Experiment No. 3

Bit error rate of Binary Phase Shift Keying (BPSK) in Additive White Gaussian Noise (AWGN)

Write a MATLAB program (without using communication toolbox inbuilt functions like 'comm.BPSKModulator') to perform BPSK Modulation and demodulation technique in AWGN.

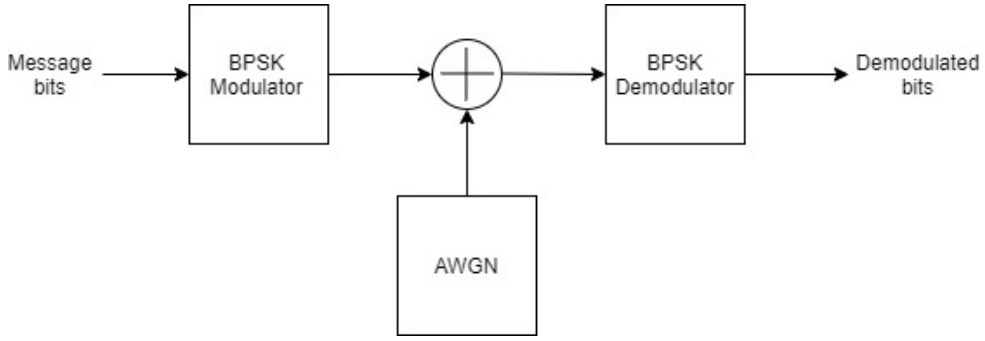

Figure 1: BPSK modulation block diagram

Generate random bits sequence and perform BPSK modulation. Add additive white gaussian noise (AWGN) with SNR varying in the range of -10 to +10 dB in steps of 1 dB. Demodulate the received signal using ML rule. Compare the demodulated bits and the message bits to obtain the error bits. Find out the error probability and plot Bit Error Rate (BER) vs. Signal to Noise Ratio (SNR) curves for simulated values. Compare this with the theoretical values obtained using the equation based on Q-function.

Reference: *Introduction to communication systems* by Upamanyu Madhow.
1. An example code for 8PSK can be found in page no.: 321, code fragment: 6.3.1
2. The theoretical probability of error using Q function can be found in page no.: 317,318.