Alexandria Institute of Technology
Electronics Section

Course: Analog Integrated Circuit
Instructor: Prof. M. El-Banna
Term: Winter

Sheet3:
Electronics Section
Time: SAT 12:00-2:00pm

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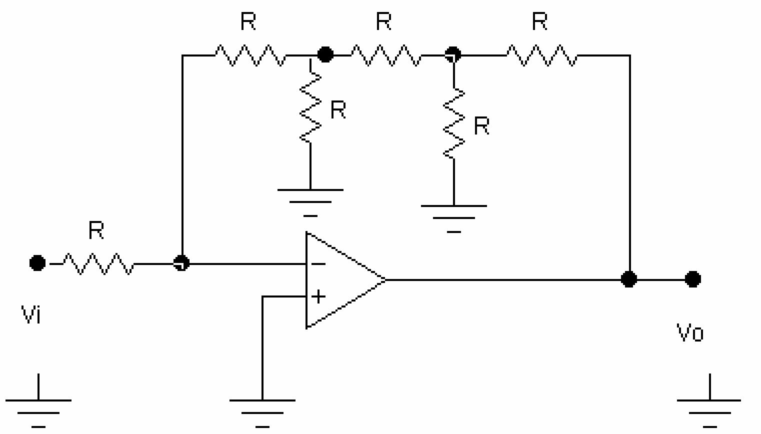
1. For the circuit given in problem (1) sheet 2, What gain results if all resistors are equal?. An extension of this circuit is shown below, determine its gain.



2. A Miller integrator incorporates an ideal op amp, a resistor R of 100kΩ, and a capacitor C of 0.1 μF. A sine wave is applied to its input.
   a- At what frequency in Hz are the input and output signals are equal in magnitude?
   b- At that frequency, how does the phase of the output sine wave relate to that of the input?
   c- If the frequency is lowered by a factor of 10 from that found in (a), by what factor does the output voltage change, and in what direction (smaller or lager)?
   d- What is the phase relation between the input and output in situation (c)?
3. A Miller integrator whose input and output voltages are initially zero and whose time constant is 1ms is driven by a square wave signal whose amplitude is $\pm$1V and periodic time is 1ms. Sketch and label the output wave form that results during the first 1ms. Indicate what happens if the input levels are $\pm$2V, with the time constant the same and with the time constant raised to 2ms.
4. The data in the following table apply to internally compensated op amps. Fill in the blank entries.

A_o	f_b (Hz)	f_t (Hz)
10^6	1	
10^6		10^6
	10^6	10^8
	10^{-1}	10^6
$2x10^6$	10	

5. A measurement of the open-loop gain of an internally compensated op amp at very low frequencies shows it to be $4.2x10^4$V/V; at 100kHz shows it is 76V/V. Estimate values for A_o, f_b, and f_t.
6. An inverting amplifier with nominal gain of –20V/V employs an op amp having a dc gain of 10^4 and a unity-gain frequency of 10^6. What is the 3-dB frequency f_{3dB} of the closed-loop amplifier? What is its gain at 0.1 f_{3dB} and 10 f_{3dB}?