

國立臺北科技大學九十六學年度碩士班招生考試

系所組別：1620 電機工程系碩士班乙組

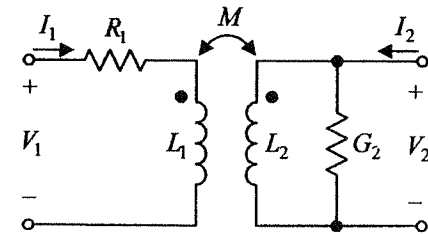
第一節 電路學 試題

第一頁 共一頁

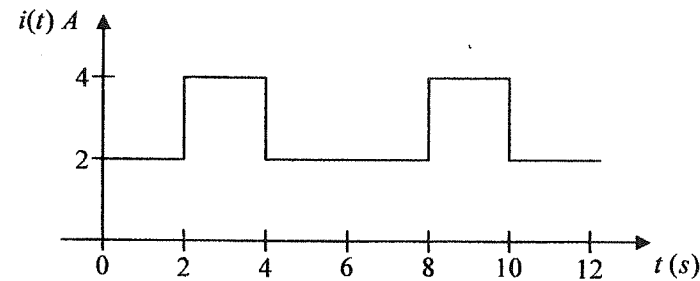
**注意事項：**

1. 本試題共 5 題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
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. Find the h-parameters of the linear transformer circuit in the s-domain as follows. (20%)

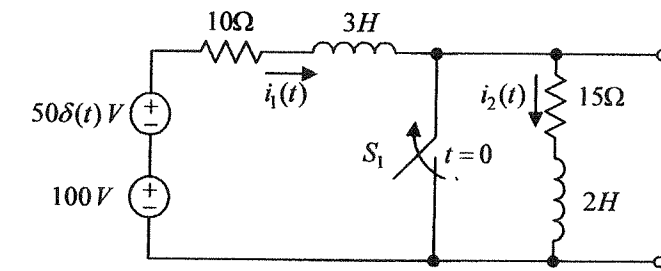


2. (a) The following current waveform is flowing through a  $4\Omega$  resistor. Compute the average power delivered to the resistor. (10%)

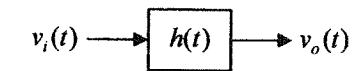


- (b) If the voltage across the device is  $v(t) = 2 + 3\cos t + 4\sin 3t$  V and the current in the device is  $i(t) = 2 + 4\sin t + 4\sin 3t$  A, then how about the average power dissipated in this device? (10%)

3. Calculate the current flowing through the  $15\Omega$  resistor at the instant of opening the switch  $S_1$ , that is to say, find the value of  $i_2(0^+)$ . (20%)



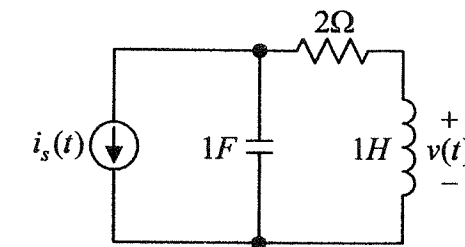
4. (a) For the linear system as shown in the following, when the input voltage is  $v_i(t) = 5\delta(t)$  V, the output is  $v_o(t) = 25e^{-2t} - 15e^{-4t}$  V. Find the output when the input is  $v_i(t) = 4e^{-t}u(t)$  V. (10%)



- (b) A band-limited signal has the following Fourier series representation:

$$i_s(t) = 10 + 8\cos(2t + 30^\circ) + 5\sin(t - 150^\circ) \text{ A}$$

- If the signal is applied to the following circuit, then find  $v(t)$  in the steady state. (10%)



5. Please seek the value of the variable capacitance C that maximizes the magnitude of the voltage across the capacitor. (20%)

