

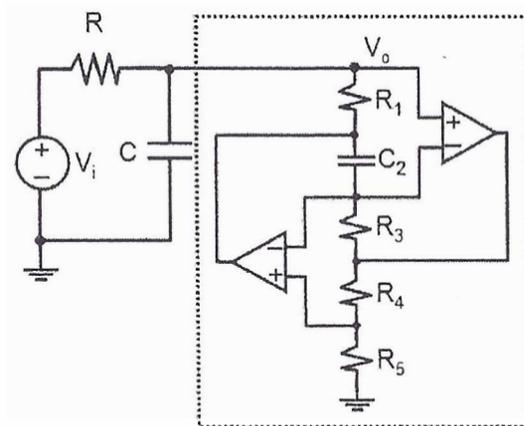
九十五學年度 微機電系統工程研究所 系(所) _____ 組碩士班入學考試

科目 電子學 科目代碼 2406 共 3 頁第 1 頁 *請在試卷【答案卷】內作答

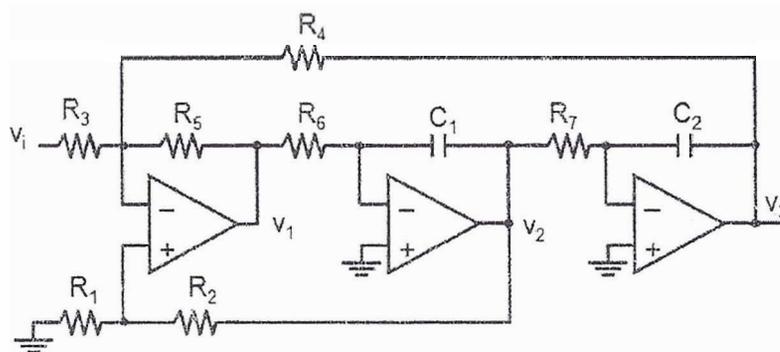
1. (15%) The circuit as shown contains passive elements and ideal operation amplifiers. The sub-circuit inside the dash-line box on the right is equivalent to an inductor.

(a) (10%) Please express the inductance value in terms of R_1 , C_2 , R_3 , R_4 , and R_5 .

(b) (5%) Write down the transfer function $V_o(s)/V_i(s)$.



2. (20%) The schematic of a state-variable filter as shown contains passive elements and ideal operational amplifiers. Please derive the transfer functions of $v_1(s)/v_i(s)$ and $v_3(s)/v_i(s)$.

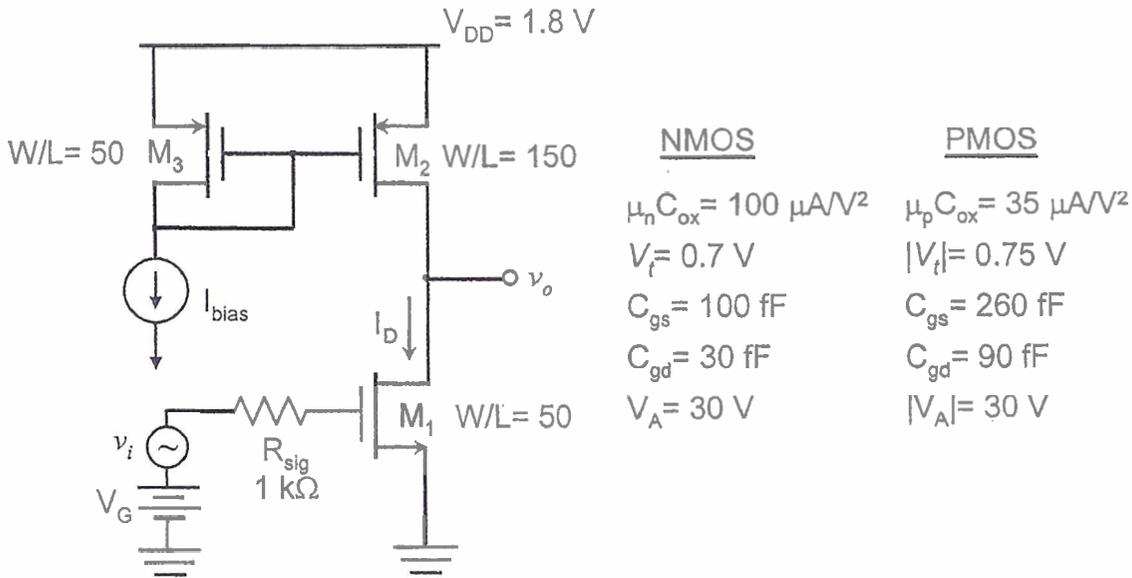


3. (15%) The circuit shown is a Wilson current mirror made by bipolar-junction transistors. Assume the collector current is related to the base current by $I_c = \beta I_b$, please derive its current gain I_o/I_{REF} .

5. (15%) Analyze the active-loaded common-source amplifier shown below, where $I_{bias} = 50 \mu A$:

(a) (5%) Calculate the low-frequency small-signal gain (v_o/v_i).

(b) (10%) Determine the 3-dB frequency f_H .



6. (25%) For the circuit shown below:

(a) (10%) Determine A_d (dB) and A_{cm} (dB).

(b) (5%) Determine the small-signal input resistance.

(c) (10%) Assuming a load of 1pF is connected, plot CMRR (dB). Mark the important frequencies and slopes.

