

國立臺北大學 105 學年度日間學士班暨進修學士班轉學生招生考試試題

系 別：電機工程學系日間學士班 3 年級
 科 目：電子電路

考試時間：80 分鐘
 第 1 頁 共 1 頁
可 不可 使用計算機

1. (10%) Calculate the equivalent resistance R_{ab} in Fig. 1.
2. (15%) Find the Thevenin equivalent circuit of the circuit (V_{TH} , R_{TH}) as shown in Fig. 2.
3. (10%) Compute the closed-loop gain ($A_V = V_{out}/V_{in}$) of the amplifier shown in Fig. 3, assuming $A_0 = 100$, $R_1 = 1k\Omega$, and $R_2 = 100k\Omega$.
4. (15%) Apply Miller's Theorem to C_{gd} in Fig. 4. (a) Redraw the high-frequency model of a CS amplifier and (b) derive its 3-dB high-frequency of f_H .
5. (15%) Fig. 5 shows that the common-source stage provides a voltage gain of 10 with a bias current of 0.5mA. Assume $\lambda_1 = \lambda_2 = 0.1 V^{-1}$, $V_{in} = |V_{tp}| = 0.4V$, and $\mu_n C_{ox,n} = 2\mu_p C_{ox,p} = 200\mu A/V^2$ (a) Compute the required value of $(W/L)_1$. (b) If $(W/L)_2 = 10$, calculate required dc bias of V_b .
6. (10%) (a) Derive the transfer function $V_{out}(s)/V_{in}(s)$ and (b) find its type of response of Fig. 6. (low-pass, high-pass, or band-pass Filter)
7. (10%) Plot the V_{in}/V_{out} characteristic of the circuit with an ideal diode, as shown in Fig. 7. (Hint: input V_{in} as x-axis and output V_{out} as y-axis)
8. (15%) Draw the Bode plot gain and phase response of $A(s) = [500(s+2)]/[2s(s+50)]$.

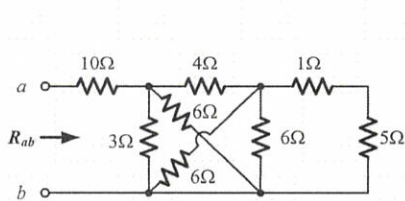


Fig. 1

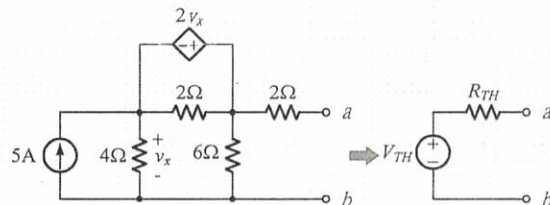


Fig. 2

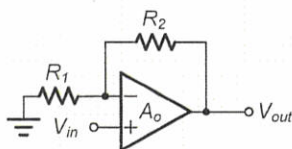


Fig. 3

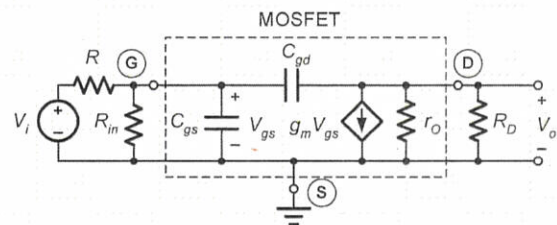


Fig. 4

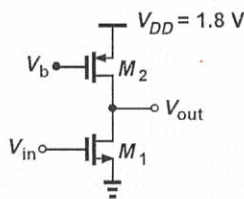


Fig. 5

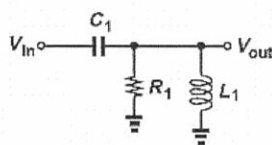


Fig. 6

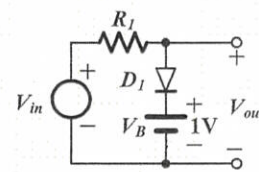


Fig. 7