

Duration : 3Hrs

Marks: 80

N B. :- Questions no. 1 is Compulsory.**Attempt any 3 out of the remaining five****All questions carry equal marks****Assume suitable data if required & state it clearly**

- Q. 1 Attempt any Four (5 Marks Each)
- Write a note on Correlator Receiver.
 - Compare MSK & QPSK
 - For a binary bit stream 11010110, Draw the Line codes for Unipolar RZ, Bipolar NRZ, Bipolar RZ, Polar RZ & Manchester.
 - What is Inter Symbol Interference? Explain in brief.
 - State Shannon Hartley Theorem. Derive the condition for upper limit of channel capacity
- Q. 2a A discrete memory less source generates symbols every one millisecond as given below:
- | S | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 |
|---|-----|-----|-----|------|------|------|------|------|
| P | 1/2 | 1/8 | 1/8 | 1/16 | 1/16 | 1/16 | 1/32 | 1/32 |
- Construct Shannon-Fano code. Also find the source entropy, information rate and code efficiency & redundancy (10)
- Q. 2b Why is MSK called Minimum. Derive this condition for F_h & F_l . Draw MSK waveforms for (m=7) with 101010101 (10)
- Q.3a For (7,4) cyclic code, $g(x) = x^3+x^2+1$. Design Encoder for 1110 & Decoder for 1010111. (10)
- Q.3b Find Convolutional Code for $g_1(101)$, $g_2(110)$, $g_3(111)$. Draw State Table, State Diagram, & Trellis Diagram. Find code word for 1101101 (10)
- Q.4a State the difference between BASK, BFSK and BPSK Modulation Systems based on following parameters:
- Bandwidth requirement & Spectral Efficiency
 - Type of Geometrical representation & Euclidian Distance
 - Modulated waveforms
 - Noise Immunity
 - Line Coding technique used for binary signal conversion
- (10)
- Q.4b Draw & Explain M-ary PSK transmitter & Receiver. Draw its spectrum & find BW (10)
- Q.5a Discrete Memoryless Source has an alphabet of five symbols with their probabilities as shown.
- | Symbol | S1 | S2 | S3 | S4 | S5 |
|-------------|------|------|------|------|------|
| Probability | 0.16 | 0.23 | 0.35 | 0.10 | 0.16 |
- Construct a Huffman Code for each symbol and determine following parameters.
- Entropy
 - Average code word Length
 - Code efficiency
 - Redundancy of the code.
- (10)

- Q.5b Illustrate 16-QAM & derive its Euclidean distance (10)
- Q.6a State the Nyquist's criteria for ISI & the practical solutions to overcome ISI (10)
- Q.6b Draw the Transmitter & Receiver for BFSK and BPSK Modulation Systems. (10)
