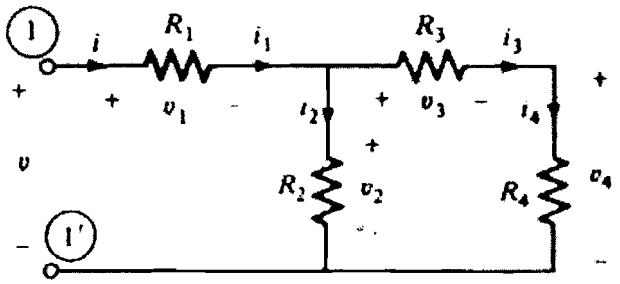
中國文化大學 99 學年度轉學招生考試

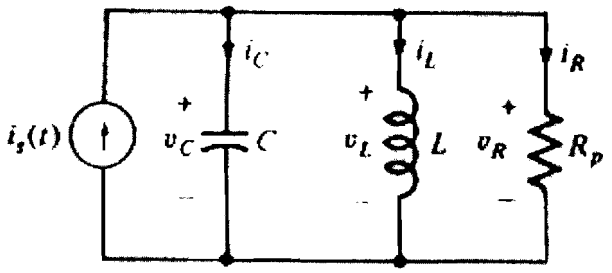
系組：電機工程學系三年級　　日期節次：7 月 28 日第 4 節 15:20-16:40

科目：**電路學**　(155-162)

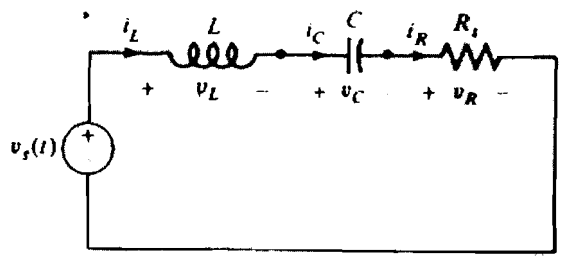
1. Give a ladder circuit shown on the following figure. The input terminal is a voltage v and output terminal is voltage v_4. There are total 4 resistors R_1, R_2, R_3, and R_4 (where $R_1=R_2=R_3=R_4 = 1\Omega$) and the input voltage v=1(V). Please answer the following questions: [20 credits]
   - a、 Please give the value of voltage, v_2 [5]
   - b、 Please give the value of voltage, v_4 [5]
   - c、 Please give the value current, i_1 [5]
   - d、 The equivalent resistance R of all resistors. [5]



2. Give the following two linear time-invariant circuits, shown as follows. Please write down their standard forms of second-order differential equations. [20]



(a)



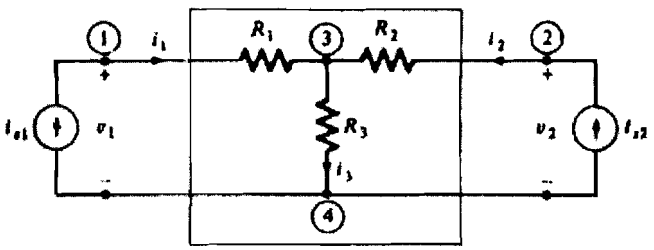
(b)

3. Give the following circuit, shown as follow. Please answer the following questions:

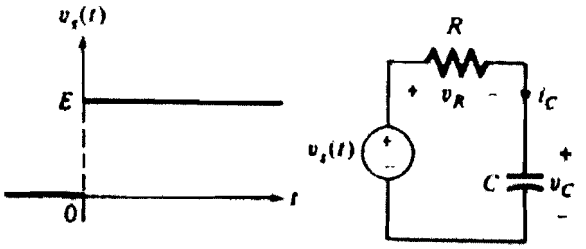
   i_1 = (A) v_1 – (B) v_2

   i_2 = (C) v_1 + (B) v_2

   , where the resistors R_1, R2, and R3 are all equal to 1Ω and the current source i_{s1} is 1 Ampere and the current soure i_{s2} is 2 Ampere. Please write down the answer of part (A), (B), (C), and (D) with respect to the given values of resistors and current sources. [20 credits]



4. Give a RC circuit, shown as follow. Please use the general conditions of capacitor: $v_c(t_0)=0$, $t_0=0$, and $v_{oc}(t) = E$, t>=0, where the voc is Thevenin equivalent voltage source $v_{oc}(t)$. Please give the voltage of $v_c(t)$ corresponding to the given circuit and general conditions of capacitor. [20 credits]



5. Give an ideal transformer, shown as follow. Please give the definition of the following: [20 credits]

   A relationship is given as

   A. v_1/i_1 = (?)

   B. (v_2/i_2) = (?)R.

   Please write down the answers of part (A) and (B).