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17/ENG04/057
ELECTRICAL ELECTRONICS ENGINEERING
ENG 342 (SOFTWARE PROGRAMMING)

Solution:

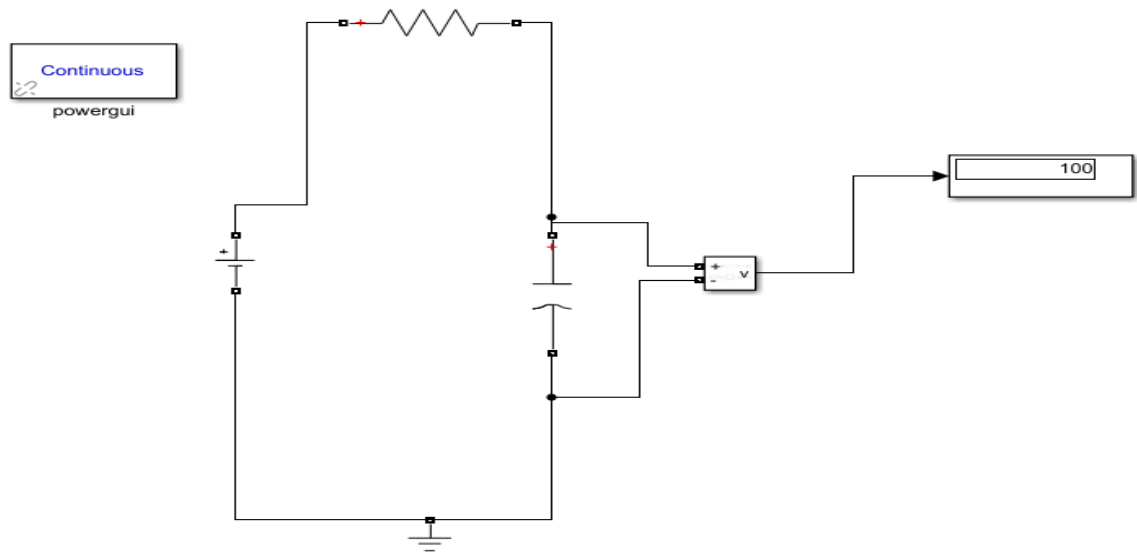
1) Discuss the benefits of filters in Engineering system:

Filters are essential building blocks of any Electronic and Communication Systems that alter the amplitude and/or phase characteristics of a signal with respect to frequency. Filter is basically linear circuit that helps to remove unwanted components such as Noise, Interference and Distortion from the input signal.

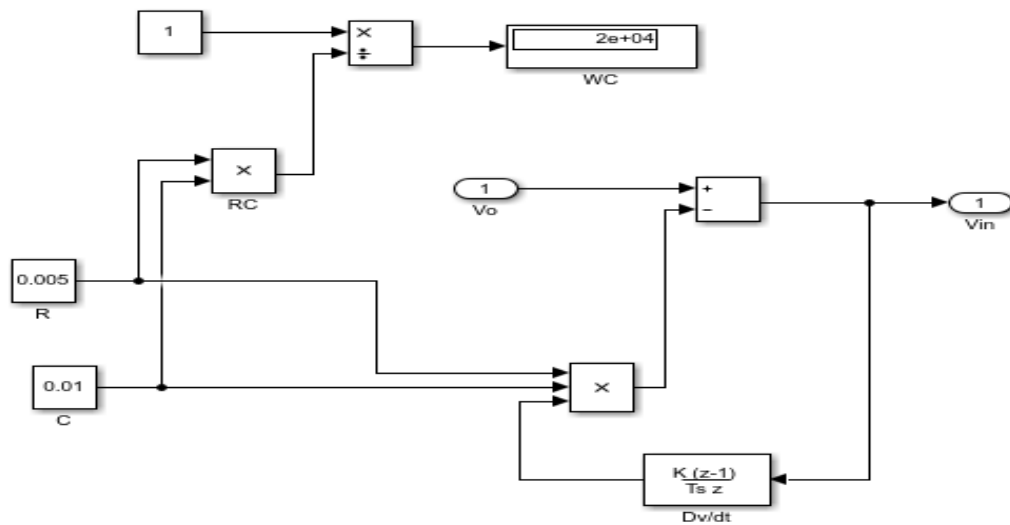
Filters are very common, especially in modern communication systems, for the receiver to need to operate over a wide frequency range. To make things worse, oftentimes the interference comes from co-located transmitters at the same location. Due to the minimal antenna isolation, especially on smaller command/control vehicles, filtering is needed to protect the receiver front end. There are various benefits of filters in engineering system:

