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**B TECH**  
**(SEM-VI) THEORY EXAMINATION 2018-19**  
**DIGITAL COMMUNICATION**

**Time: 3 Hours****Total Marks: 100****Note: 1.** Attempt all Sections. If require any missing data; then choose suitably.**SECTION A****1. Attempt all questions in brief. 2 x 10 = 20**

- a. List the advantages of Manchester coding.
- b. Explain the importance of probability of error.
- c. Explain why digital communication is preferred over analog communications.
- d. Explain geometric interpretation of signals.
- e. Calculate the channel capacity of the telephone channel of 3.4kHz for a signal to noise ratio of 30 dB.
- f. Define the Commutative distribution function (CDF).
- g. What is Manchester coding?
- h. Explain the function of Equalizer.
- i. Explain the difference between slow and fast hopping.
- j. What is the condition to justify the orthogonality of two signals?

**SECTION B****2. Attempt any three of the following: 10 x 3 = 30**

- a. (i) Explain with the help of neat diagram, the method for Generation and Demodulation of DPSK.  
 (ii) What are the advantages and disadvantages of M-ary digital carrier modulation?
- b. With the help of block diagram, explain QPSK coherent digital carrier system. Sketch the QPSK waveform for the sequence 1101010010, assuming the carrier frequency to be equal to the bit rate.
- c. A binary communication channel, the receiver detects the pulse with an error Probability  $P_e$ . What is the probability that out of 100 received digits, no more than four digits are in error.
- d. Find the error probability for the multi-amplitude signaling and hence define the relationship between power and bandwidth of the same.
- e. Write short notes on:
  - (i) MUD
  - (ii) OFDM.

**SECTION C****3. Attempt any one part of the following: 10 x 1 = 10**

- (a) With the help of block diagram, explain the signal processing operations involved in a digital communication system.
- (b) Write short notes on:
  - (i) Convolution codes
  - (ii) Central limit theorem

4. Attempt any *one* part of the following: 10 x 1 = 10
- (a) What is hamming distance? Using hamming bound condition explain hamming code.
  - (b) (i) What do you mean by ISI?  
(ii) Explain the Generation and Detection of ASK with neat diagram.
5. Attempt any *one* part of the following: 10 x 1 = 10
- (a) Define the term burst error and error detection. How many redundancy Checks are used in data communication?
  - (b) What is a PN sequence? Draw the PN-sequence generator and define its autocorrelation function.
6. Attempt any *one* part of the following: 10 x 1 = 10
- (a) Plot and compare the probabilities of error for non coherent detection of Binary ASK, Binary FSK and Binary DPS.
  - (b) Show that impulse response of a matched filter is proportional to an inverted and shifted version of the input signal to which filter is matched.
7. Attempt any *one* part of the following: 10 x 1 = 10
- (a) (i) State Central Limit Theorem and explain purpose of this theorem.  
(ii) In an experiment, a trial consists of four successive tosses of a coin. If we define a random variable  $x$  as number of head appearing in a trial, determine  $P_x(x)$  and  $F_x(x)$ .
  - (b) List the advantages of cyclic codes over hamming codes. Construct the systematic (7,4) cyclic code using the generator polynomial  $g(x) = x^3+x+1$ . What are the error correcting capabilities of this code? Construct the decoding table. If the received word is 1101100, determine the transmitted data word.