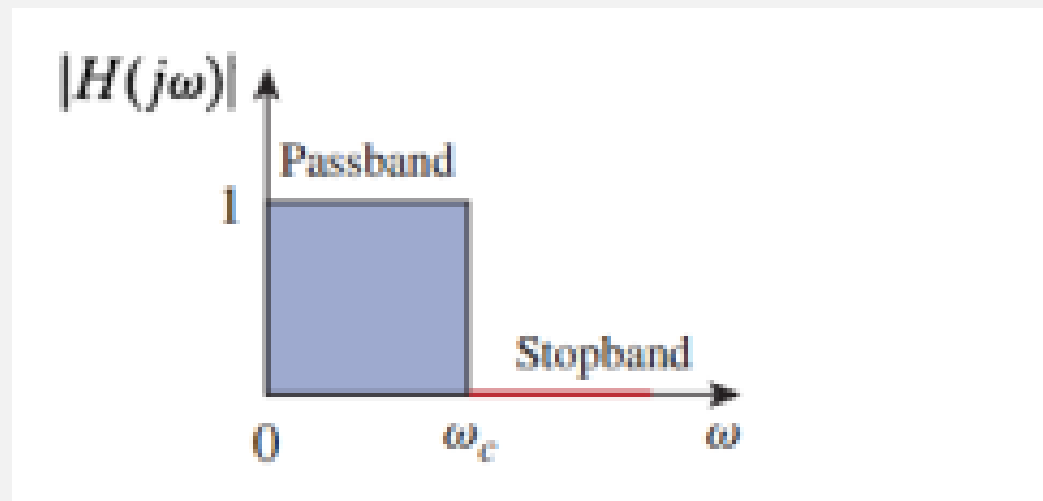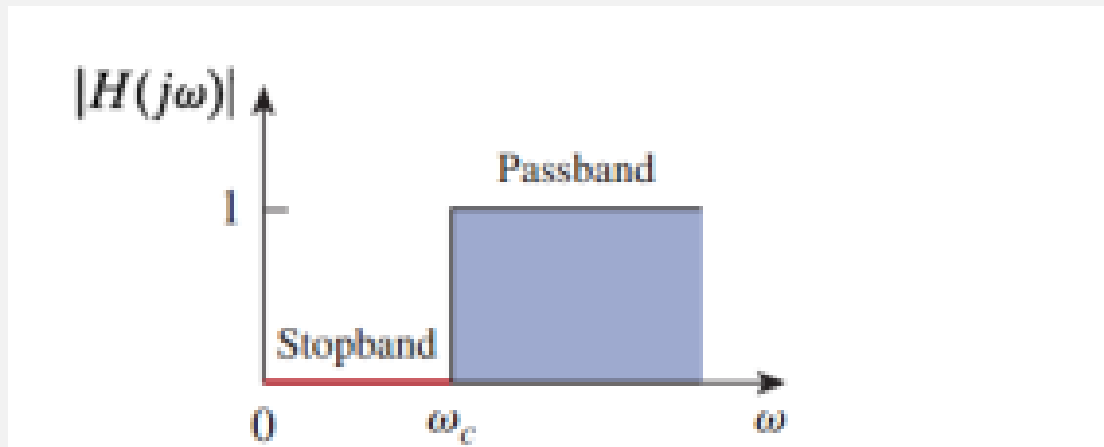Lecture 14: Sampling and Filtering

Low-Pass Filter

Low-pass filter allows low-frequency components of a signal.
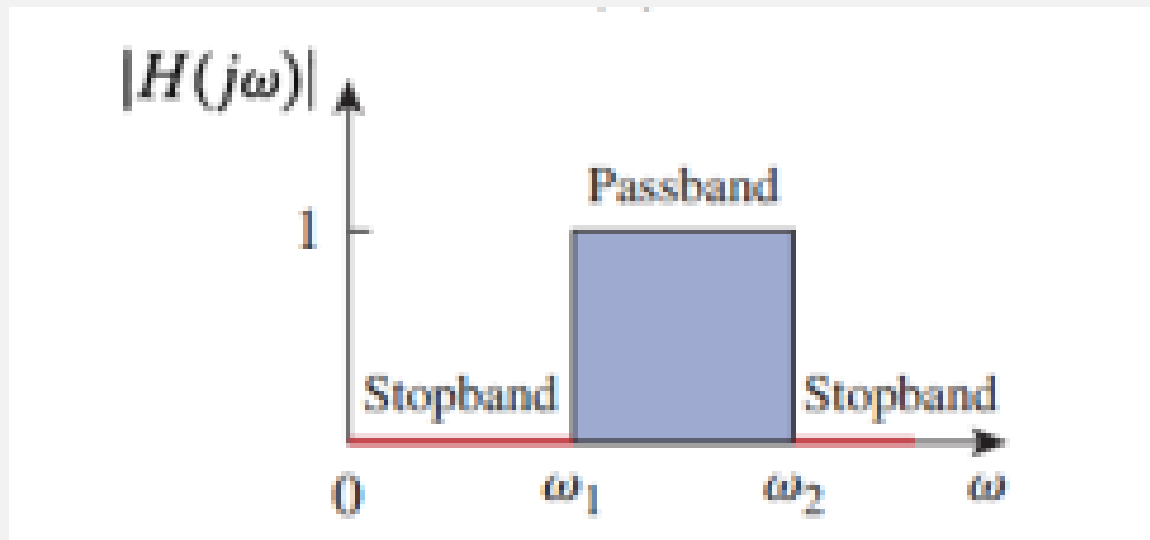
High-Pass Filter

