國立彰化師範大學 98 學年度碩士班招生考試試題

系所： 積體電路設計研究所　　科目：電子學

☆☆請在答案紙上作答☆☆　　共 2 頁，第 1 頁

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

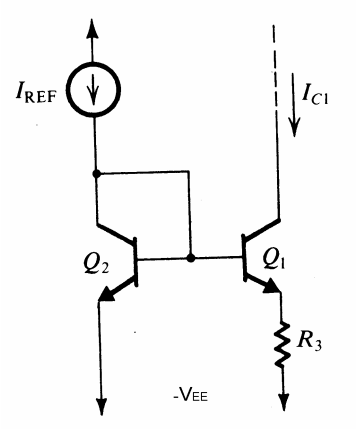
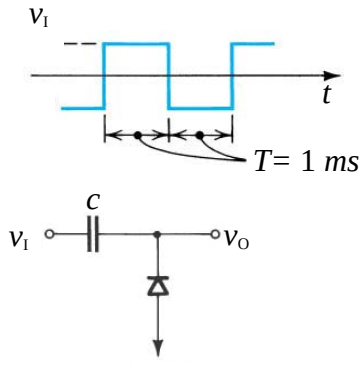


Fig. 1

2. An amplifier has a dc gain of 10^4 V/V and poles at 10^4 Hz, 2×10^4 Hz, and 10^5 Hz. Find the value of feedback factor (β), and the corresponding closed-loop gain, for which a phase margin of 50^o is obtained. (15%)

3. Design a pseudo-NMOS inverter that has V_{OL}=0.15V. Let V_{DD}=3.3V, $|V_t|$=0.5V, $k_n' = 2\,k_p' = 100\mu$A/V^2, and $(W/L)_n$=0.7μm/0.35μm. 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_0 for the input shown below. Label the most positive and most negative output levels. (14 %)



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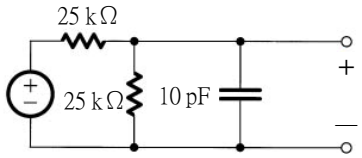
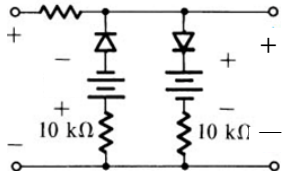
5. Find the dc transmission, the corner frequency f_0, and the transmission at f = 8 MHz for the circuit. (24 %)



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



V_I　　V_O

5kΩ

V_I　3V　　3V V_O