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**17/ENG04/001**

**ELECTRICAL ELCTRONICS ENGINEERING**

**ENG 342**

1. **Benefits of filters in Engineering Systems**

A filter is a circuit capable of passing (or amplifying) certain frequencies while attenuating other frequencies. Thus, a filter can extract important frequencies from signals that also contain undesirable or irrelevant frequencies. The four primary types of filters are the Low-pass filter, the high-pass filter, the band-pass and the notch filter. There are many practical applications for filters. Examples include:

* **Radio Communications:** Filters enable radio receivers to only "see" the desired signal while rejecting all other signals (assuming the other signals have different frequency content).
* **DC power supplies:** Filters are used to eliminate undesired high frequencies (i.e., noise) that are present on AC input lines. Additionally, filters are used on a power supply's output to reduce ripple.
* **Audio electronics:** A crossover network is a network of filters used to channel low-frequency audio to woofers, mid-range frequencies to midrange speakers, and high-frequency sounds to tweeters.
* **Analog-to-digital conversion:** Filters are placed in front of an ADC input to minimize aliasing.
* High-pass and low-pass filters are also used in digital image processing to perform image modifications, enhancements, **noise reduction,** etc.
* Used in Audio Applications for Equalization purposes.
* Used in Receivers such as Superheterodyne etc for efficient reception of the baseband signals.
1. **Designing a Low-Pass Filter with 0.005Ω resistor and 0.01F capacitor**

**A 70V Amplitude was selected with a frequency of 10Hz for the Ac Voltage source.**

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1. **Determining the Cut-off frequency**

Theoretically, the cut-off frequency can be determined by F= ½\*(pi\*R\*C)

Where R= 0.005Ω and C= 0.01F

F= 0.5\*pi\*0.005\*0.01=3189.099 Hz

1. **Design Ouput**

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The curve is shown above with the peak value 70 which is the input voltage.

1. **If two signals of 5 KΩ and 2 KΩ are pass through the filter at different intervals. Discuss your observation**

**When the signal of 5 KΩ is passed through the filter, the following result is obtained:**

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**Observations:** It is noticed that when the signal of 5K ohms is passed through the filter, the signal is attenuated to 0.02228 since the input frequency was too high.

**When the signal of 2K ohms is passed through the filter the following results are obtained:**

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**Observations:** It is seen that when the signal of 2K ohms is passed through the filter, the signal is attenuated to 0.0557.