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Semester I 2006/2007 Electronic Circuits II (EE303) Final Test

ATTEMPT ALL QUESTIONS
TIME ALLOWED THREE HOURS

Q1. Consider the amplifier circuit shown in Fig. 1 and answer the following questions:

a. Calculate the input resistance and the output resistance of the circuit.
b. Calculate the HF poles of the circuit.
c. Calculate the LF poles of the circuit.
d. It is required to reduce the output resistance to half its value and to increase the input resistance to five times its value using the Feedback Principle rather than redesigning the circuit. Suggest the appropriate feedback configuration(s) that can achieve the required goal.
e. Draw a complete circuit shown your modifications. **AT THIS STAGE, DO NOT CALCULATE FEEDBACK RATIO. JUST SHOW THE SUGGESTED CONFIGURATIONS.**

Q2. Obtain the transfer function of the circuit shown in Fig. 2. Sketch this transfer function showing the most important characteristics of it. Select design values for the resistors and capacitors so that the center frequency of this transfer function will be located at 10 kHz.

Q3. Consider the circuit shown in Fig. 3 and answer the following questions:

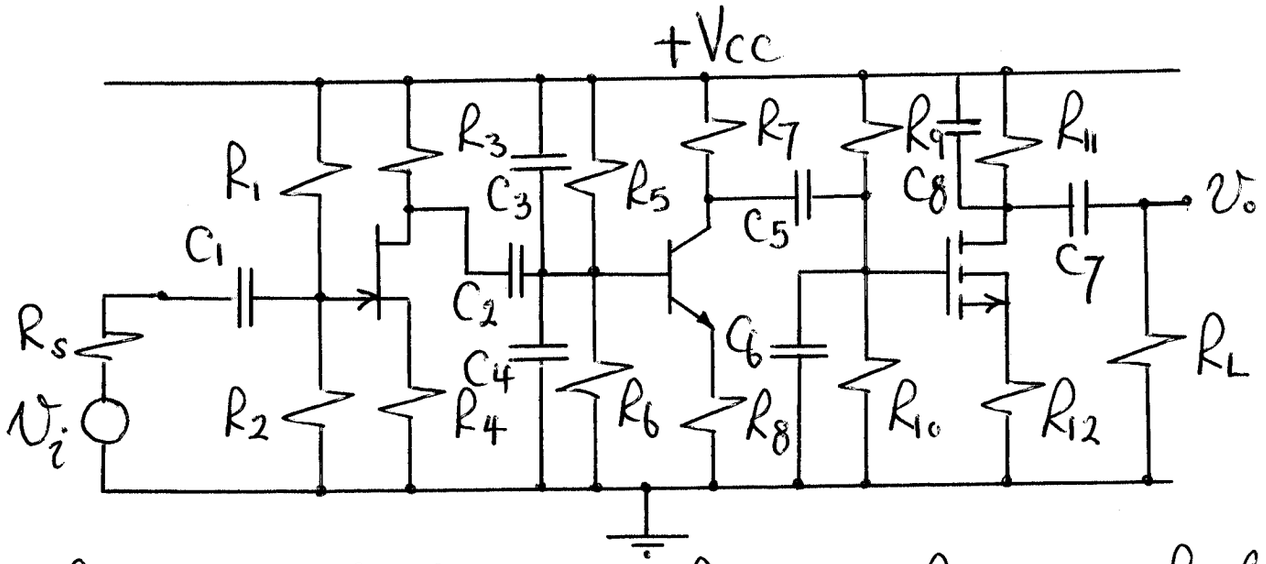
a. Can this circuit oscillate?
b. If your answer to (a) is YES, calculate the frequency and the condition of oscillation.
c. If your answer to (a) is NO, then explain why.

Q4. Design a circuit to implement the following function:

$$v_o = 5v_i + 3\frac{dv_i}{dt} + 2\int v_i dt$$

Draw a complete circuit showing the component values of your design.

