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MATRIC NO: 17/ENG01/001

DEPARTMENT: MECHANICAL ENGINEERING

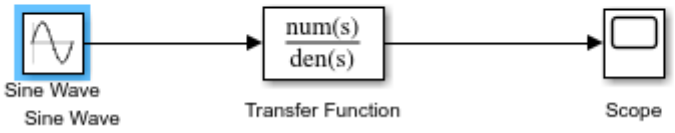
ENG 342 (SOFTWARE DEVELOPMENT AND APPLICATIONS)

A.BENEFITS OF FILTERS IN ENGINEERING SYSTEMS

- **Radio Communications:** filters are used to select or pass desired signals and reject or block undesired signals. (assuming the other signals have different frequency content).
- **DC power supplies:** The purpose of power supply filters is to smooth out the ripple contained in the pulses of DC obtained from the rectifier circuit while increasing the average output voltage or current.
- **Audio electronics:** The audio filters are the electronic circuits which are designed to amplify or attenuate certain range of frequency components. This helps in eliminating the unwanted noise from the audio signal and improving the tone of the output audio.
- Used in Audio Applications for Equalization purposes.
- Used in Receivers such as Superheterodyne etc for efficient reception of the baseband signals.

B. Designing a Low-Pass Filter with 0.005Ω resistor and 0.01F capacitor

A 100V Amplitude was selected with a frequency of 1Hz for the Sine Wave Source.



C. Determining the Cut-off frequency

The cut-off frequency is calculated by F= ½*(pi*R*C)

