

# ADIC

## Assignment - 2

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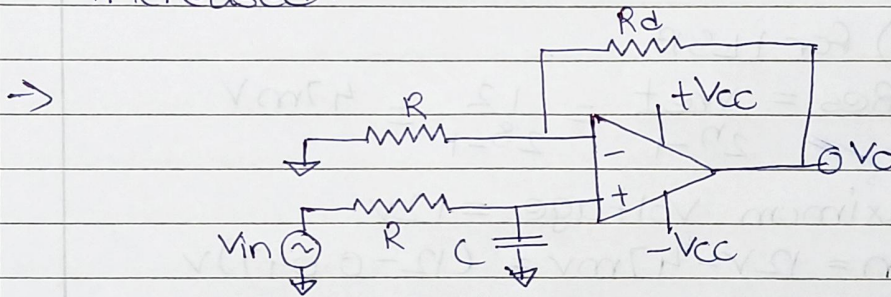
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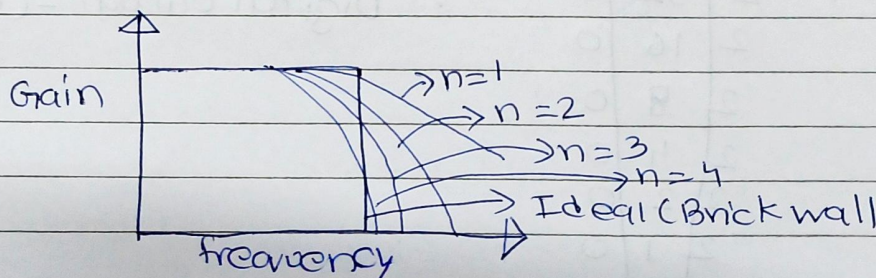
Sy B.Tech Electrical & Computer

### Set 1.3

Q 1) Draw schematic diagram of first order low pass Butterworth filter. what happens to frequency response of filter if its order is increased?



As order of the filter is increased, the frequency response graph's slope gets steeper. The frequency response goes on becoming closer to the ideal response (brick wall response). This happens as the order increases the roll of rate also increases





2) An 8-bit A/D converter accepts an input voltage signal of range 0 to 12V.

a) what is minimum value of input voltage required to generate change of 1LSB?

b) what input voltage will generate if all is at A/D converter output?

c) what is digital output for input voltage of 6V?

→ Given: 8 bit ADC

Input voltage signal from 0 to 12V

Soln: a) for 1LSB

$$Res = \frac{V_{ref}}{2^n - 1} = \frac{12}{2^8 - 1} = 47mV$$

b) maximum voltage = 12V

$$V_{in} = 12V - 47mV = (12 - 0.047)V \\ = 11.953V$$

c) For 6V:

$$\frac{6}{Res} = \frac{6}{47mV} = (127.65)_{10} = (128)_{10}$$

$$\begin{array}{r|l} 2 & 128 \\ \hline 2 & 64 \\ 2 & 32 \\ 2 & 16 \\ 2 & 8 \\ 2 & 4 \\ 2 & 2 \\ 2 & 1 \\ \hline & 0 \end{array}$$

$$\therefore (128)_{10} = (100000000)_2$$

$$\therefore \text{Digital output} = (10000000)_2$$