國立彰化師範大學 99 學年度碩士班招生考試試題

系所：機電工程學系　　組別：乙組(選考甲)　　科目：電子學

☆☆請在答案紙上作答☆☆　　

1. A MOSFET amplifier and the small signal model of the MOS transistor are shown in Figs. 1(a) and 1(b), respectively.

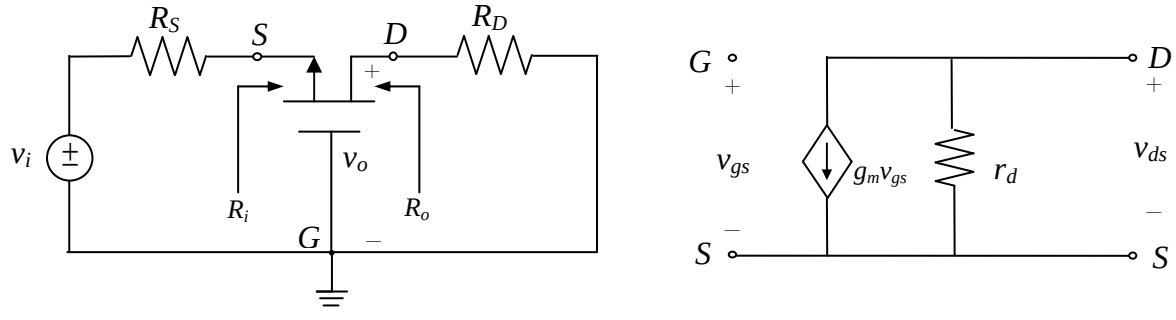
   (1)What is the amplifier configuration? (CC, CG, CS) (2) Find the input and output impedance. (3) Determine the voltage gain v_o/v_i. (20%)

2. For the circuit in Fig. 2, the transistor has $|V_t|$= 1V, $\mu_p C_{ox}$=60μA/V^2, L=0.8μm and λ=0. (1) Find the maximum value of R when V=1V. (2) If R=1kΩ, find the value of W. (15%)

3. In the circuit of Fig. 3, let R_s=1kΩ and λ=0. (1) If the pole and zero introduced by C_s are 100rad/s and 10rad/s, respectively, find C_s and g_m. (2) Determine ω_z and ω_p introduced by C_s when R_s is replaced by an ideal constant-current source. (20%)

4. For the circuit Fig. 4, assume β=100, I_{C1}=0.2mA, I_{C2}=10mA. (1) What is the feedback amplifier configuration? (shunt-shunt, shunt-series, series-series, series-shunt). (2) Find v_o/v_s and R_{in}. (25%)

5. An ideal op amp is used in an oscillator as shown in Fig. 5. (1) Find the feedback gain β(S). (2) Derive the loop gain L(S)=A(S)β(S). (3) What is the ratio of R_2/R_1 for oscillation. (20%)



(a)　　(b)

Fig. 1

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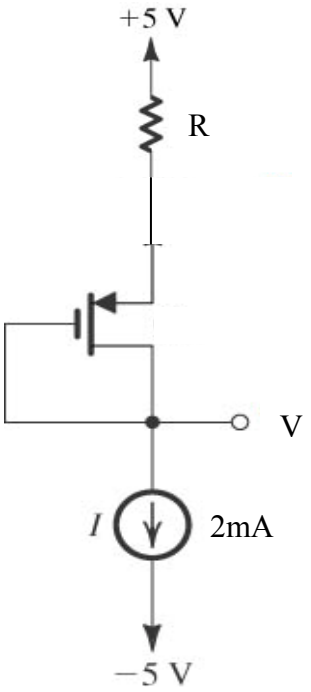

(b)

Fig. 2

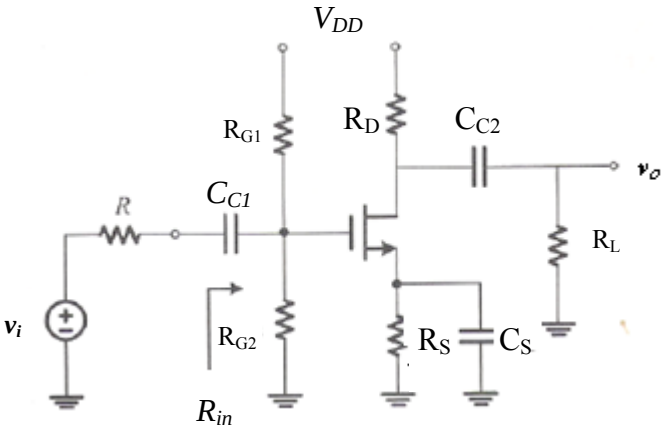

Fig. 3

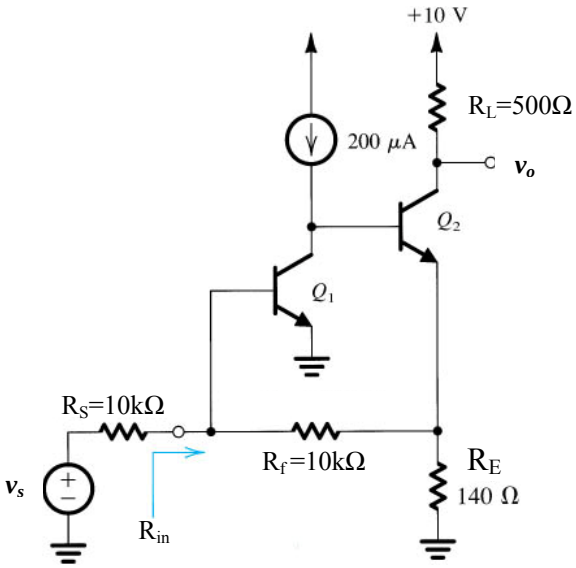

Fig. 4

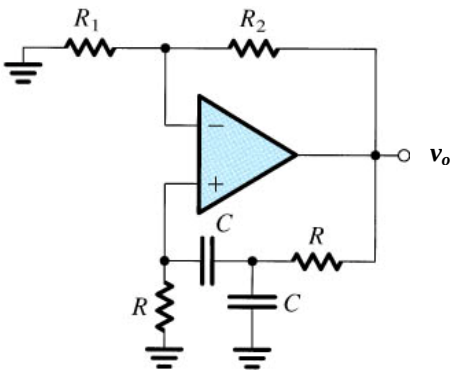

Fig. 5