When R= 0.005Ω and C= 0.01F

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

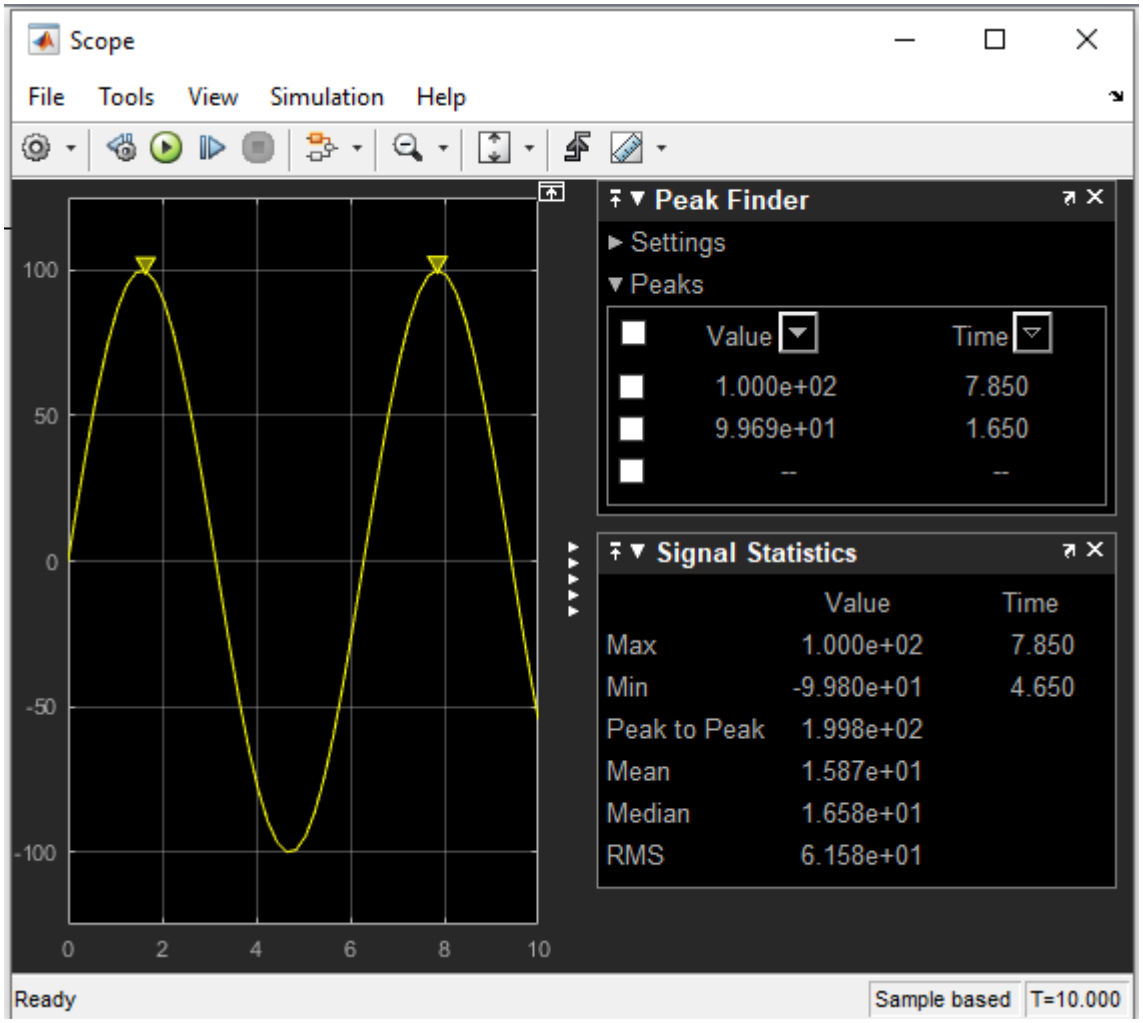
D. Design Output

The transfer function equation for the circuit is given as

(1/RC)/(S + 1/RC)

When R= 0.005Ω and C= 0.01F

Transfer Fcn=(1/0.005*0.01)/(S + (0.005*0.01))= (20000)/(s+ 20000)



A. **<u>If two signals of 5 KΩ and 2 KΩ are pass through the filter at different intervals. Discuss your observation</u>**

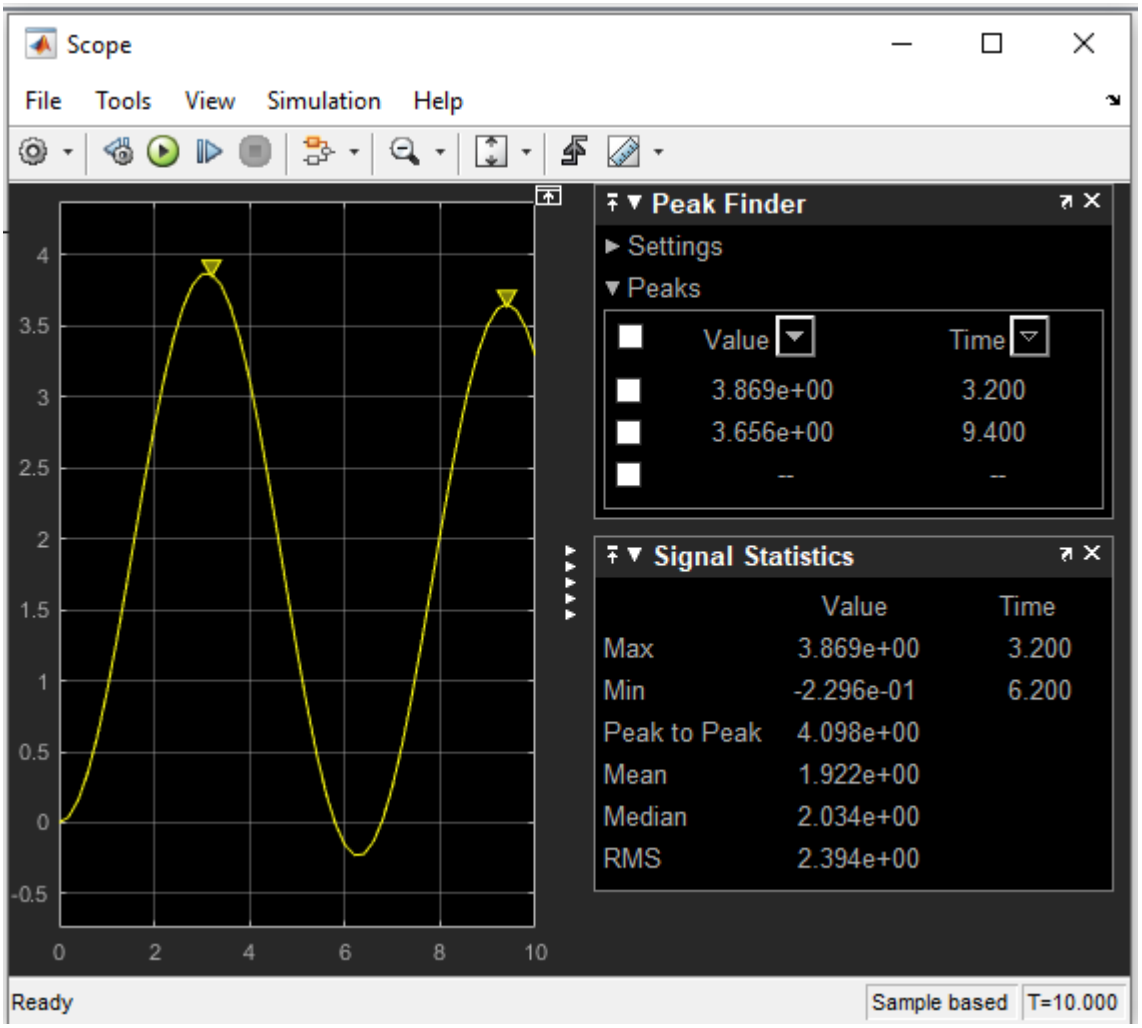
When the signal of 5 KΩ is passed through the filter, the following result is obtained:

