Assignment-2

LPF

A Low pass filter basically allows/passes all the frequencies of the input signal, below the cut off frequency (fc) and attenuates all the frequencies above cutoff frequency of the filter. As it passes the lower frequency components of the input signal it is called as low pass filter.

In general, Ideal LPF $|H(f)|= 1$ if $|f|<fc$,

$= 0$ if $|f|>fc$

HPF

A High pass filter basically allows all the frequencies of the input signal, above the cut off frequency (fc) of the filter and attenuates all the frequencies below the cutoff frequency of the filter. Its operation is opposite to that of a LPF. As it passes the higher frequency components of the input signal it is called as high pass filter.

In general, Ideal HPF $|H(f)|=1$ if $|f|>fc$.

$= 0$ if $|f|<fc$

BPF

A Band pass filter basically allows only a certain frequencies of the input signal which falls in the range between the two cut off frequencies i.e., lower cut off frequency (fcl) and higher cut off frequency (fch) and attenuates all other frequencies above (fch) and below (fcl) of the input signal. As it passes only certain band of frequencies of the input signal it is called as band pass filter.

In general, Ideal BPF $|H(f)|= 1$ if $|fcl|<f<|fch|$,

$= 0$ if $|fcl|>f$, $|fch|<f$

HBF

Half Band Filter is a special case of Low pass filter whose cutoff frequency (fc) and its sampling frequency is related as fc=fs/4.

The HBF is defined as $h[2n] =1/2$ at $n=0$

$=0$ at $n!=0$ i.e it is zero at even indices.