

淡江大學 100 學年度進修學士班轉學生招生考試試題

系別：電機工程學系三年級

科目：電子學

10-1

考試日期：7月20日(星期三) 第3節

本試題共 5 大題， 2 頁

本試題雙面印刷

- Using the constant-voltage model plot the input/output characteristics of the circuit depicted in Fig. 1. Note that a diode about to turn on carries zero current but sustains $V_{D,on}$ so find $V_{D,on}$. (20%)

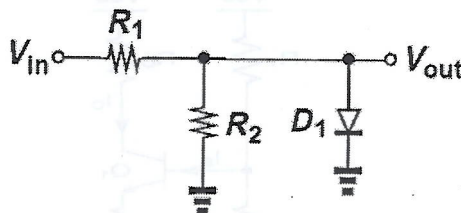


Fig.1

- As shown in Fig. 2, assuming an ideal diode model, (a) Plot the V_{out} as a function of time. (b) Plot the voltage across $D1$, V_{D1} , as a function of time. (20%)

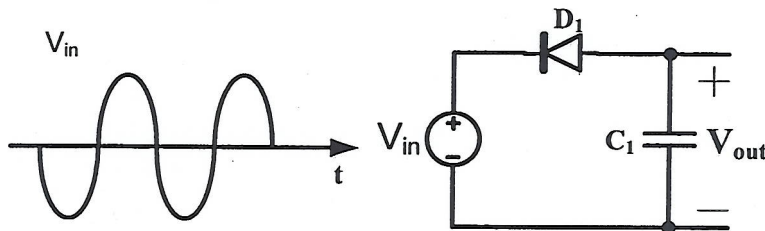


Fig.2

- The circuit is shown in Fig. 3, where resistor R_C converts the collector current to a voltage. (a) Verify that the transistor operates in the active mode. (b) Determine the output signal level if the V_1 is a 1-mV signal and calculate voltage gain (A_v). (20%)

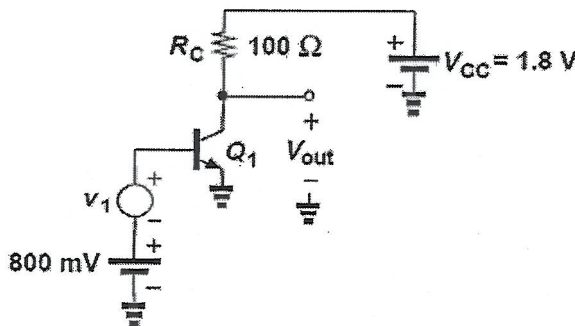


Fig. 3

- As shown in Figs. 4(a)-(c), find R_{in} and R_{out} of the circuit by using small signal model. (20%)

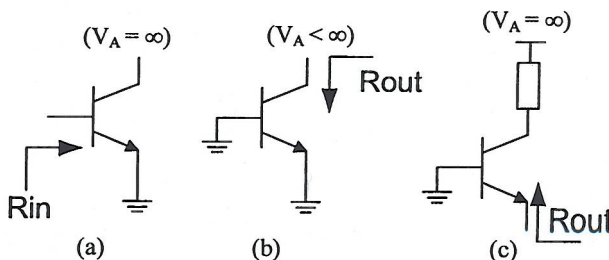


Fig. 4

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5. Design the circuit of Fig. 5 so as to provide a transconductance of $1/(52\Omega)$ for Q_1 . Assume $V_{CC} = 2.5V$, $\beta = 100$, and $I_S = 5 \times 10^{-17} A$. (a) What is the maximum tolerable value of R_C ? (b) Find R_1 and R_2 . (20%)

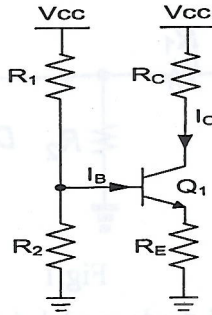


Fig.5