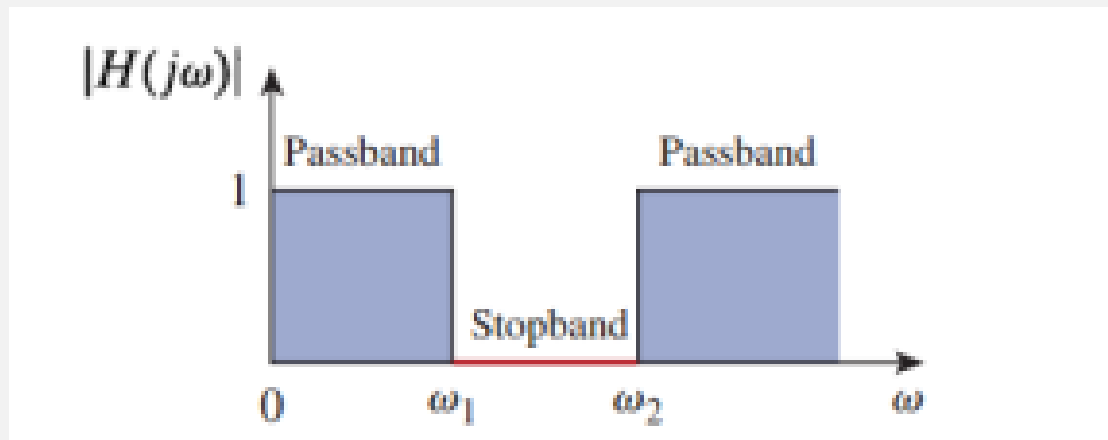High-pass filter allows high-frequency components of a signal.

Bandpass Filter

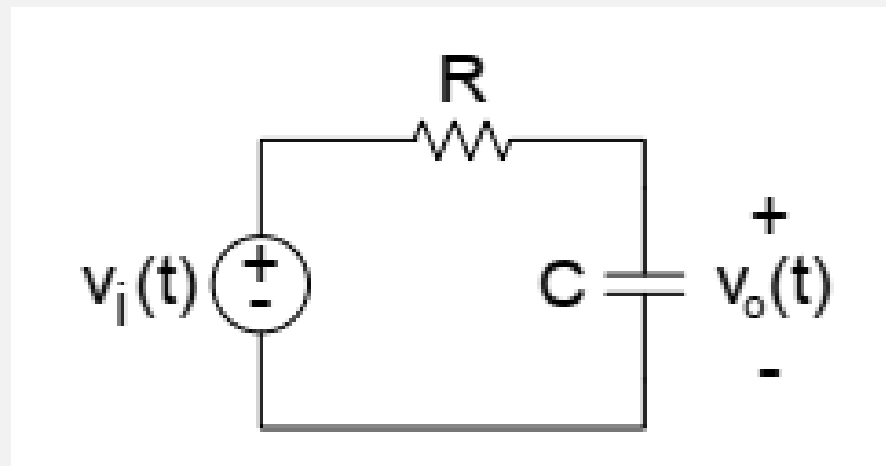Band-pass filter allows a range of frequency components of a signal.

Bandstop Filter

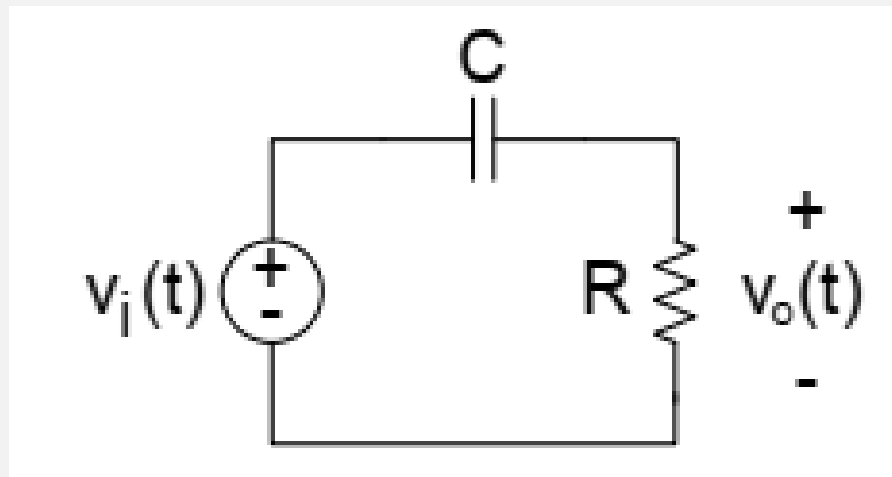Band-pass filter supresses a range of frequency components of a signal.

RC circuit given below is a simple low-pass filter.
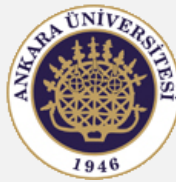
RC circuit given below is a simple high-pass filter.

Sampling

Sampling is applied to convert a continuous time signal to discrete time signal.

We should prevent aliasing while doing the conversion.

If we do not have enough samples, we cannot recover the original signal (aliasing occurs)

If we have more samples that is required, we can recover the original signal but we end up with using more storage than necessary.

Nyquist Rate

The Nyquist rate (frequency) is the minimum rate at which a signal needs to be sampled without causing any aliasing.

If the highest frequency component of a continuous time signal is let's say f, then we should sample it with a frequency of at least 2f to prevent aliasing.

Questions?

Thank you.