

八十四學年度 生命科學 所 乙 組碩士班研究生入學考試

科目 應用電子學 科號 1006 共 2 頁第 1 頁 *請在試卷【答案卷】內作答

1. Explain the following terms (40%):
 (a) Johnson noise (b) magic-T (c) quarter wavelength, $1/4 \lambda$,
 (d) Nyquist frequency (e) Hall effect (f) Butterworth filter
 (g) ASCII (h) BNC (i) lock-in detection (j) Josephson junction
2. Design a comparator circuit that gives an output of logic high if and only if two 2-bit binary numbers ($A=A_1A_0$ and $B=B_1B_0$) are equal (10%)
3. Show that the transfer function for the op amp circuit of Fig. 1 is $v_0/v_1 = 1$. (10%)

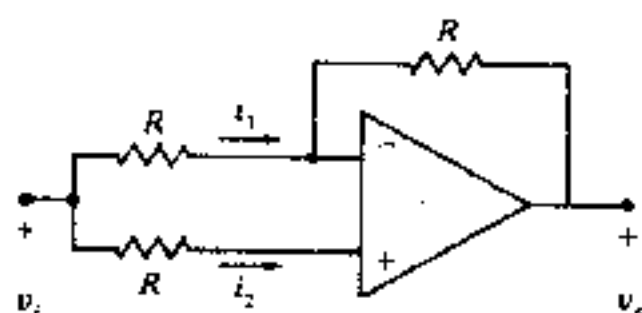


Fig. 1

4. Draw a small-signal h-parameter equivalent circuit for the simplified (bias network omitted) CE amplified of Fig. 2. (10%)

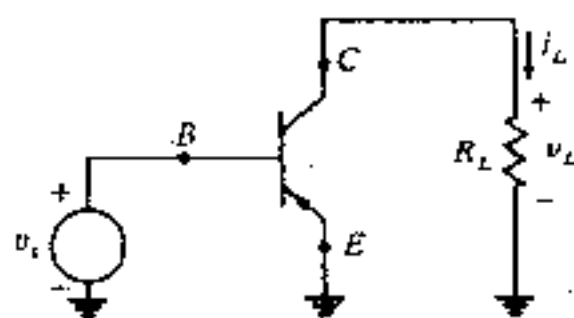
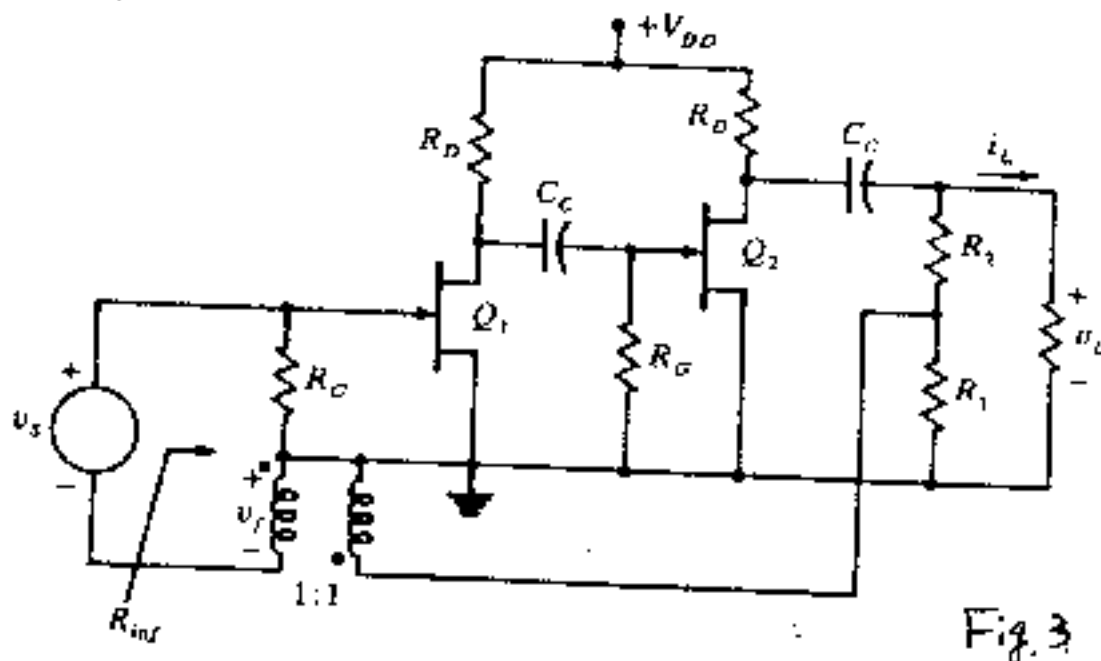


Fig. 2

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5. For the cascaded amplifiers of Fig. 3 using identical FETs voltage-series feedback, let $R_1=10\text{ k}\Omega$, $R_2=190\text{ k}\Omega$, $R_D=R_L=2\text{ k}\Omega$, $R_G=1\text{ M}\Omega$, $r_{ds}=30\text{ k}\Omega$, and $\mu=60$. Negelect loading by the feedback network and find the overall voltage gain. (20%)



6. In the circuit of Fig. 4, let $R_1=R_2=R_c=1\Omega$. Find the Thevenin equivalent for the circuit to the right of terminals a, b if $v_c = 0.5 i_1$. (10%)