- a) Filters are used in communication systems for suppressing noise, to isolate a communication of signal from various channels to improve the unique message signal from a modulated signal.
- b) Filters are used in instrumentation systems by the designers to choose a required frequency apparatus and detach unwanted ones.
- c) Filters can be used to limit the analog signal's bandwidth before altering them to digital signals.
- d) Filters are used in audio systems by engineers to send various frequencies to various speakers. For example, in the music industry, record & playback applications are needed to control the frequency components.
- e) Filters are used in biomedical instruments to interface psychological Sensors with diagnostic equipment's & data logging.
- f) Filter Circuits are used to eliminate background Noise
- g) They are used in Radio tuning to a specific frequency
- h) Used in Pre-amplification, Equalization, Tone Control in Audio Systems
- i) They are also used in Signal Processing Circuits and Data Conversion
- j) Filter Circuits are extensively used in Medical Electronic Systems
- k) They are economical or cost-effective

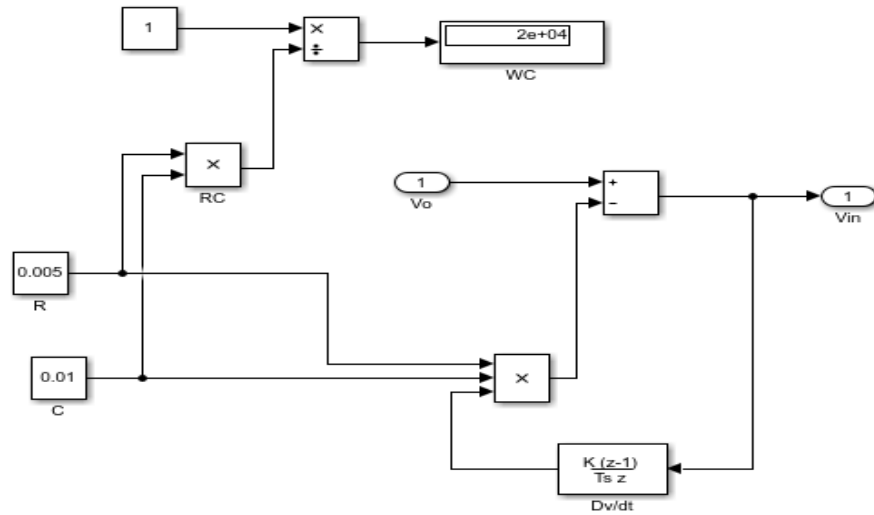
2) Design a low pass filter of 0.005Ω and $0.01F$ using **building blocks only**; you are free to determine your amplitude value.



