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300 LEVEL

17/ENG06/069

ENG 342

1. Filters in engineering systems are used to eliminate background noise.
2. They are used in radio tuning to a specific frequency:

An example of filter used is the radio frequency filter. They are used so that only the right kind of frequencies can be entertained while filtering out other unwanted bands of frequencies. It is most frequently used in equipment such as radio, wireless communications, and televisions etc.

3. They are used in pre-amplification, equalization, tone control in audio systems:

This is the adjusting of the balance between frequency components within an electronic signal.

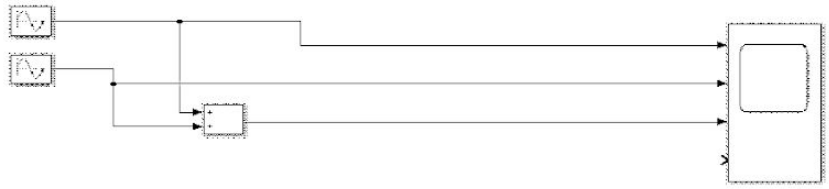
4. They are extensively used in medical electronic systems:

Medical devices are increasingly using sensitive analogue electronics, wireless technologies and microprocessors. When medical devices receive strong electromagnetic waves, unwanted electric currents can be induced in the circuits and cause unintended operations and most circuits often operate at lower voltages and are easily affected by noise and this is where electromagnetic interference filters are introduced

5. They are used in signal processing circuits and data conversion:

Filters are used to separate signals that have been combined and also restoration of signals that have been distorted in some way and it helps to analyze data better.

b)



