明新科技大學九十三學年度研究所碩士班 ☑一般生 □在職生 招生考試入學試題卷

系所別	組別	科目	考試日期	節次	時間
電機工程研究所		電子電路	93 年 5 月 2 日	第二節	

1. The transistor amplifier in Fig. 1 is biased with a current source I and has $\beta = 100$. What is the voltage gain? (10%)

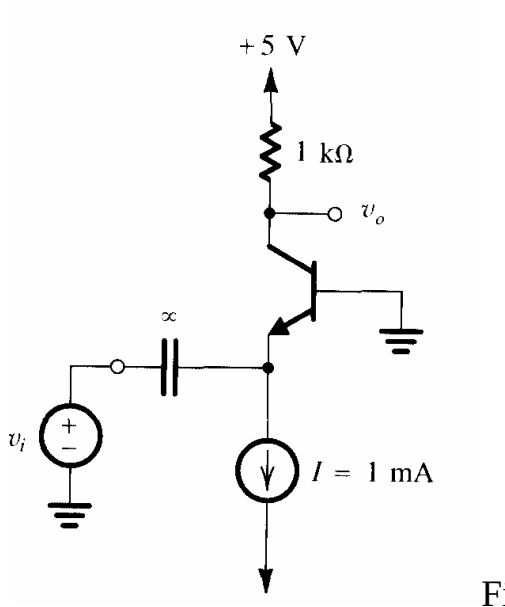

Fig. 1.

2. Consider the CMOS amplifier of Fig. 2 when fabricated with a technology for which $W/L = 100um/2um$ for all transistors, $k_n' = 100uA/V^2$, $k_p' = 30uA/V^2$, $I_{REF} = 100uA$, $V_{An} = 8L(um)$, volts and $|V_{Ap}| = 12L(um)$, volts. Find the voltage gain. (10%)

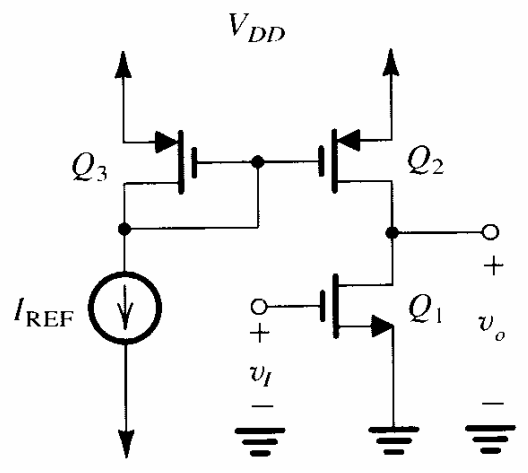

Fig. 2.

3. The amplifier in Fig. 3 is biased to operate at $I_D = 1mA$ and $g_m = 1mA/V$. Neglecting r_o, find the value of C_s that places the corresponding pole at 20 Hz. What is the frequency of the transfer-function zero introduced by C_s? (10%)

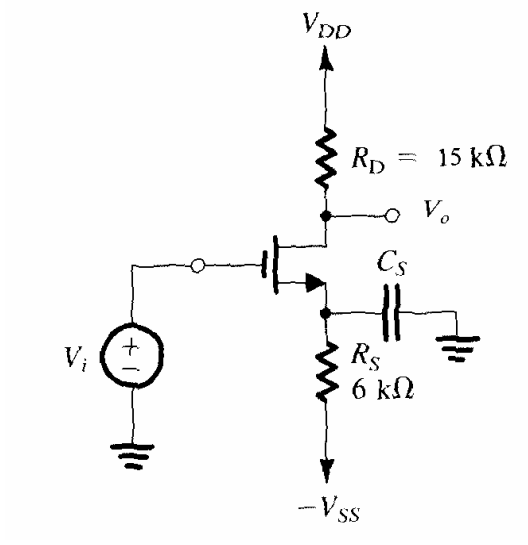

Fig. 3.

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4. Consider the op amp-RC circuit shown in Fig. 4. We wish to use this circuit as a phase shifter. If the input signal frequency is $10^3 rad/s$ and if $C = 10nF$, find the value of R required to obtain phase shift of -60^o. (10%)

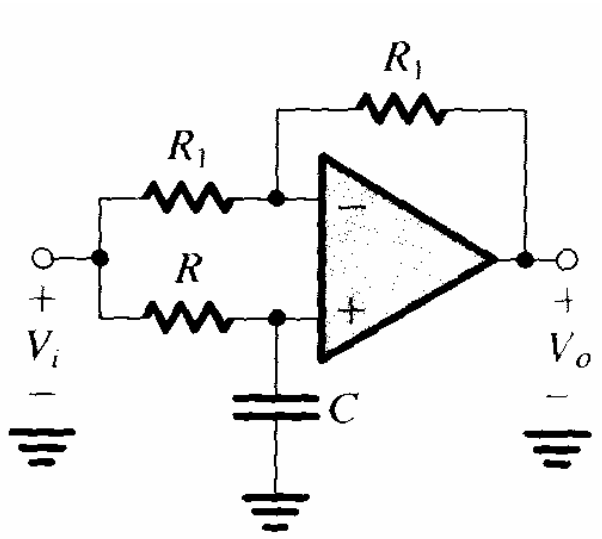

Fig. 4.

