Problem 7.23

(a) The transmission bandwidth of DSK signal is the same as that of the corresponding BPSK. Therefore, for a bit duration $T_b = 1\mu s$, the bandwidth is

$$B_T = \frac{2}{T_b} = 2 \times 10^{+6} \text{ Hz} = 2 \text{ MHz}$$

(b) In plotting the DPSK waveform shown in Fig. 1, we have followed three points:

(i) Time t is measured in microseconds.

(ii) For clarity of presentation, a carrier frequency $f_c = 1$ MHz has been used in place of $f_c = 6$ MHz.

(iii) Synchronism is assumed between the timing circuitry responsible for line encoding the incoming binary data stream and the clock responsible for generating the carrier.

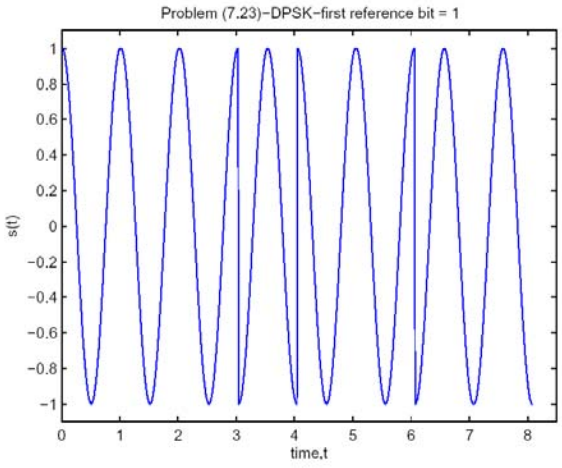

Figure 1

(c) Decoding in the receiver is first accomplished by multiplying the received signal by $\cos(2\pi f_c t)$ and then low-pass filtering. Next, the low-pass filter output is applied to a DPSK decoder. Thus, starting with a reference bit 1 and assuming perfect transmission (i.e., zero channel noise), the receiver output is the same as the original binary sequence, namely, 11100101.