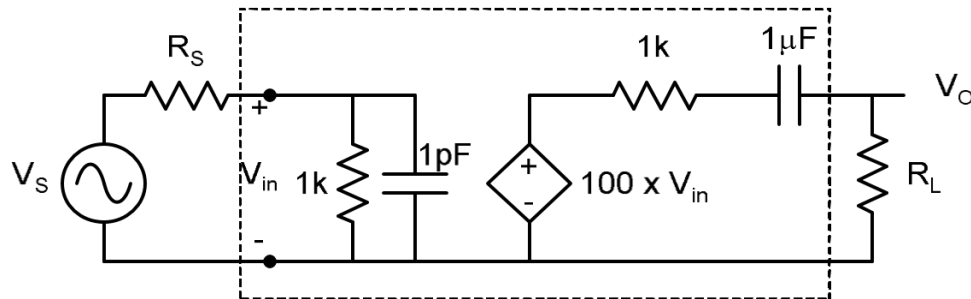


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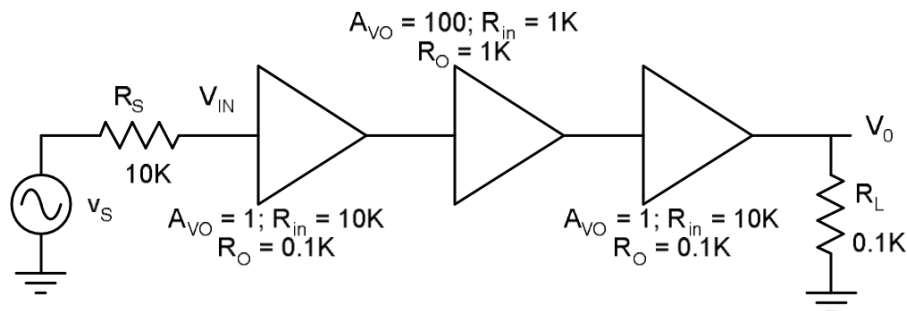
Date: 10/01/2019

Q.1 For the equivalent circuit of the amplifier shown in the figure, determine the mid-band voltage gain, lower and upper cutoff frequencies for a source (R_S) and load resistance (R_L) of $1k\Omega$.



Q.2 An amplifier's input-output relationship is described by the expression: $v_o = K_1(v_{in} + K_2)^2$. Determine the expression for second harmonic distortion. Assuming input is a sinusoid, determine the maximum output voltage swing such that harmonic distortion is less than 5% for $K_1 = 5V^{-1}$ and $K_2 = 1V$.

Q.3 (i) Determine the overall voltage gain, input resistance and output resistance of the amplifier shown below. **(ii)** First and third amplifiers at input and output respectively, are unity gain buffers to provide overall high input resistance and low output resistance. What will be the overall gain, if these unity gain buffers are removed?



Q.4 Two amplifiers A and B have the following characteristics:

A: $A_{VO} = 100$, $R_{IN} = 1k\Omega$, $R_O = 1k\Omega$;

B: $A_{VO} = 10$, $R_{IN} = 100k\Omega$, $R_O = 0.1k\Omega$

Create two examples (with appropriate source and load resistances), one where A provides higher voltage gain and one where B provides a higher voltage gain.

Q.5 The amplifier shown in the figure has a maximum output current drive capability of $1mA$. Sketch qualitatively the output, when the magnitude of a sinusoidal input is $5mV$ and when it is $20mV$.

