Problem 7.26

(a) The given binary FSK signal is defined by

$$s_{\mathrm{FSK}}(t) = \begin{cases} \sqrt{\dfrac{2E_b}{T_b}}\cos(2\pi f_1 t + \theta_1) & \text{for symbol } 0 \\ \sqrt{\dfrac{2E_b}{T_b}}\cos(2\pi f_2 t + \theta_2) & \text{for symbol } 1 \end{cases} \tag{1}$$

Equation (1) may be expressed in the equivalent form

$$s_{\mathrm{FSK}}(t) = s_1(t) + s_2(t) \tag{2}$$

where

$$s_1(t) = \begin{cases} \sqrt{\dfrac{2E_b}{T_b}}\cos(2\pi f_1 t + \theta_1) & \text{for symbol } 0 \\ 0 & \text{for symbol } 1 \end{cases} \tag{3}$$

and

$$s_2(t) = \begin{cases} 0 & \text{for symbol } 0 \\ \sqrt{\dfrac{2E_b}{T_b}}\cos(2\pi f_2 t + \theta_2) & \text{for symbol } 1 \end{cases} \tag{4}$$

The digitally modulated signals $s_1(t)$ and $s_2(t)$ are recognized as two complementary BASK signals, operating in parallel. In light of Eqs. (1) through (4), we may construct the two-transmitter equivalence depicted in Fig. 1.

(a)

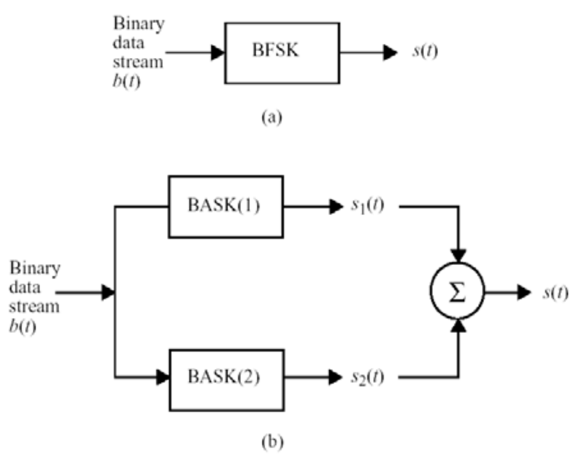

Figure 1

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Problem 7-26 continued

(b)