Assignment-4

Ques3 Write a short note on slew rate, PSRR and offset effects in opamps

Ans

Slew rate

Slew rate is the maximum rate of change of output voltage caused by a step input voltage and is usually specified in V/μs. For example: 1V/μs slew rate means that the output rises or falls by 1V in one microseconds. Ideally slew rate is infinite which means the opamps output should be changed simultaneously in response to input step voltage. Practical opamps are available with slew rates from 0.1 V/μs to well above 1000V/μs

Ques4

Ans

PSRR

The change in an opamp's input offset voltage due to variations in supply voltage is called as power supply rejection ratio (PSRR) or called as supply voltage rejection ratio (SVRR). This term is expressed in microvolts per volt or decibels. for 741C, PSRR = 150μV/V, lower the value of PSRR, better the opamps.

offset → Input offset
↳ Output offset

Input offset

Input offset voltage is the differential input voltage that exists between two input terminals

Offset may be due to error occured during fabrication and finite gain of the opamp. It is due to the inherent mismatch of the input transistors and components during fabrication of the silicon and stresses placed during the packaging process. These effects collectively produce a mismatch of the bias currents that flow through the input circuit. Input o.

Input offset voltage and output offset voltage are related by a factor of opamp gain. Both of these are effects of mismatch of transistor parameters

Ques write a short note on noise bandwidth & Noise figure

Ans Noise Bandwidth.

Noise Bandwidth is the bandwidth of the filter with an ideal rectangular amplitude response that passes the same power as the cascaded filters in the receiver. In other words, the definition of Equivalent noise Bandwidth is the bandwidth of a brick wall filter which produces the same integrated noise power as that of an actual filter. Furthermore, the power that a filter is capable of passing is a function of the filter curve (area under)

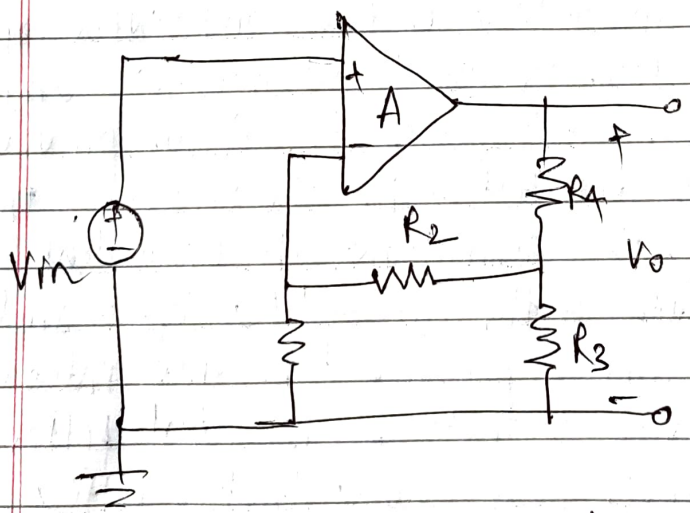
Noise figure:

Noise figure is used to indicate the quality of amplifiers. It is the decibel representation of the noise factor that determines the sensitivity of the amplifier is decreased to an incoming signal due to the internal noise. It is defined as the ratio of total output noise power to the output noise due to the input source. Noise figure indicates the noise performance of a radio frequency (RF) system.

There are various method used to measure noise figure. Some are

(I) Gain method
(II) Y-factor method
(III) Noise figure meter method

Ques 1 for the circuit shown below



(I) find the expression for feedback factor β and close-loop voltage gain

$V_x = (V_{in} - u) A$

$u = \frac{R_1}{R_1+R_2} \times \frac{R_3}{R_3+R_4} + 1$

$K = \frac{R_1 \times R_3}{(R_1+R_2)(R_3+R_4)}$

$C_{Lgain} = \frac{A}{1+AK} + 1$

$= \frac{A}{1+A\frac{R_1 R_3}{(R_1+R_2)(R_3+R_4)}} + 1$

(II) C_L if $R_1 = R_2 = R_3 = R_4 = 1K\Omega$

$C_{Lgain} = \frac{A}{1+\frac{A}{4}} =$

$= \frac{A}{1+A/4} + 1$

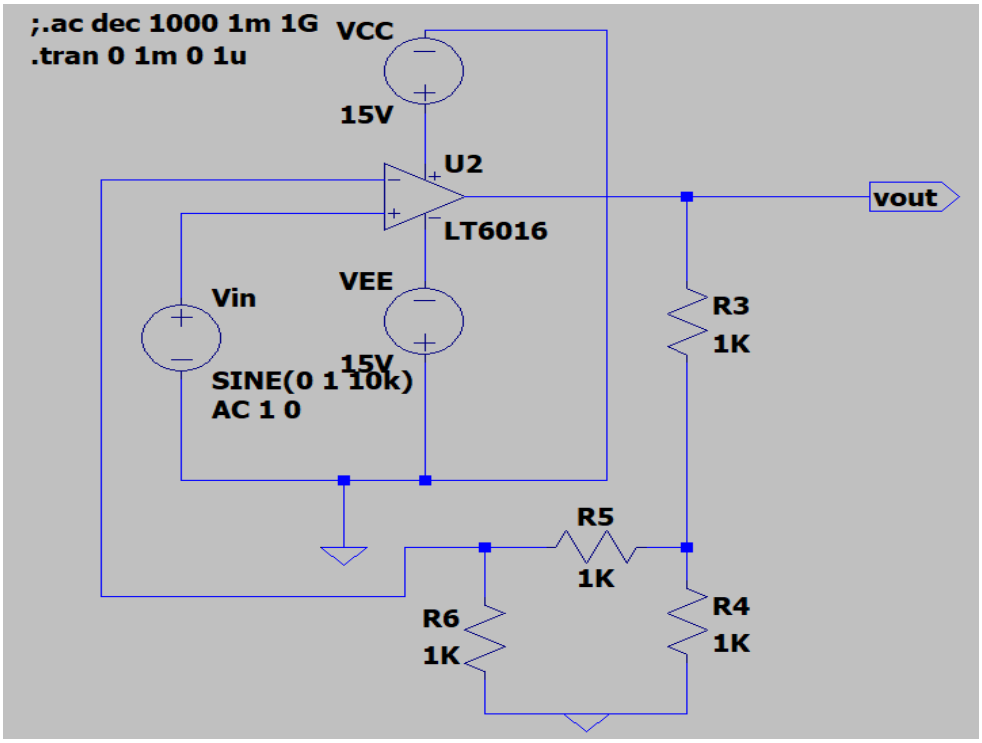
(III) if $A = 200 V/V$

$C_{Lgain} = \frac{200}{1+200 \times \frac{1}{4}}$

$= \frac{200}{1+200/4}$

$= \frac{200}{1+50} \approx 4+1 \approx \boxed{5}$

Circuit:



Output: