RC Filters (28:59)

Illustrate plots of band pass and band stop filters. Describe identifying characteristics and basic behavior of these types of filters.

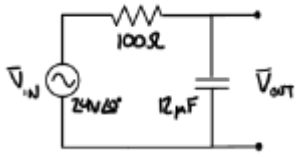
Illustrate plots of low and high pass filters. Describe identifying characteristics and basic behavior of these types of filters.

Illustrate how to construct low and high pass filters using resistors and capacitors. Identify where output voltage is read for these types of filters.

Identify why filters are not typically constructed using inductors.

Identify when an RC filter experiences the critical frequency, f_c.

Identify the formula used to determine the critical frequency.



Determine the critical frequency of the above series RC circuit.

Determine the impedance of the R and C in the above series RC circuit at the critical frequency.

Determine the output voltage for the above series RC circuit at the critical frequency.

Discuss identifiable features of filter circuits at the critical frequency.

Determine the output voltage for the above series RC circuit at 66.3Hz and 265.2Hz.

Compare and contrast the performance of the above series RC filter circuit at frequencies less than, at, and at greater than the critical frequency.

Draw a plot of output voltage as a function of frequency on a linear scale for the above series RC filter.

Draw a plot of output voltage as a function of frequency on a semi log plot for the above series RC filter.

Identify how to calculate normalized output. Identify the units of normalized output. Identify the value of normalized output for any filter at the critical frequency.

Draw a plot of normalized output as a function of frequency on a semi log plot for the above series RC filter.

Identify how to calculate gain in units of dB.

Identify the maximum gain for a passive filter.

Calculate the gain in units of dB of the above series RC filter circuit at 66.3Hz, 132.6Hz, and 265.6Hz.

Draw a plot of gain as a function of frequency on a semi log plot for the above series RC filter.

Draw a general-purpose gain plot of a low pass filter and identify where linear approximations can be made. Compare and contrast actual observations with the linear approximations.

Given a low pass filter with a critical frequency of 500Hz determine the gain at 250Hz, 500Hz, 1kHz, and 5kHz.

Draw a general-purpose gain plot of a high pass filter and identify where linear approximations can be made. Compare and contrast actual observations with the linear approximations.

Given a high pass filter with a critical frequency of 2kHz determine the gain at 200Hz, 1kHz, 2kHz, and 4kHz.

Identify a short cut means of calculating gain for a low pass filter at frequencies less than $1/10^{th}$ the critical frequency.

Calculate the gain of a low pass filter with a critical frequency of 500Hz operating at 1.5kHz when output voltage is 3.8V given 12V input.

Use the shortcut method to determine the gain of the same filter. Compare and contrast the results of circuit analysis and the shortcut method.

Identify a short cut means of calculating gain for a high pass filter at frequencies more than 10X the critical frequency.

Use the shortcut method to determine the gain of a high pass filter with a critical frequency of 2kHz operating at 285.7Hz.

Identify regions where the short cut gain calculation method can and cannot be applied.