Indian Institute of Space Science and Technology
AV312 - Digital Communication
Department of Avionics

Assignment 3

Question 1: Do questions 2.42, 2.43, and 2.45 from the textbook ("Communication Systems" - Haykin) Please try to do these questions on your own without referring to any solution manual.

Question 2 (Proakis and Salehi): Let $p(t)$ be a periodic rectangular wave with period T_p defined as follows.

$$\begin{aligned} p(t) &= 1; t \in [-\frac{T_p}{2}, 0), \\ &= -1; t \in [0, \frac{T_p}{2}]. \end{aligned}$$

Suppose $m(t)$ is a baseband signal with two sided bandwidth of $2W$. Let $s(t) = p(t)m(t)$. Suppose $s(t)$ is passed through an ideal (i.e. rectangular magnitude response, linear phase response) bandpass filter with unit gain, center frequency being $\frac{1}{T_p}$ and bandwidth $2W$. Prove that the output of the bandpass filter is a DSB signal. Assume that W is small compared to $\frac{1}{T_p}$.