Q5. Sketch the output waveform in each the following circuits (See Fig. 4)



$R_s = 100\Omega$, $R_1 = R_2 = 1M\Omega$, $R_3 = 1K\Omega$, $R_4 = 100\Omega$, $R_5 = R_6 = 10K$, $R_7 = 1K\Omega$, $R_8 = 100\Omega$, $R_9 = R_{10} = 1M$, $R_{11} = 1K\Omega$, $R_{12} = 100\Omega$ $R_L = 10K\Omega$, $C_1 = C_2 = C_5 = C_7 = 10\mu F$, $C_3 = C_4 = C_8 = C_6 =$ 10 PF, $r_\pi = 1K$, $\beta = 100$ Fig 1.

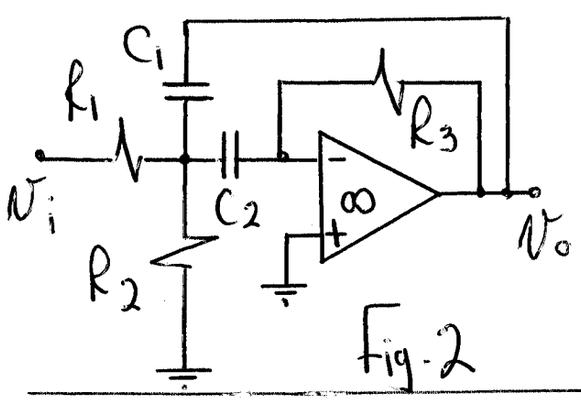


Fig-2

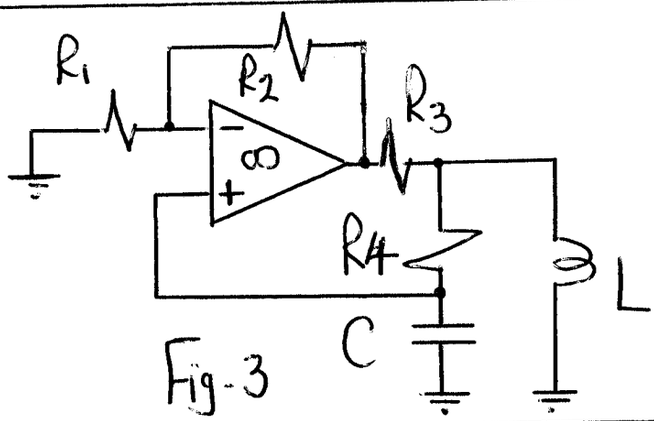
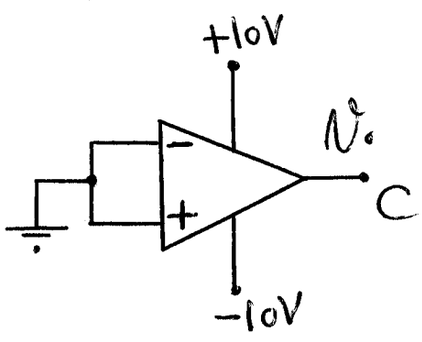


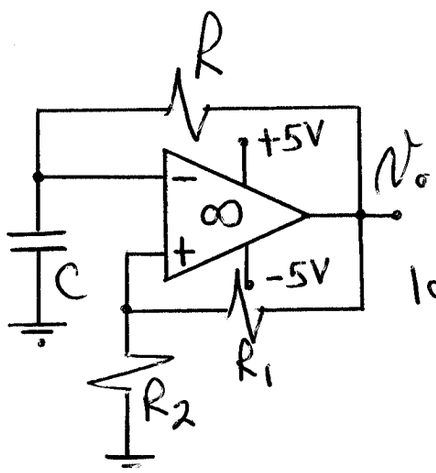
Fig-3



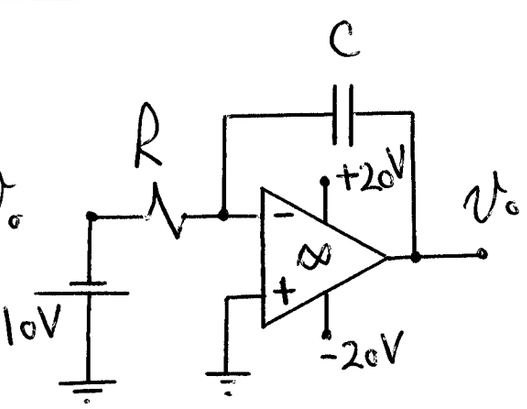
$V_{offset} = 3mV$

$G_d = 10^4$

(a)



(b)



$R = 1M\Omega$

$C = 1\mu F$

Fig. 4