

Problem 7.14

(a) The transmission bandwidth of the QPSK signal is

$$B_T = \frac{2}{T} = \frac{2}{2T_b} = \frac{1}{T_b}$$

where T is the symbol (dibit) duration and T_b is the bit duration. With $T_b = 1\mu\text{s}$, it follows therefore that

$$\begin{aligned} B_T &= \frac{1}{10^{-6}} \text{ Hz} \\ &= 1 \text{ MHz} \end{aligned}$$

(b)

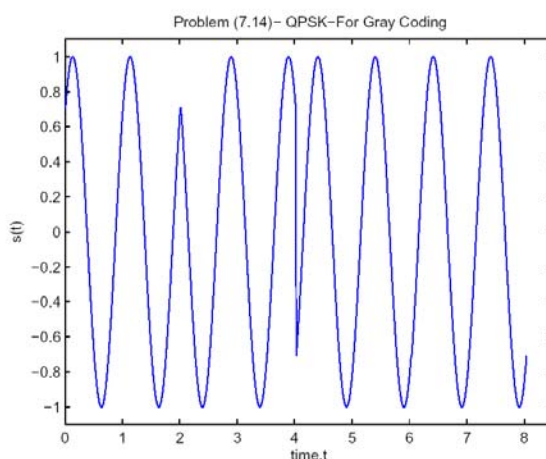


Figure 1

Notes:

- (i) Time t in Fig. 1 is measured in microseconds.
- (ii) For clarity of presentation, we have plotted the QPSK waveform using a carrier of 1 MHz instead of 6 MHz.
- (iii) Synchronism between the timing waveform representing the incoming binary data stream and the clock responsible for generating the carrier is assumed.