

Q.P.No. : 6278

Total Marks: 80

Duration: 3 Hrs

N.B: Question No 1 is compulsory.
Attempt any three questions out of remaining five.
All questions carry equal marks
Assume Suitable data, if required and state it clearly.

Q1)

- (20)
- Describe in brief four types of Trade-Offs that can be accomplished by using Error correcting code.
 - How is signal bandwidth spread in spread spectrum modulation?
 - What is Entropy of an information source? When is entropy maximum?
 - What is gram Schmitt orthogonalization procedure? Explain?
 - Distinguish between Matched filter and Correlator.

Q2) a) Consider a DMS $S = (S_1, S_2, S_3, \dots, S_7)$ with following message probabilities (10)

S_i	S_1	S_2	S_3	S_4	S_5	S_6	S_7
$P(S_i)$	0.40	0.25	0.15	0.10	0.05	0.03	0.02

Encode the source using Huffman algorithm. Find the average code length and efficiency.

b) Explain the necessity of line codes for data transmission. State different types of line codes. Plot power spectral density of NRZ signal. (10)

Q3) a) State and explain maximum likelihood decision rule. Explain the function of correlator receiver. (10)

b) Derive the expression for error probability of BPSK system with coherent detection. (10)

Q4) a) Draw and explain the block diagram of QPSK transmitter. Sketch the waveforms at the output of each block of the transmitter. (10)

b) Consider a (7, 4) code whose generator matrix is

(10)

$$G = \begin{bmatrix} 1 & 1 & 1 & 1 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 & 0 & 1 & 0 \\ 1 & 1 & 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

- 1) Find H , the Parity – Check matrix of the code.
- 2) Compute the syndrome for the received vector 1 1 0 1 1 0 1. Is this a valid code vector?

Q5) a) Design Encoder for an (8,5) cyclic code with generator $g(x) = 1+x+x^2+x^3$. Use this encoder to find the code word for the message (10101) in systematic form. (10)

b) Draw the state Diagram and Tree diagram for $L=3$, rate $=\frac{1}{3}$ convolution encoder generated by $g_1(x) = x+x^2$, $g_2(x) = 1+x$, $g_3(x) = 1+x+x^2$. (10)

Q6) a) What are two basic types of spread spectrum systems? Explain the basic principle of each of them. (10)

b) Explain in detail 16-QAM transmitter and receiver system. Draw and explain signal constellation diagram for 16-QAM. (10)