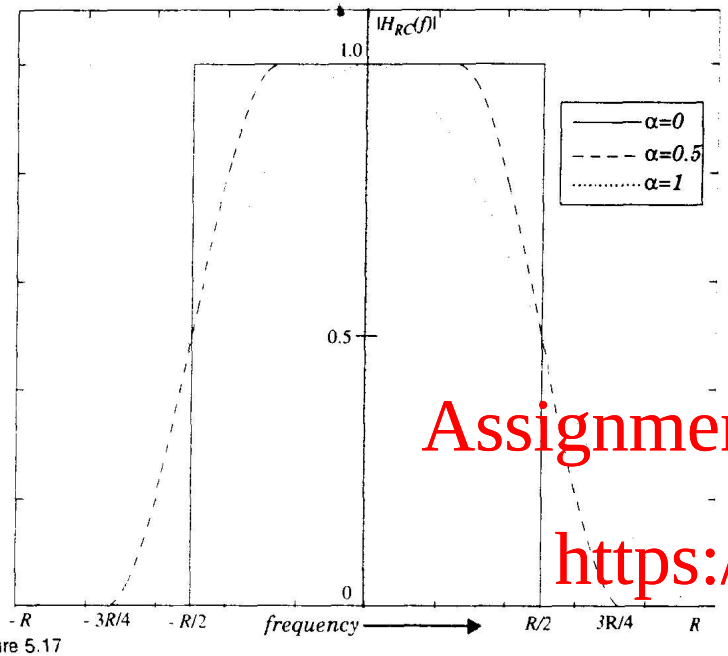

Figure 5.17
Magnitude transfer function of a raised cosine filter.

The symbol rate R_s that can be passed through a baseband raised cosine rolloff filter is given by

$$R_s = \frac{1}{T_s} = \frac{2B}{1+\alpha} \tag{5.50}$$

where B is the absolute filter bandwidth. For RF systems, the RF passband bandwidth doubles and

$$R_s = \frac{B}{1+\alpha} \tag{5.51}$$

The cosine rolloff transfer function can be achieved by using identical $\sqrt{H_{RC}(f)}$ filters at the transmitter and receiver, while providing a matched filter for optimum performance in a flat fading channel. To implement the filter responses, pulse shaping filters can be used either on the baseband data or at the output of the transmitter. As a rule, pulse shaping filters are implemented in DSP in baseband. Because $h_{RC}(t)$ is noncausal, it must be truncated, and pulse shaping filters are typically implemented for $\pm 6T_s$ about the $t = 0$ point for each symbol. For this reason, digital communication systems which use pulse shaping often store several symbols at a time inside the modulator, and then