$ V, $v_C(0) = 2$ V, and $i_L(0) = 6$ A, where $u(t)$ is an unit step function. (20%)