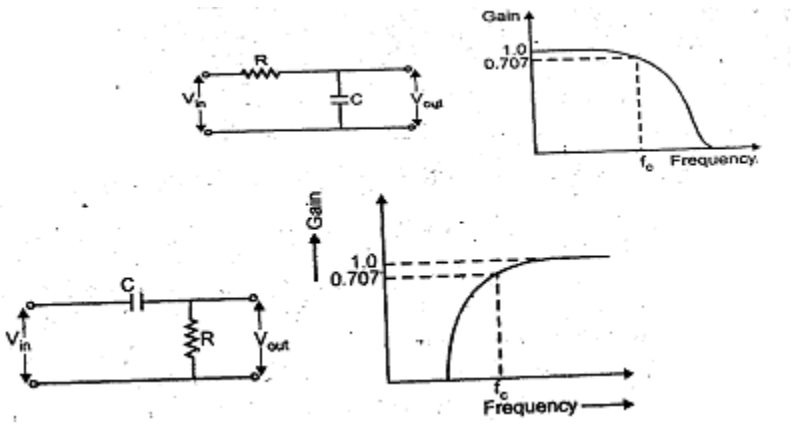
FILTER & LINEARIZATION IN SIGNAL CONDITIONING SYSTEM

A network designed to attenuate certain frequencies but pass others without attenuation is called a filter. In measurement system the transducers often does not measure the physical parameter precisely. The information present is not in standard form, h the need for further filtering and analysis. Filters can be designed to reject signals over specific desired frequency ranges like low 1 filters, high pass filters, notch filters etc.



The filter circuits can be implemented by using only resistors, capacitors and inductors called passive filters or using active devices such as transistors, op-amps called active filters. The passive low pass filter. (LPF), high pass filter (H PF) and their respective frequency response curves.

For LPF at low frequencies the capacitive reactance is very high and the capacitor circuit can be considered as an open circuit. Under this condition, the output equals the input or voltage gain is equal to unity. At very high frequencies, he capacitive reactance is very low and the output voltage v i small as compared to the input voltage V Hence as the frequency is increased the gain falls and drops off gradually. In high pass filter at low frequencies the capacitive reactance is high, the output is minimum and the gain is small. When frequency is high, the capacitive reactance is small; the output equals the input and. the gain approaches unity. Hence this circuit passes high frequencies while rejects low frequencies.

The cut-off frequency for LPF or, HPF is given by

$$\omega_c = \frac{1}{RC}$$

$$f_c = \frac{1}{2\pi RC}$$

Linearization

In many cases, the proportionality that exists between the input variable t& the transducer and its output signal, is non-linear. The readouts or recorders f systems ate generally designed to respond to signals which were assumed to be ‘linear, so the actual nonlinearities cause errors in the measured data.

To reduce these errors, the out of the transducer can be linearized, before it is passed into instruments and recorders. This can be done either with analog circuitry or by a computer. In analog linearization, the signal is passed through a circ that has a response which is the inverse of the transducer. Example, if the transducer has an exponential response, its output signal might be passed through an amplifier circuit that h logarithmic response, producing an output that is the linear of the measured variable. Alternatively, the signal could be dig after which a digital computer could be used to generate logarithm of the input signal.

Source: http://mediatoget.blogspot.in/2012/03/filter-linearization-in-signal.html