

Problem 10.6 Compare the transmission bandwidth required for binary PAM and BPSK modulation, if both signals have a data rate of 9600 bps and use root-raised cosine pulse spectrum with a roll-off factor of 0.5.

Solution

For BPSK modulation (bandpass signal), the transmission bandwidth is $B_T = 2 \times \frac{1 + \beta}{2T}$, where β is the roll-off factor (0.5) and T is the symbol duration (1/9600 sec). Therefore, $B_T = (1 + 0.5) \times 9600 = 14.4$ kHz.

For binary PAM modulation (baseband signal), $B_T = \frac{1 + \beta}{2T} = 7.2$ kHz.