5. For the circuit shown in Fig. 5, both diodes are identical, conducting 10mA at 0.7V and 100mA at 0.8V. Find the value R, for which V=40mV. (10%)

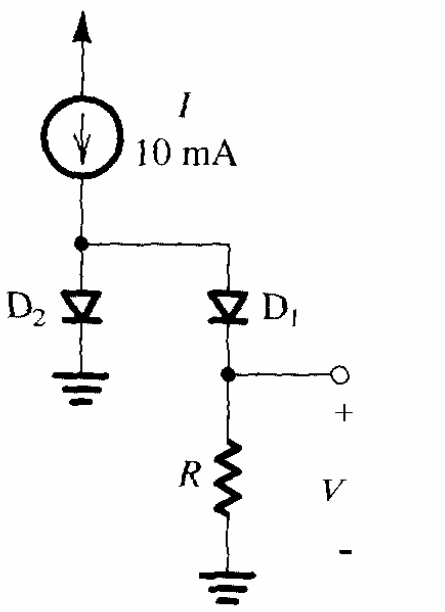

Fig. 5.

6. Determine the current I in the circuit shown in Fig. 6. (10%)

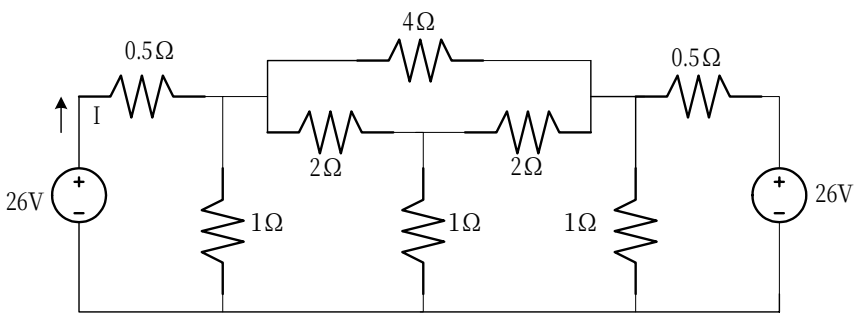

Fig. 6.

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7. Find the Thevenin equivalent circuit of the network shown in Fig. 7. (10%)

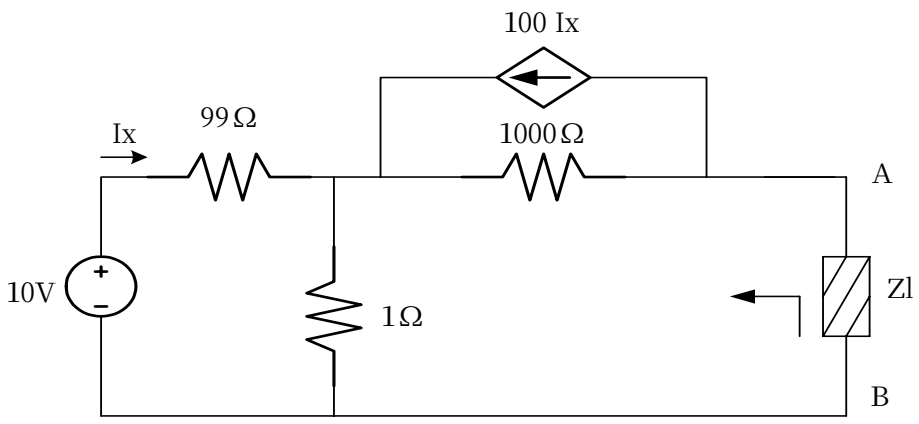
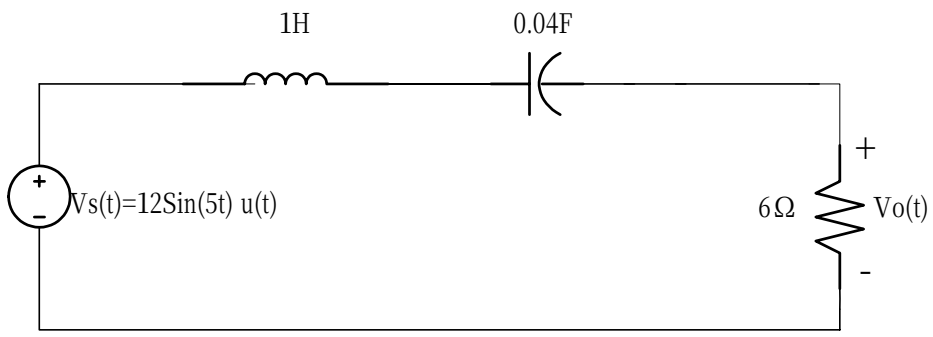


Fig. 7

8. For a circuit shown below, please find the zero state response $V_o(t)$. (10%)



9. The transfer function for a linear circuit is

$$H(s) = \frac{V_o}{I_i} = \frac{625(s+100)}{s^2+100s+12500}$$

If $i_i(t) = 4\cos(50t + 60°)$, find the steady-state expression for $V_o(t)$. (10%)

10.Given the following voltage source

$$v_s(t) = 260\sqrt{2}\cos(\omega t)$$

together with a nonlinear load such that the resulting load current

$$i(t) = 100\sqrt{2}\cos(\omega t + 60°) + 10\sqrt{2}\cos(3\omega t - 12°) + 5\sqrt{2}\cos(5\omega t + 40°) + 3\sqrt{2}\cos(7\omega t - 20°)$$

Find the power factor of this load. (10%)