Communication Theory

Spring 2024

Exam: Quiz 2
Total Marks: 25

Date: 01 April 2024
Time: 11:45 am to 12:30 pm

Instructions:

- All questions are compulsory.
- Clearly state the assumptions (*if any*) made that are not specified in the question.

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1. For binary detection of pulse $\pm p(t)$ under AWGN noise, show that optimal receiver filter is [5]

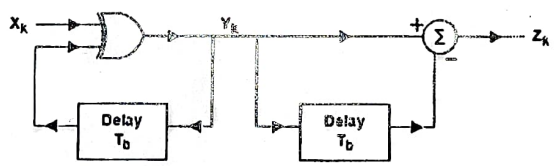
$$h(t) = p(T_o - t).$$

2. Explain M-ary FSK scheme and determine its minimum transmission bandwidth? [6]

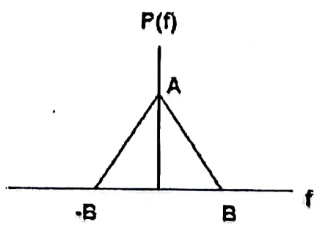
3. Determine the PSD of the following line coding scheme [6]

$$m(t) = \sum_k z_k p(t - kT_b),$$

where $p(t)$ is a rectangular pulse of duration T_b and sequence z_k is generated using following logic circuit.



4. The Fourier transform of $p(t)$ is shown in the following figure. Consider the pulse $p(t)$ is employed for binary communication system and answer the following questions. [8]



1. Determine the pulse rate that satisfies the Nyquist's zero ISI criterion using $P(f)$.
2. Find $p(t)$ and verify whether it satisfy the Nyquist's criterion.
3. If $p(t)$ satisfy the Nyquist's criterion, then determine the transmission rate R_b and the roll-off factor α.

ALL THE BEST!