

國立勤益技術學院九十四學年度研究所碩士班招生筆試試題卷

所別：資訊與電能科技研究所 組別：

身分別：一般生或在職生

科目：電子學 考證號碼：□□□□□□□□ (考生自填)

考生注意事項：

一、考試時間 100 分鐘。

二、

三、

四、

試題一：〈10 分〉

Draw two CMOS circuits to realize the functions

(1) $Y = \overline{AB}$.

(2) $Y = \overline{A(B+CD)}$.

試題二：〈25 分〉

For the OPA phase-shift circuit as shown in Fig. 1,

- (1) Derive the transfer function $T(s) = v_{out}(s)/v_{in}(s)$ and find the corresponding zero and pole.
- (2) With the values, $R_1 = 10k\Omega$, $R = 1k\Omega$, $C = 1\mu F$, make an approximate Bode plot (including magnitude and phase plot) where the key frequencies are clearly shown on it.

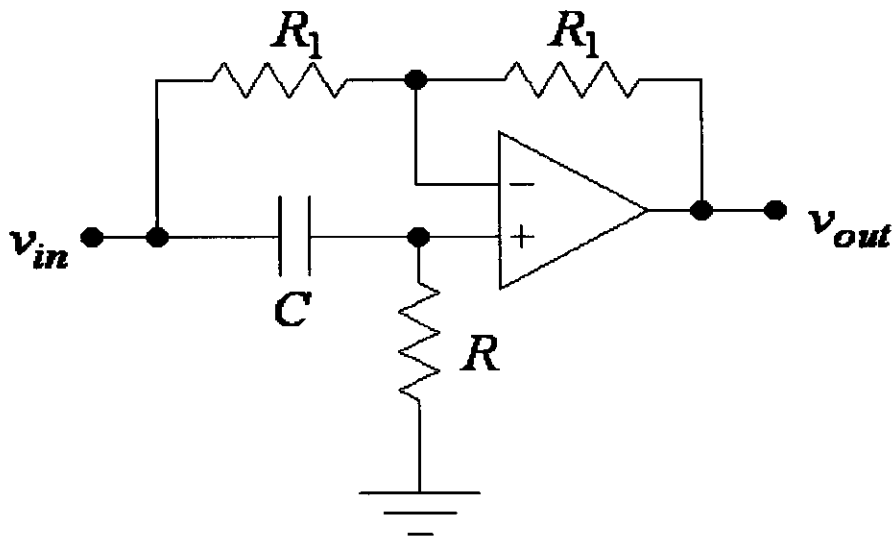


Fig. 1

試題三：〈 20 分〉

As the circuit shown in Fig. 2, Zener diode has the parameters, $V_Z = 10V$, $P_{Z\max} = 400mW$.

- (1) Determine V_L , I_L , I_Z and I_R with $R_L = 180\Omega$.
- (2) Repeat part (a) with $R_L = 470\Omega$.
- (3) Determine the value of R_L that will establish maximum power conditions for Zener diode.
- (4) Determine the minimum value of R_L to ensure that the Zener diode is in the “on” state.

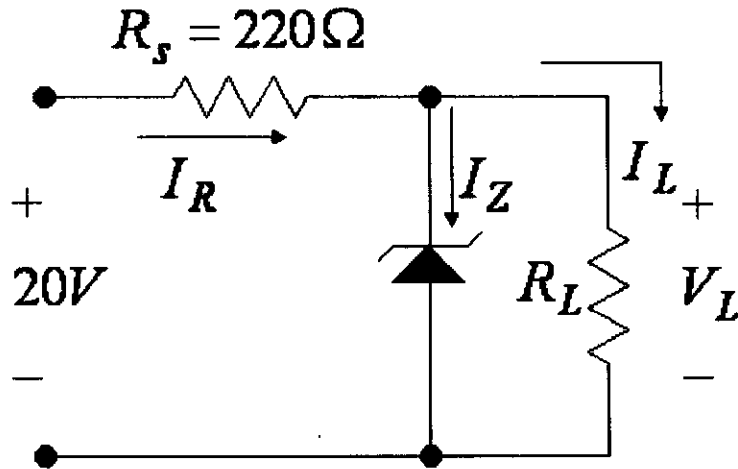


Fig. 2

試題四：〈 25 分〉

The differential amplifier in Fig. 3 uses transistors with $\beta = 100$, $\Delta R_c = 0.02R_c$ in the worst case and $V_T = 25mV$. Evaluate the following:

- (a) The input differential resistance R_{id} .
- (b) The overall voltage gain v_o/v_s (neglect the effect of r_o).
- (c) The worst-case common-mode gain if the two collector resistances are accurate to within $\pm 1\%$.
- (d) The CMRR, in db.

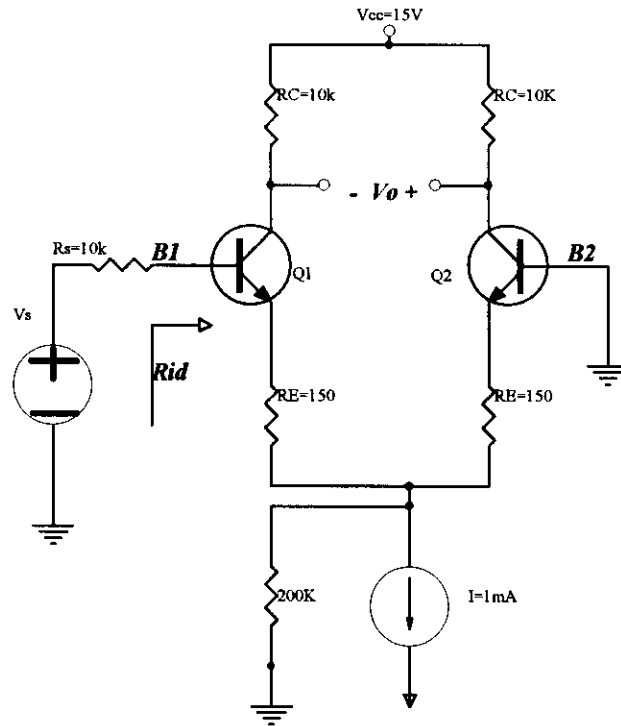


Fig. 3

試題五：〈 20 分〉

Sketch a Colpitts and a Hartley oscillator circuit and list its generating frequency?