The transfer function equation for the circuit is given as

(1/RC)/(S + 1/RC)

When R= 5000Ω and C= 0.01F

Transfer Fcn=(1/5000*0.01)/(S + (5000*0.01))= (0.02)/(s+ 0.02)



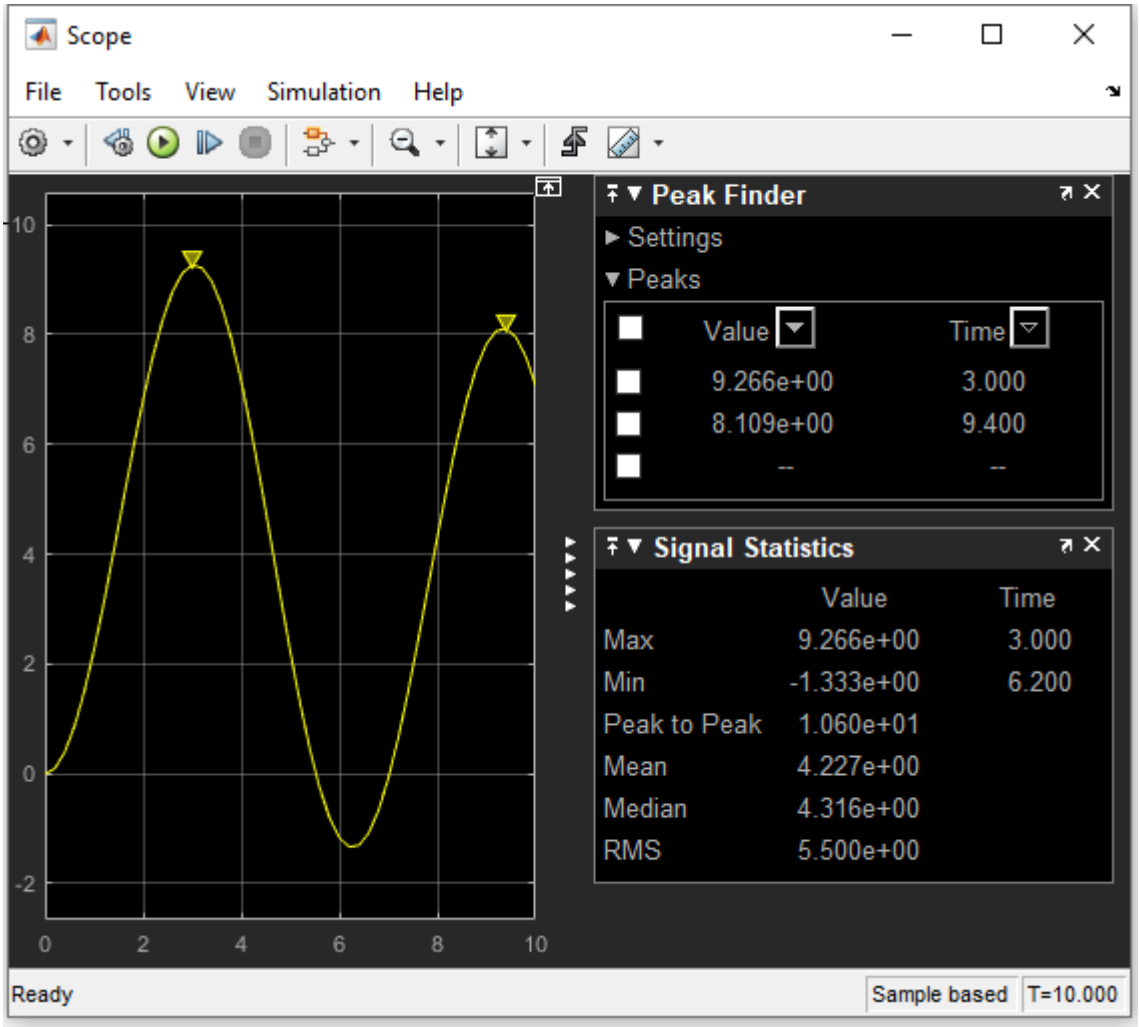
Observations: The signal is attenuated to 3.869 ohms

When the signal of 2K ohms is passed through the filter the following results are obtained: The transfer function equation for the circuit is given as

(1/RC)/(S + 1/RC)

When R= 2000Ω and C= 0.01F

Transfer Fcn=(1/2000*0.01)/(S + (2000*0.01))= (0.05)/(s+ 0.05)



Observations: The signal is attenuated to 9.266 ohms