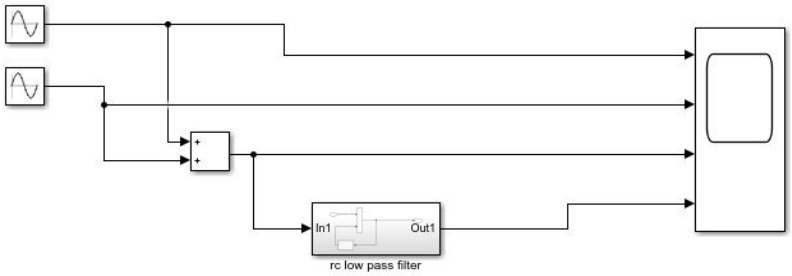


Figure 1: low pass filter design

c) Cut off frequency

Fc = ½ pi* R*C

R=0.005ohms

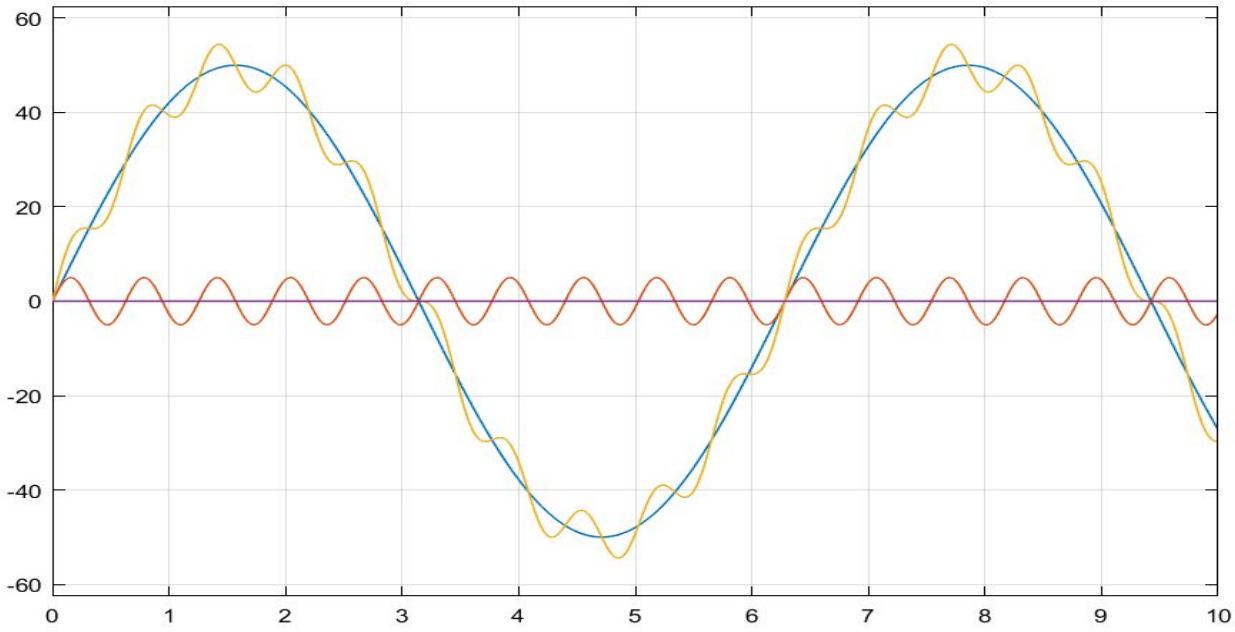
C=0.01F

Fc = `1/2*pi*0.005*0.01

Fc = 3183.098Hz

D) amplitude-50

