

# 國立彰化師範大學 98 學年度碩士班招生考試試題

系所：電信工程學研究所

科目：電子學

☆☆請在答案紙上作答☆☆

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1. Design a Widlar current source of Fig.1 to generate a current  $I_{C1}=10\mu\text{A}$  given that  $I_{REF}=0.2\text{ mA}$ . If for the transistors,  $I_S=2\times 10^{-14}\text{ A}$ , find  $V_{BE2}$  and  $V_{BE1}$ . Assume  $\beta$  to be high. (15%)

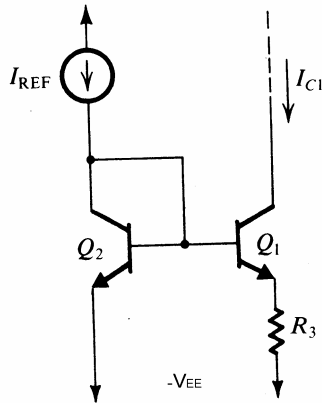
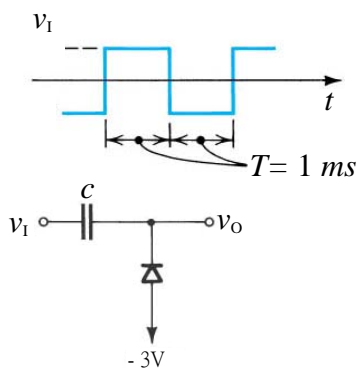


Fig. 1

2. An amplifier has a dc gain of  $10^4\text{ V/V}$  and poles at  $10^4\text{ Hz}$ ,  $2\times 10^4\text{ Hz}$ , and  $10^5\text{ Hz}$ . Find the value of feedback factor ( $\beta$ ), and the corresponding closed-loop gain, for which a phase margin of  $50^\circ$  is obtained. (15%)
3. Design a pseudo-NMOS inverter that has  $V_{OL}=0.15\text{V}$ . Let  $V_{DD}=3.3\text{V}$ ,  $|V_t|=0.5\text{V}$ ,  $k'_n=2k'_p=100\mu\text{A/V}^2$ , and  $(W/L)_n=0.7\mu\text{m}/0.35\mu\text{m}$ . What is the value of  $(W/L)_p$ ? Calculate the value of  $NM_L$  and the static power dissipation. (20%)
4. Assume the diode is ideal. Sketch the output  $v_o$  for the input shown below. Label the most positive and most negative output levels. (14%)



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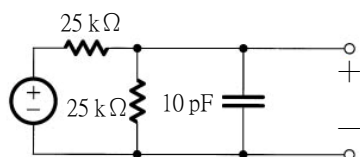
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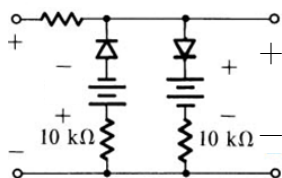
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共 2 頁，第 2 頁

5. Find the dc transmission, the corner frequency  $f_0$ , and the transmission at  $f = 8$  MHz for the circuit. (24 %)



6. Assuming the diodes to be ideal, find the transfer characteristic of the circuit. (12 %)



$V_i$

$V_o$

$5\text{k}\Omega$

$V_I \quad 3\text{V}$

$3\text{V} \quad V_O$