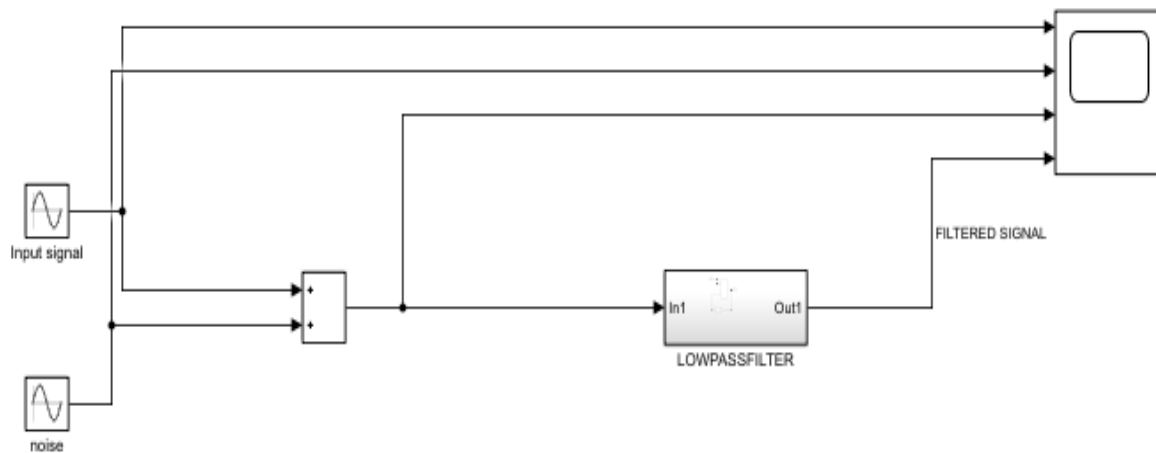
3) Determine the cut-off frequency



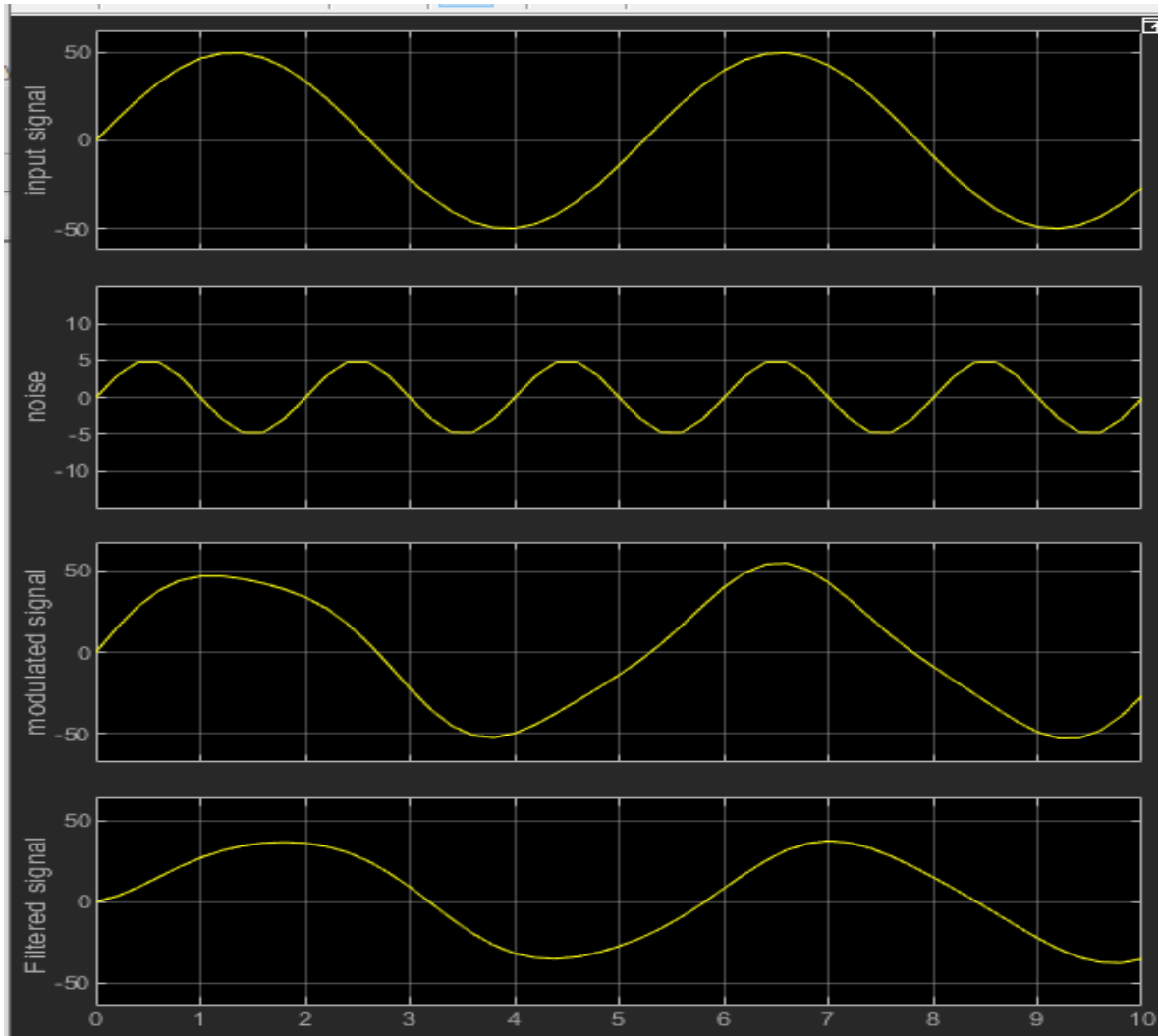
c) Simulate the design and show the output using a display unit



a) If two signals of $5\text{ K}\Omega$ and $2\text{ K}\Omega$ are pass through the filter at different intervals. Discuss your observation(s).



RESULT:



Discuss observations:

- 1) From the graph displayed the filtered signal was slightly the same as that of the 2khz signal although they were still noise present.
- 2) The modulated signal was a combination of both the 2khz and 5khz with noise present .
- 3) By using the low pass filter part of the noise from the modulated signal was cut off .