

Time : 3 Hours**Marks: 80**

N.B.

- 1) Question number ONE is compulsory.
- 2) Attempt any THREE questions from remaining questions.
- 3) All questions carry equal marks.

Q1

- a) What is random variable? Explain mean and variance 5
- b) Compare QPSK and QASK 5
- c) Explain with block diagram Optimum Receiver 5
- e) Syndrome generator and decoder for linear block code 5

Q2 a) A communication system transmits 5 digits over a noisy channel with per digit error probability of 0.01. What is the probability that upto 2 digits will be in error? Also calculate mean and variance of the error. Use Binomial probability distribution. 10

b) Explain Direct Sequence and Frequency Hop Spread Spectrum Techniques. 10

Q3 a) A DMS emits six messages m_1, m_2, m_3, m_4, m_5 and m_6 with probabilities 0.30, 0.25, 0.15, 0.12, 0.10 and 0.08 respectively. Find

1. Huffman code
2. Average code word length
3. Entropy of source
4. Efficiency and redundancy of code. 10
- b) Compare Shannon Fano and Huffman Coding 10

Q4 a) Explain the necessity of line codes. State different types of line codes. Plot power spectral density of NRZ signal. 10

b) Show that the duobinary signalling suffers from error propagation while precoded duobinary signalling doesnot. Explain with encoder and decoder block diagram and decoding logic 10

Q5 a) Draw block diagram of BPSK transmitter and receiver and explain. Sketch signal space diagram and PSD of BPSK. 10

b) The generator polynomial of a (7,4) cyclic code is given by $G(D)=1+D+D^3$ Compute all the non-systematic code words. 10

Q6 Write short notes on following 20

- a) Central Limit Theorem
- b) Eye Pattern
- c) Gray Code
- d) Correlator