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Courses » Principles of Digital Communications

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Unit 12 - Week 11

Course outline

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Week 11

- Lecture 55 : M-ary PSK
- Lecture 56 : M-ary Quadrature Amplitude Modulation (M-QAM)
- Lecture 57 : M-ary FSK

Assignment 11

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

Due on 2018-10-17, 23:59 IST.

1) M equiprobable symbols are transmitted via an M-ary digital communication system with $M = 2^n$ where n is the dimension of the signal space. The corresponding signal constellation has M signal vectors which lie at the vertices of a hypercube that is centered at the origin. The channel is AWGN with noise power spectral density $\frac{N_0}{2}$. The probability of symbol error P_e in terms of symbol energy-to-noise power spectral density ratio, i.e. $\frac{E_s}{N_0}$ where E_s is energy per symbol is ***1 point***

- $P_e = 1 - \left[1 - Q\left(\sqrt{\frac{E_s}{N_0}}\right)\right]^n$
- $P_e = 1 - \left[1 - Q\left(\sqrt{\frac{E_s}{nN_0}}\right)\right]^n$
- $P_e = 1 - \left[1 - Q\left(\sqrt{\frac{2E_s}{N_0}}\right)\right]^n$
- $P_e = 1 - \left[1 - Q\left(\sqrt{\frac{2E_s}{nN_0}}\right)\right]^n$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$P_e = 1 - \left[1 - Q\left(\sqrt{\frac{2E_s}{nN_0}}\right)\right]^n$

2) A 4-PSK and an 8-PSK signal constellations are shown in the figure below. The distance between two adjacent points in the two signal constellations is d. Assuming high signal-to-noise ratio so that the probability of symbol error is approximated by errors in selecting adjacent signal points, the additional transmitted energy in dB required

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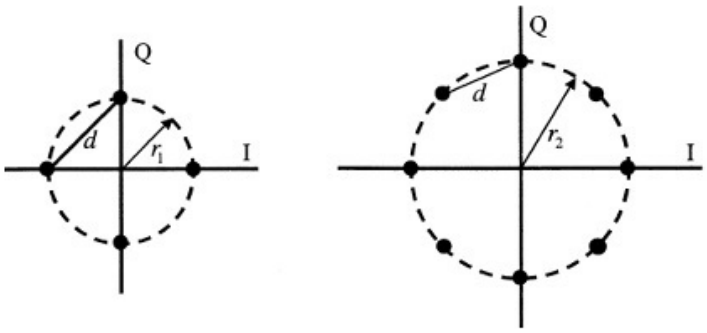
Quiz : Assignment 11
Assignment 11 - Solution
Week 12



No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 5.2,5.5

1 point

3) A digital communication system transmits information via QAM over a voice-band telephone channel at a rate of 2400 symbols/s. Consider an AWGN channel with zero mean noise and noise power spectral density $\frac{N}{2}$. Assume deployment of a square QAM. The bit energy-to-noise power spectral density ratio, i.e., $\frac{E_b}{N}$ required to achieve symbol error probability of 10^{-5} at 4800 bps is _____

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 9.2,10.2

1 point

4) 2^n symbols are transmitted using an M-ary PSK system over a bandpass AWGN channel with transmission bandwidth of 100 kHz and noise power spectral density $\frac{N}{2} = 10^{-14} W/Hz$. It is desired to transmit at a minimum bit rate $R_b = 750$ kbps with the average probability of bit error $P_b \leq 10^{-6}$. Given that there is no intersymbol interference on the channel, the minimum value of M is _____

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Numeric) 256

1 point

5) Equiprobable binary symbols at a rate of 10 Mbps are transmitted over AWGN channel with noise power spectral density $\frac{N}{2} = 10^{-14} W/Hz$ using BFSK modulation format. The amplitude of the received signal in absence of noise is 2 milliVolt. For a noncoherent BFSK receiver the probability of bit error is $\alpha 10^{-3}$ where α is

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 3.1,3.5

1 point

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