EE02

國立臺北科技大學 108 學年度碩士班招生考試

系所組別：2120 電機工程系碩士班乙組

第一節　電路學　試題

注意事項：

1. 本試題共 10 題，每題 10 分，共 100 分。
2. 不必抄題，作答時請將試題題號及答案依照順序寫在答案卷上。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. If $y(t)$ is equal to $x(t)$ convoluted with $h(t)$, then please find $y(t)$, where $x(t) = tu(t-1) + u(t-2)$ and $h(t) = u(t)$. (10%)

2. By using the node-voltage method, please find the current I_x in the circuit of Fig. 1. (10%)

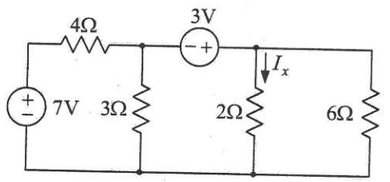


Fig. 1.

3. If $H(s) = \dfrac{V_o(s)}{V_i(s)} = \dfrac{1}{s+1}$ and the input voltage $v_i(t)$ is equal to $\sqrt{2}\sin(t+30°)+5\cos\dfrac{3}{4}t$ V, then please find the expression of the output voltage $v_o(t)$ in the steady state? (10%)

4. In Fig. 2, the circuit is fed with a dc current source. Please determine the values of v_C, i_L, the energy stored in the capacitor, and the energy stored in the inductor. (3%, 3%, 2%, 2%)

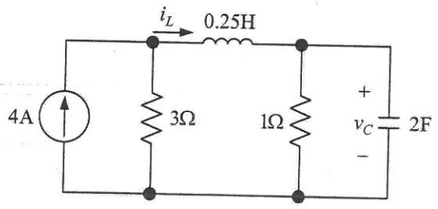


Fig. 2.

5. In the circuit of Fig. 3, please find: (a) the value of R_L under the maximum power transfer, and (b) the corresponding maximum power transferred. (5%, 5%)

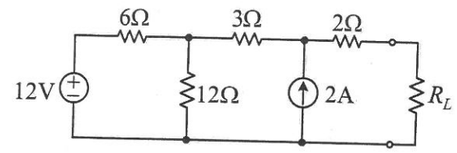


Fig. 3.

6. The two-wattmeter method produces wattmeter readings P_1=1560W and P_2=2100W when connected to a delta-connected load. If the line voltage is 220V, please calculate: (a) the average power per phase, and (b) the reactive power per phase. It is noted that $P_1 = V_L I_L \cos(\theta+30°)$ and $P_2 = V_L I_L \cos(\theta-30°)$, where V_L, I_L and θ are line voltage value, line current value and power factor angle, respectively. (5%, 5%)

7. Fig. 4(a) shows the current i_L flowing one coupling inductor, whereas Fig. 4(b) shows the corresponding current waveform in this coupling inductor. With suitable values labelled, please plot the waveforms relevant to the voltage v_L, the power and the energy, under the condition that L_1=4H, L_2=9H and k=0.5. (4%, 3%, 3%)

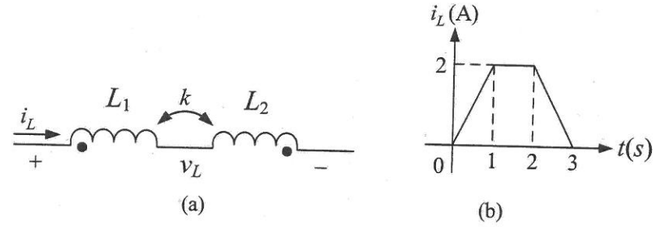


Fig. 4.

8. As shown in Fig. 5, please find the Thevenin equivalent resistance R_{TH} by looking from the terminals a and b. (10%)

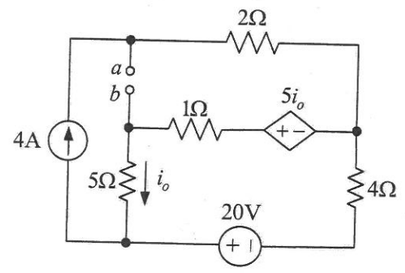
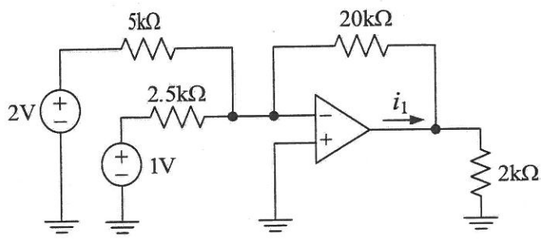


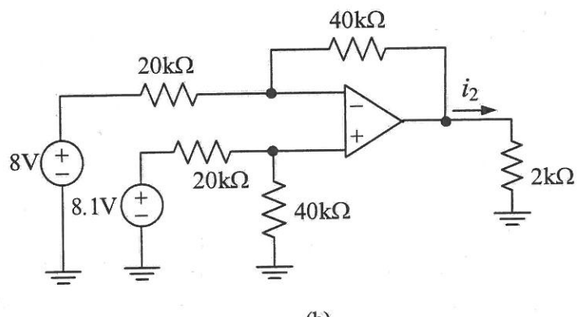
Fig. 5.

注意：背面尚有試題

9. Please find the currents i_1 and i_2 shown in Figs. 6(a) and (b), respectively. (5%, 5%)



(a)



(b)

Fig. 6.

10. (a) If $y(t)$ is equal to $h(t)$ convoluted with $x(t)$, then how to transfer this time-domain expression to the s-domain expression? (2%)
    (b) What are three constraints required when the phasor is used? (2%)
    (c) What type of nodes is used in the node-voltage method? (2%)
    (d) What concept is used in the passive sign convention? (2%)
    (e) What constraint is needed when we define the transfer function? (2%)