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)
- a)   Write a note on Correlator Receiver.
- b)   Compare MSK & QPSK
- c)   For a binary bit stream 11010110, Draw the Line codes for Unipolar RZ, Bipolar NRZ, Bipolar RZ, Polar RZ & Manchester.
- d)   What is Inter Symbol Interference? Explain in brief.
- e)   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 Fh & Fl. Draw MSK waveforms for (m=7) with 101010101   (10)

Q.3a   For (7,4) cyclic code, $g(x) = x3+x2+1$. Design Encoder for 1110 & Decoder for 1010111.   (10)

Q.3b   Find Convolutional Code for g1(101), g2(110), g3(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:
  a. Bandwidth requirement & Spectral Efficiency
  b. Type of Geometrical representation & Euclidian Distance
  c. Modulated waveforms
  d. Noise Immunity
  e. 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.
a. Entropy
b. Average code word Length
c. Code efficiency
d. 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)

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