

國立臺北科技大學 115 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

第 1 頁 共 2 頁

注意事項：

1. 本試題共 7 題，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 Find the voltage v from the circuit shown in Figure 1. (15%)

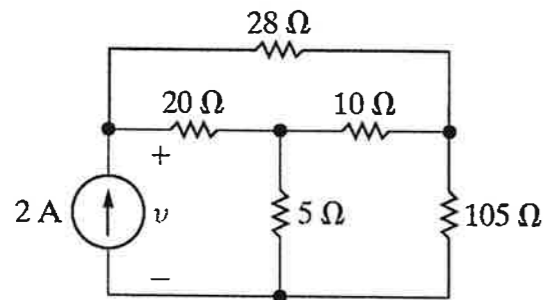


Figure 1

- 2 After the switch in the circuit of Figure 2 has been open for a long time, it is closed at $t = 0$. Calculate the numerical expression for $i(t)$ and $v(t)$ when $t \geq 0$. (10%)

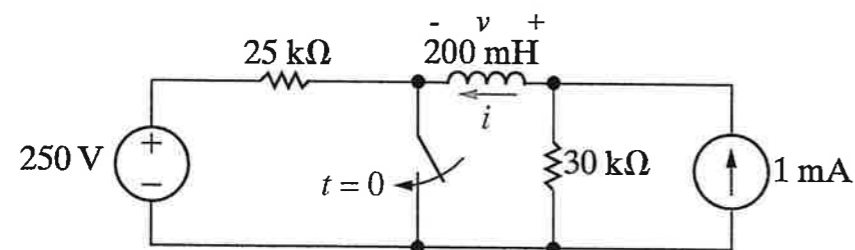


Figure 2

- 3 For the circuit shown in Figure 3, find the steady-state expression for v_o . Given the inputs $v_a = 10 \cos 16,000t$ and $v_b = 20 \sin(4,000t + 150^\circ)$. (10%)

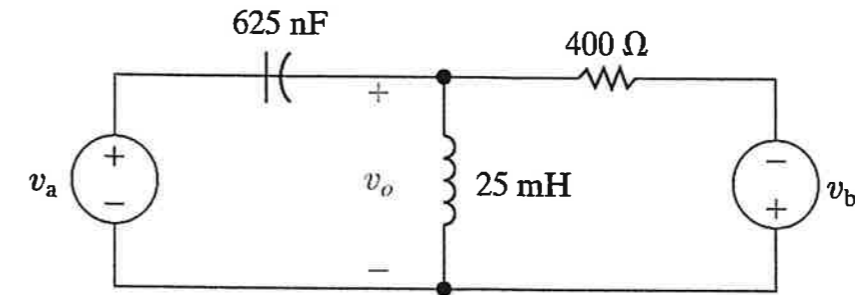


Figure 3

- 4 Given a circuit shown in Figure 4.
- 4.1 Find and draw the Thevenin equivalent circuit. (10%)
 - 4.2 What resistance load will allow the voltage source to transfer maximum power to the load? (5%)

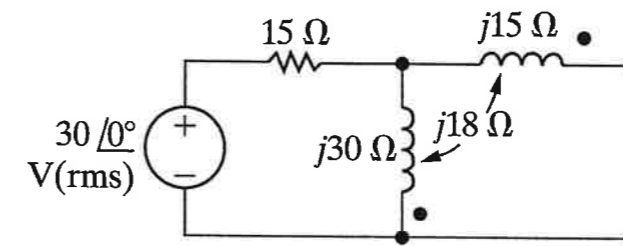


Figure 4

- 5 A balanced three-phase distribution line has an impedance of $1 + j6\Omega/\phi$. This line is used to supply three balanced three-phase loads that are connected in parallel. The three loads are $L_1 = 120 \text{ kVA}$ at 0.9 pf leading, $L_2 = 180 \text{ kVA}$ at 0.80 pf lagging, and $L_3 = 100 \text{ kW}$ and 15 kVAR (magnetizing). The magnitude of the phase voltage at the terminals of the loads is 2400V.
- 5.1 What is the total complex power supplied absorbed by the load. (6%)
 - 5.2 What is the magnitude of the line voltage at the sending end of the line? (7%)
 - 5.3 What is the percent efficiency of the distribution line (based on real power)? (7%)

- 6 The sinusoidal voltage pulse shown in Fig. 6(a) is applied to the circuit shown in Fig. 6(b). Use the convolution integral to find the value of v_o at $t = 1.2$ s. (15%)

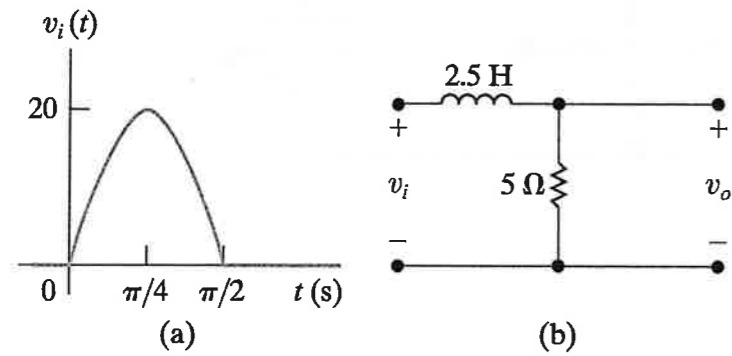


Figure 6.

- 7 Given a circuit shown in Figure 7 and assume the operation amplifier is ideal.
- 7.1 Find the transfer function (V_o/V_g) of the given circuit. (7%)
 - 7.2 Determine the center frequency ω_0 , bandwidth β , quality factor Q , and maximum amplitude A_{max} . (4%)
 - 7.3 Sketch the Bode magnitude plot with center frequency labeled. (4%)

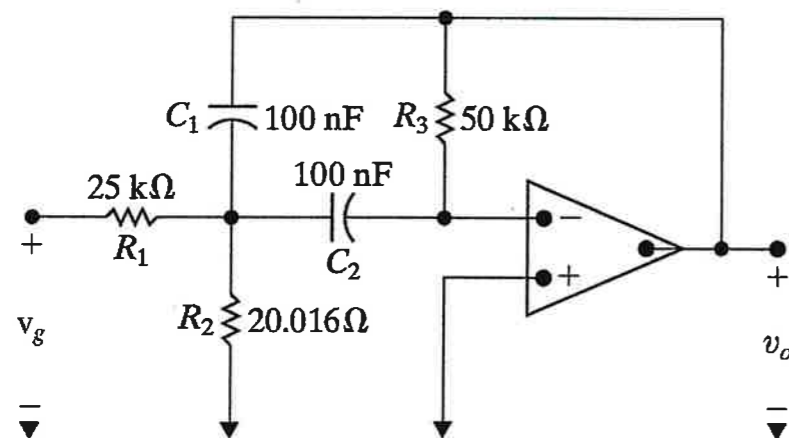


Figure 7.