CT303 Digital Communication Autumn, 2018

Lab. 3 Binary Random Sequence Random Process

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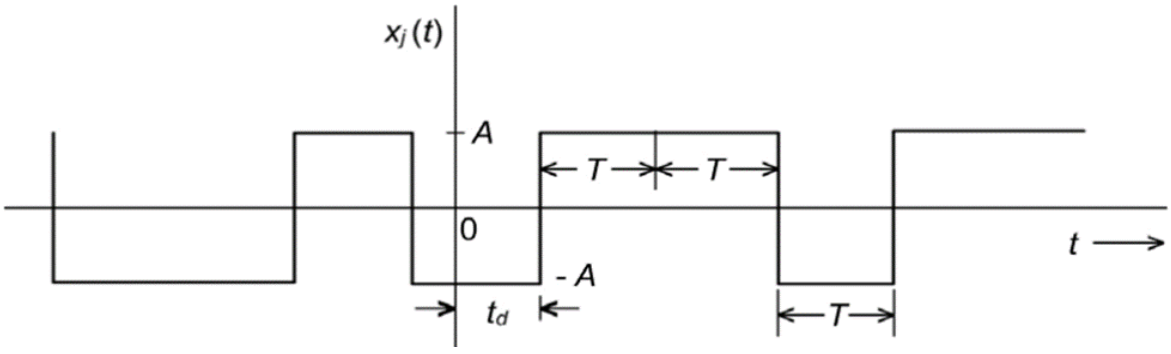
1. Figure shows the sample function $x_j(t)$ of a process $X(t)$ consisting of a random sequence of binary symbols 1 and 0. It is assumed that:
    - The symbols 1 and 0 are represented by pulses of amplitude + A and − A volts, respectively and duration T seconds.
    - Since it is a random process, we have a large number of sample functions. The pulses are not synchronized, so that the starting time of the first pulse, t_d is equally likely to lie anywhere between zero and T seconds. That is, t_d is the sample value of a uniformly distributed random variable Td with its probability density function defined by

$$f_{T_d}(t_d) = \begin{cases} \frac{1}{T}, & 0 \le t_d \le T \\ 0, & elsewhere \end{cases}$$

    - During any time interval $(n-1)T \le t - t_d \le nT$, where n is an integer. The presence pulses corresponding to 1 or 0 are equiprobable and the presence of a 1 or 0 in anyone interval is independent of all other intervals. A large number of sample functions can be generated by generating every random sequence (which correspond to rows) in which random delay is included.



Check whether the given process is WSS? Compute autocorrelation and power spectral density for the given process. Follow the same procedure as done in earlier lab to check for WSS.

Note: Generate the random process for T=10s and T=5s. Observe the effects of T on the plots of autocorrelation and power spectral density.

Expected Output: