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NPTEL

Unit 8 - Week 7

Assignment 7

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2018-09-19, 23:59 IST.

1) Three equiprobable symbols generated by a memoryless source at the rate $R = 500$ symbols per second are respectively transmitted using a 3-level baseband PAM system over an AWGN channel with zero-mean noise and noise power spectral density $\frac{N}{2}$. The amplitude levels of the transmitted pulse $p(t) = \text{sinc}(tR)$ are $0, \pm 2$. For an optimum receiver it can be shown that the probability of symbol error $P_e = \alpha Q\left(\sqrt{\beta \frac{E_{av}}{N}}\right)$ where α and β are constant and E_{av} denotes the average pulse energy. The value of α and β *1 point*

- $\alpha = 1, \beta = 0.5$
- $\alpha = 1.33, \beta = 0.66$
- $\alpha = 1.33, \beta = 0.33$
- $\alpha = 1, \beta = 2$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\alpha = 1.33, \beta = 0.33$

2) Let $\{\alpha_k\}_{k=-\infty}^{\infty}$ be a sequence of independent and identically distributed (iid) random variables, each taking values +1 and -1 with equal probability. This sequence is transmitted at baseband by a Manchester line coding scheme described by $x(t) = \sum_{k=-\infty}^{\infty} \alpha_k p(t - kT)$ where $p(t) = \begin{cases} 1 & if \ \ 0 \leq t < \frac{T}{2} \\ -1 & if \ \ \frac{T}{2} \leq t < T \end{cases}$ *1 point*

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$S_x(f) = T\,\mathrm{sinc}^2\left(\frac{T}{4}f\right)\sin^2\left(2\pi f\frac{T}{2}\right)$

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No, the answer is incorrect.
Score: 0

Accepted Answers:
$S_x(f) = T\,\mathrm{sinc}^2\left(\frac{T}{2}f\right)\sin^2\left(2\pi f\frac{T}{4}\right)$

3) The output of a binary memoryless source is transmitted over an AWGN channel using a binary baseband PAM system which deploys rectangular pulses of duration T and amplitude $\pm A$. Assuming transmission of equiprobable binary symbols at a rate $R = \frac{1}{T} = 10^5$ bits per second, noise power spectral density $\frac{N}{2} = 0.5 \times 10^{-2}$ W/Hz, and probability of bit error $P_b = 10^{-6}$,the minimum value of A is

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 104,108

1 point

4) In Question-1 it is desired that P_e be less than 10^{-4}.Assuming the symbol rate of 5000 symbols per second the average signal power P_{av} in terms of noise power spectral density is $P_{av} = \gamma N$ where γ is

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 21600,21700

1 point

5) In Question-2, we use precoded sequence $\{\beta_k\}_{k=-\infty}^{\infty}$ for baseband transmission by the same Manchester line coding scheme where $\beta_k = \alpha_k + \mu\alpha_{k-1}$ with μ as a constant. It is desirable to have a null in the power spectrum $f = \frac{1}{T}$. If possible, the value of μ is ...
Otherwise, indicate your answer as 0.

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Numeric) -1

1 point

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