

國立臺北大學 107 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、通訊工程學系日間學士班 3 年級

科 目：電子電路

第 1 頁 共 1 頁

可 不可使用計算機

- [10%] Explain (a) channel length modulation of a MOSFET and (b) early effect of a BJT.
- [10%] Calculate the equivalent resistance R_{ab} in Fig. 1.
- [10%] Apply Miller's Theorem and an amplifier gain to C_{gd} , redraw the high-frequency model of a common source amplifier in Fig. 2.
- [10%] Draw the small-signal mixed π -model of a common-base amplifier as shown in Fig. 3.
- [10%] Compute the small-signal voltage gain ($A_V = V_{out}/V_{in}$) of a common-source amplifier shown in Fig. 4, assuming transconductance of M_1 is g_m .
- [10%] Fig. 5 shows the circuits illustration of full-wave rectifier with four constant-voltage diodes ($V_{D,ON} = 0.7V$). Plot the V_{in}/V_{out} characteristics curve. (Hint: V_{in} as x -axis and V_{out} as y -axis).
- [10%] Compute the impedance $Z_1(s)$ of the lossy tank in Fig. 6.
- [10%] Compute the output voltage (V_{out}) of the amplifier shown in Fig. 7, assuming $A_0 = \infty$.
- [10%] Find each location of **poles** (ω_{p1}, ω_{p2}), **zeros** (ω_{z1}, ω_{z2}), and 3-dB low-frequency ω_L (rad/s) of the low-frequency response of $L(s) = [s(s+10)] / [(s+100)(s+25)]$
- [10%] Find the Thevenin equivalent circuit (V_{TH}, R_{TH}) of this circuit as shown in Fig. 8.

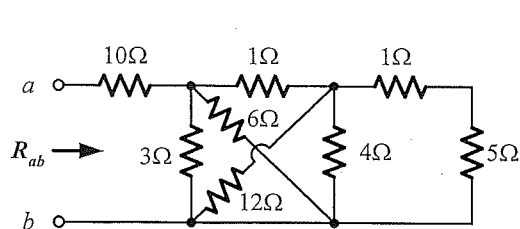


Fig. 1

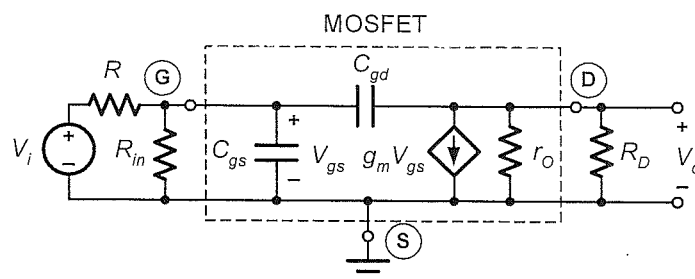


Fig. 2

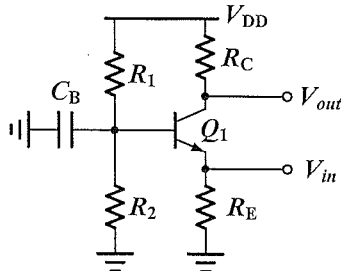


Fig. 3

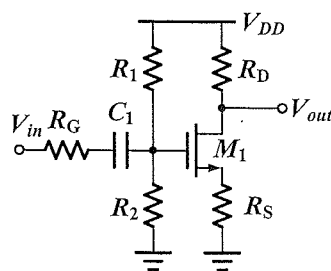


Fig. 4

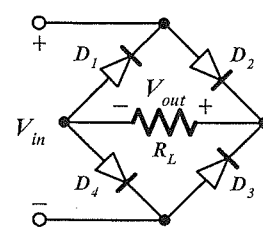


Fig. 5

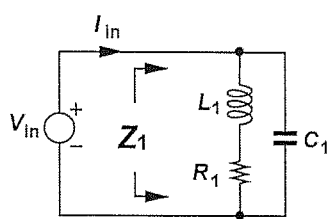


Fig. 6

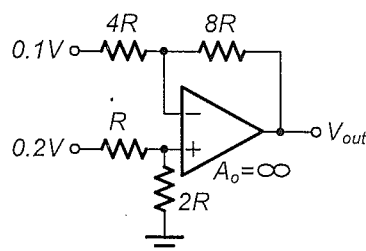


Fig. 7

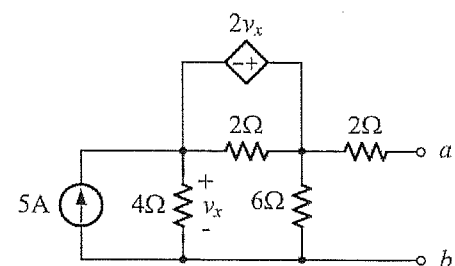


Fig. 8

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