Step size – 0.00005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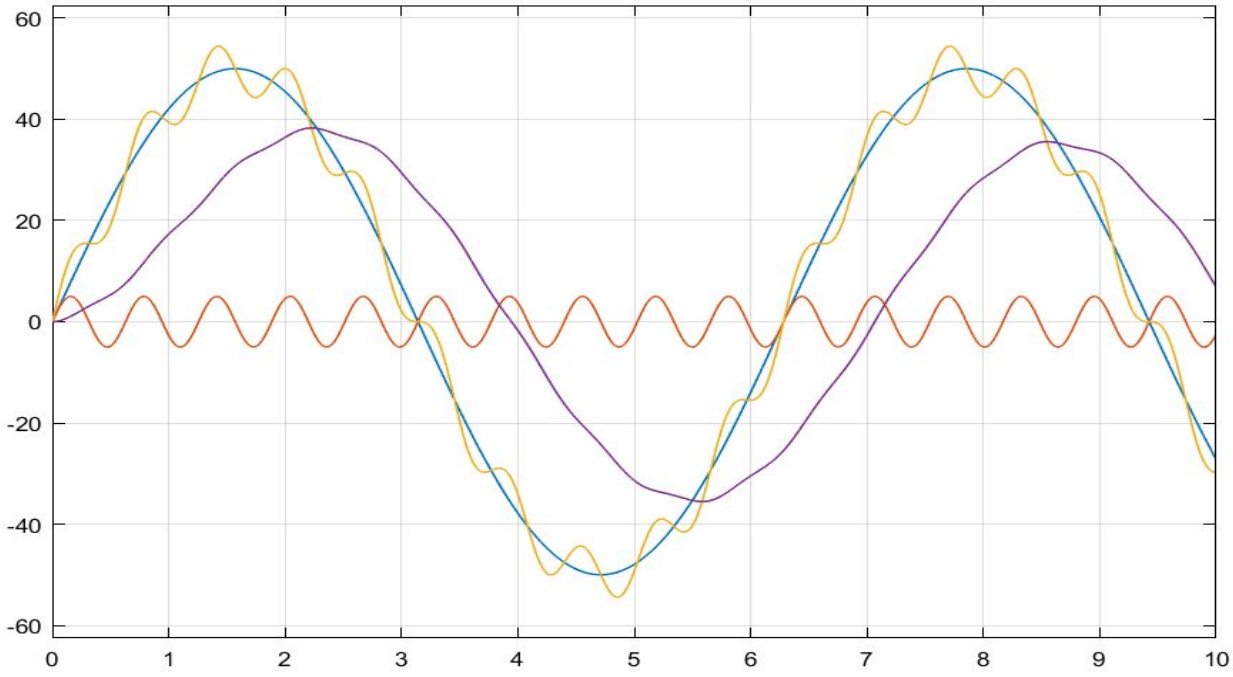
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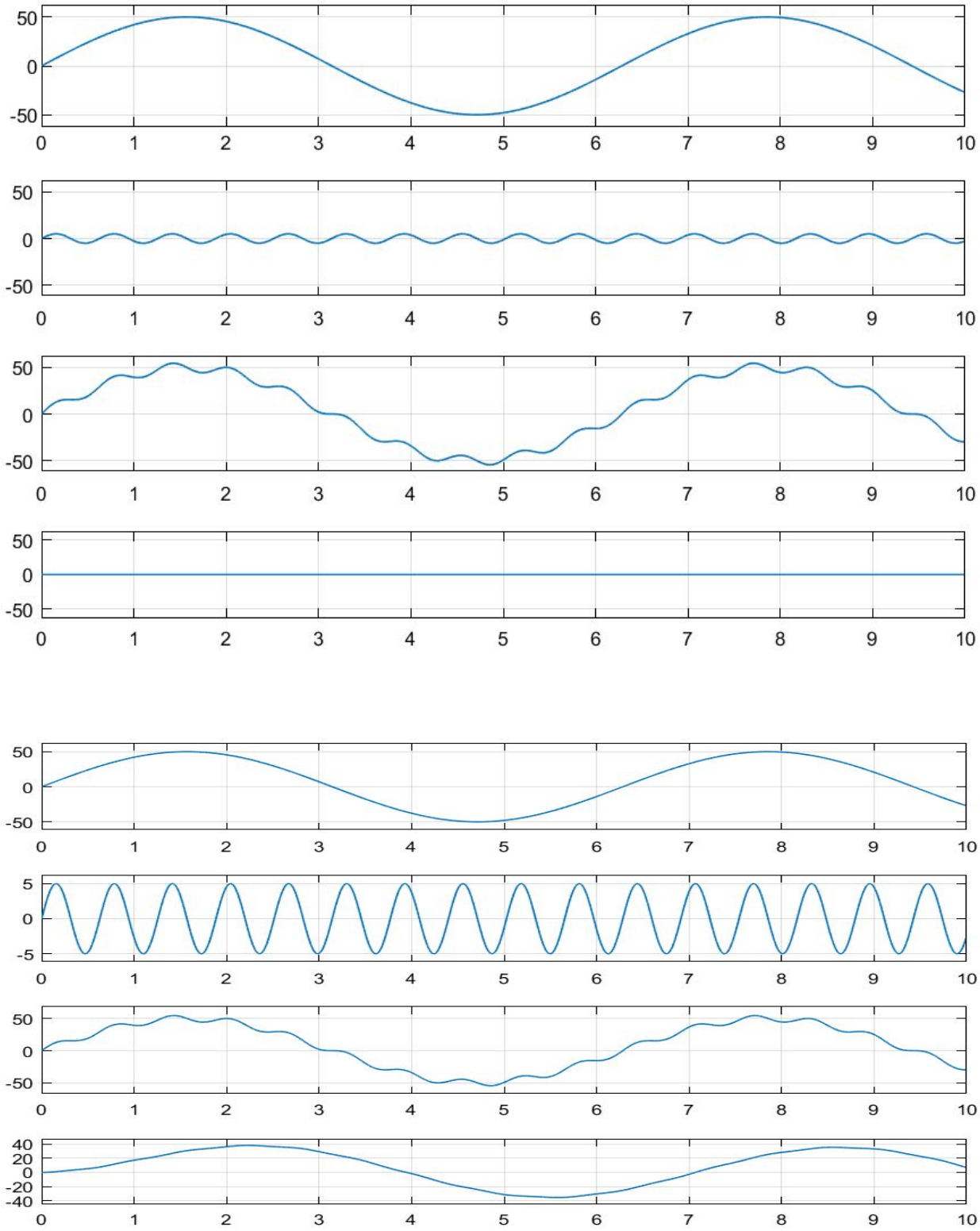

Figure 2: output

E. <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