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Courses » Principles of Digital Communications

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Unit 8 - Week 7

Course outline

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Lecture 34 :
M-ary
PCM/PAM – I

Lecture 35 :
M-ary
PCM/PAM – II

Lecture 36 :
Line Coding – I

Lecture 37 :
Line Coding – II

Lecture 38 :
Line Coding – III

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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

1 point

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



$\alpha = 1, \beta = 0.5$



$\alpha = 1.33, \beta = 0.66$



$\alpha = 1.33, \beta = 0.33$



$\alpha = 1, \beta = 2$

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

1 point

by $x(t) = \sum_{k=-\infty}^{\infty} \alpha_k p(t - kT)$ where $p(t) = \begin{cases} 1 & \text{if } 0 \leq t < \frac{T}{2} \\ -1 & \text{if } \frac{T}{2} \leq t < T \end{cases}$

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



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No, the answer is incorrect.**Score: 0****Accepted Answers:**

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

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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