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B. TECH.

THEORY EXAMINATION (SEM–VI) 2016-17

DIGITAL COMMUNICATION

Time : 3 Hours *Max. Marks : 100*

Note : *Be precise in your answer. In case of numerical problem assume data wherever not provided.*

SECTION – A

1. Attempt all parts of the following questions: 10 x 2 = 20

(a) In an experiment a trial consists of four successive with draw of playing cards from a pack of 52 cards. If we define RV X as number of king appearing in a trial. Find Fx(x)

(b) Calculate the autocorrelation for White noise.

(c) What is the condition to justify the orthogonality of two signals?

(d) What is essential bandwidth for polar NRZ line codes?

(e) Explain the difference between slow hopping and fast hopping.

(f) Compare the spectrum occupancy of PSK and FSK schemes.

(g) Explain the Bay's rule of probability.

(h) Explain the advantages of Manchester coding.

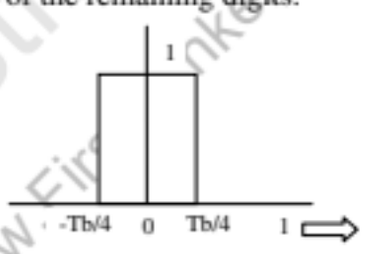
(i) Draw the Manchester representation for the sequence 1010101001111

(j) Discuss BPSK modulator.

SECTION – B

2. Attempt any five parts of the following questions: 5 x 10 = 50

(a) Find the PSD Sy(f) for a polar random signal use a basic pulse as shown in fig. below. The digits are 1 and 0 equally likely and digits are transmitted every Tb seconds. Each digit is in dependent of the remaining digits.



(b) Explain the working of frequency hopping spread spectrum system. Discuss its applications in detail. A slow FH/MFSK system has following parameters:

(i) The number of bits per MFSK symbol = 4

(ii) The number of MFSK symbols per hop = 5

(iii) Calculate the processing gain of the system in decibels.

(c) What is the probability of error in presence of white noise for BPSK system? We are required to transmit 2.08×10^6 binary digits per second with $P_b \leq 10^{-7}$. The channel noise PSD is $S_n(f) = 10^{-8}$. Determine the transmission bandwidth and signal power required in binary.

(d) A binary communication channel, the receiver detects the pulse with an error probability Pe. What is the probability that out of 100 received digits, no more than four digits are in error.

(e) A source emits one of the four messages randomly every microsecond. The probabilities of these messages are 0.4, 0.3, 0.2 and 0.2. Messages are generated independently.

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(i) What is the source entropy?

(ii) Obtain a compact binary code determine the average length, efficiency and redundancy of codeword.

(f) Explain the convolution codes, their advantage and disadvantage.

(g) Explain the Chebyshev's Inequality.

(h) What is a PN sequence? Draw the PN sequence generator and define its autocorrelation function. A PN Sequence is generated using linear feedback shift register with number of stages equal to 10. The chip rate is 10^7 per second. Find the following:

(i) PN sequence length (ii) chip Duration (iii) period of PN sequence

SECTION – C

Attempt any two parts of the following questions: **2 x 15 = 30**

3. Explain the principle of OFDM.

4. (i) Write a short note on Matched Filter.

(ii) Find the probability of error for a matched filter? Explain how a matched filter works as correlator receiver.

5. **Write short notes on :**

(i) Central limit theorem (ii) Error Correcting codes

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