國立高雄應用科技大學
100 學年度碩士班招生考試
電機工程系（甲組）

准考證號碼□□□□□□□□□□ （考生必須填寫）

電路學

試題　共 3 頁，第 1 頁

注意：a. 本試題共 6 題，第 1~2 題每題 10 分，第 3~6 題每題 20 分，共 100 分。
b. 作答時不必抄題。
c. 考生作答前請詳閱答案卷之考生注意事項。

1. Calculate the power delivered by the dependent voltage source in the circuit shown in Fig.1. (10%)

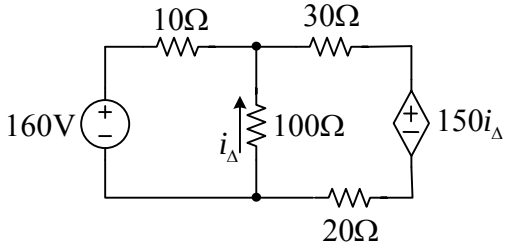

Fig.1

2. The sinusoidal voltage source in the circuit in Fig.2 is $v_g = 20\cos(2000t - 30^\circ)\text{V}$, find the steady-state expression of v_o. (10%)

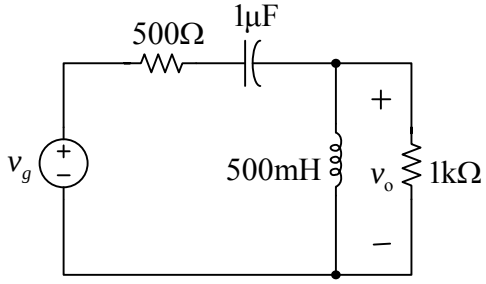

Fig.2

3. In the circuit in Fig.3, switches 1 and 2 are synchronized. When switch 1 is opened, switch 2 closes and vice versa. Switch 1 has been opened for a long time before closing at t = 0.
   (a) What type of damping will the circuit produce? (overdamped, underdamped, critically damped, or none of the above) (5%)
   (b) Find $i_L(t)$ for $t \geq 0$. (15%)

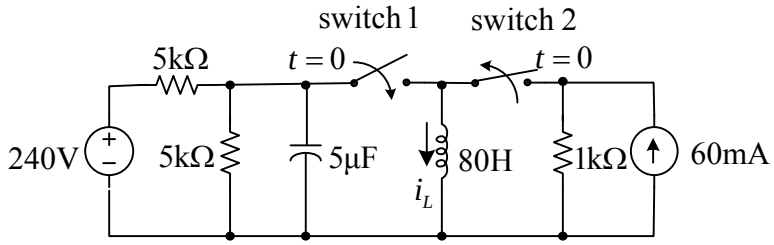

Fig.3

4. The coupling coefficient of the two coils in the circuit in Fig.4 is $k = 0.75$, and the load resistor R_L is adjustable. If $v_g = 54\sqrt{2}\cos 1000t$ V.
   (a) If the value of R_L is ∞(open circuit), find v_o. (10%)
   (b) What value of R_L will result in the maximum average power being transferred to R_L? (10%)

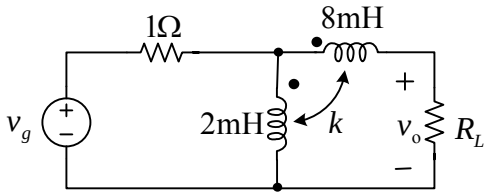

Fig. 4

5. The op amp in the circuit in Fig.5 is ideal, and there is no energy stored in the capacitors at the time the circuit is energized.
   (a) Find the transfer function of the circuit. (10%)
   (b) If $v_g = 0.5u(t)$ V, How many milliseconds elapse before the op amp saturate? (10%)

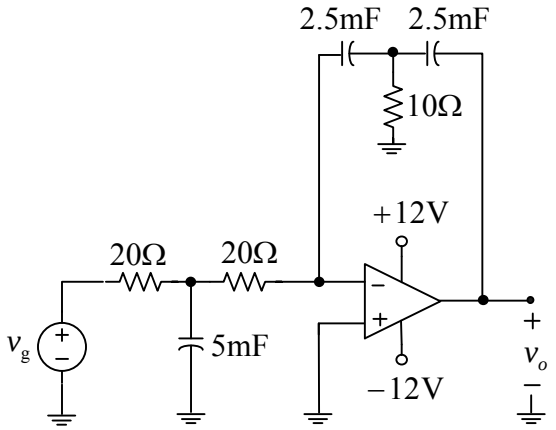

Fig.5

6. Explain the following glossaries: (20%)
   (a) susceptance
   (b) apparent power
   (c) unit impulse response
   (d) third-order harmonic
   (e) root-mean-square value